

JDS Labs

cMoyBB v2.02 Assembly Guide

Required Tools

- Soldering iron with a small tip
- Thin diameter solder (0.032" or smaller highly recommended)
- Diagonal cutters
- Small flathead screwdriver
- 6-32 Hex screwdriver
- 1/4 inch hole punch
- Hot glue gun and hot glue, or other method of electrical insulation
- Dry-Erase marker
- High concentration Isopropyl alcohol (> 94%)

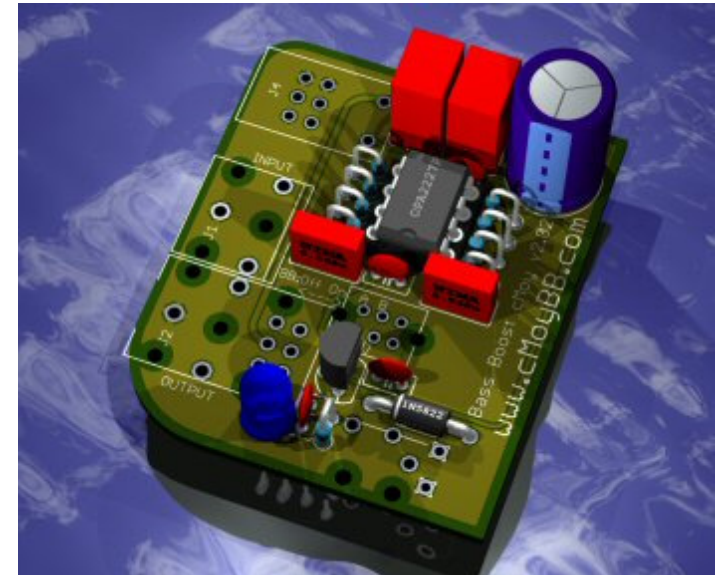
Pre-Assembly

In addition to the reference images on this page, you will need to refer to the [BOM](#) and layout PDFs during your amplifier's construction:

- Printable [Silkscreen Layer](#)
- Printable [Enclosure Jack Cutout Pattern](#)
- Printable [Assembly Instructions](#)

Feature Substitutions and Omissions

- Diode D2 is normally omitted (leave its spot empty -- do not short). D2 is reserved for over-voltage protection and is generally unnecessary.
- An STX-3100-3C audio jack can be used in place of the STX-3100-9N jack for part J2. The auto on/off feature must be bypassed by shorting all unused pins in J2.
- The internal bass boost switch can be substituted for other DPDT switches or a 50k Ω potentiometer. Connection diagrams and details are given below.
- To disable bass boost, short the CB_L and CB_R terminals, independently.

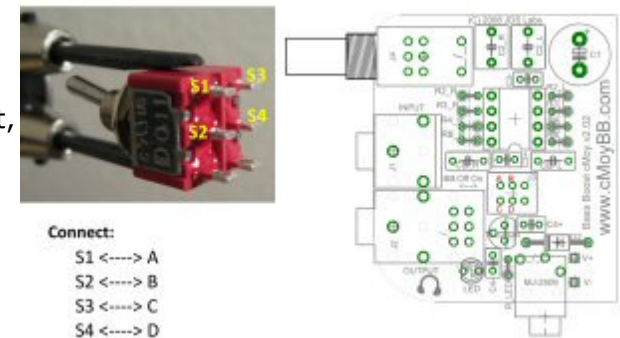


- To omit the DC jack, short the MJ-2509 pads between the symbol "_/_" on the printable Silkscreen Layer.

PCB Assembly (20-40 minutes)

Note: Solder after each step, then trim off excess leads with diagonal cutters. Review the complete instructions before beginning, especially if you plan to omit, bypass, or modify any features.

1. Begin by mounting the 8-pin DIP socket on the board. Be sure to match to socket's orientation notch to the label on the PCB. Bend two adjacent socket pins on the bottom side of the circuit board to keep it in place.
2. Place capacitors C3+, C3-, C4+, and C4-. These capacitors are non-polar, i.e., they can be inserted in either direction.
3. Place all resistors:
R2_L and R2_R
R3_L and R3_R
R4_L and R4_R
RB_L and RB_R
R_LED
4. Place capacitors C2_R, C2_L, CB_R, and CB_L. These capacitors are also non-polar.
5. Mount the bass boost toggle switch in location J3. Direction is unimportant. Hold the switch in place and carefully bend adjacent pins as in step 1. Alternatively, you may use four short 22 gauge wires to connect an enclosure mountable switch, as pictured at right, or a bass boost control potentiometer as described at the bottom of the page.
6. Push the Texas Instruments TLE2426CLP IC into location U2. The center pin will bend easily and allow you to slide the component into place.
7. Place capacitor C1. Electrolytic capacitors are polarized; the longest lead is positive (+). If you use an especially tall capacitor (14mm or taller), make sure it will fit in the enclosure before soldering. The capacitor may be rotated 90 degrees if height is a problem.
8. Insert all jacks: J1, J2, J4, J5. The extra six pins on the STX-3100-9N audio jack (component J2) are sensitive to heat damage. Solder each pin in under 1.5 seconds, with 5+ second cooling periods between soldering each pin.
9. Place the LED, noting polarity. Bend the LED forward 90 degrees so that it is aligned with the DC jack. It will be helpful to bend the LED's pins before soldering. LEDs are also sensitive to heat damage. Solder quickly.
10. Insert the red lead of the 9V battery connector into terminal V+ and the black lead into terminal V-. If you wish to braid the battery



connector wires, do so before attaching the connector to the PCB.

11. Insert the OPA2227PA operational amplifier (or other opamp) into the DIP socket, once again observing socket orientation.

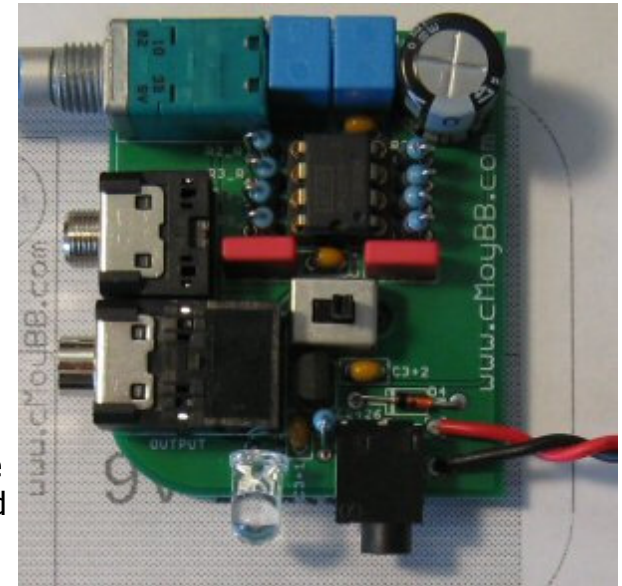
Post-Soldering Tests (5-10 minutes)

Now is a good time to test your new cMoyBB. Connect a new 9V battery and a cheap pair of headphones to the amp. Barely turn the volume knob on and check for obvious faults: Ensure you hear silence from your headphones and that no chips or components are overheating (everything should be cool to the touch). Engage and disengage the bass boost switch and check that no problems arise.

Assuming this preliminary test passes, connect the amp to a cheap source to verify its full functionality.

DC offset can optionally be verified by measuring the voltage at each of the output channels with respect to the audio ground. Offset should not exceed 20mV with bass boost turned on. Typically, DC offset for the cMoyBB with an OPA2227PA opamp is below 5mV with bass boost on and less than 3mV with bass boost off.

Once you have a working amplifier, you should clean the PCB. Use rubbing alcohol and an old toothbrush to scrub excess flux from the bottom of the circuit board. See [Tangent's video tutorials](#) for help. Failure to clean the PCB can eventually lead to corrosion of the PCB's 74 soldering pads.



Casing Assembly (10-30 minutes)

1. Print the [enclosure pattern](#) and set an Altoids tin atop the pattern. Use a Dry-Erase marker to mark approximate jack locations and the edge of the enclosure's lid.
2. Punch holes at the marked locations with a hole punch. Ensure the holes will not interfere with the lid (remember to account for the nut on the input jack). Holes for the audio jacks, the LED, and the DC jack should require a single punched hole. The volume potentiometer hole will need to be enlarged by punching multiple holes. It's sometimes helpful to slightly enlarge the input jack hole as well. Both of these unsightly holes will be hidden by the volume knob and jack nut, respectively.
3. Use some method to insulate the bottom of the PCB from shorting out to the tin. For example, apply hot glue to

various spots on the bottom of the PCB, but avoid gluing soldering pads. Other enclosure insulation ideas include: foam, plastic, cardboard, or layers of thick tape.

4. Slide the assembled PCB into the tin, potentiometer first and DC jack last. Even if the holes and jacks line up well, the PCB will need to be pushed into place with light to moderate force.
5. Screw the STX-3100-3C's included nut onto the threaded 3.5mm jack.
6. Insert the LED grommet (see tip below).
7. Shut the enclosure lid and position the volume knob onto the RK097 potentiometer shaft. Tighten the knob's 6-32 hex screw.
8. Attach a piece of sticky sided foam inside the tin as a cushion for the battery.

Tips:

- Do not use the washer or nut with the Alps RK097 potentiometer. The input, output, and DC jacks are arranged so that the amplifier will already be securely positioned without the volume potentiometer. The RK097's washer & nut are too large for the tin's lid to close easily (though it is possible). As previously mentioned, the potentiometer's hole and threads will be covered up once a volume knob is attached.
- It is usually possible to push the LED grommet in place. If not, trim off one of the two thickest plastic "legs." The grommet should still stay in place.
- One customer suggests adding a drop of hot glue to the 9V battery snap leads (glue V+ and V- on the PCB). This added support will help prevent the wires from being pulled loose when changing batteries.

Suggested Modifications

Capacitors:

- Choose the most expensive varieties from the BOM.

Bass Boost Control Knob:

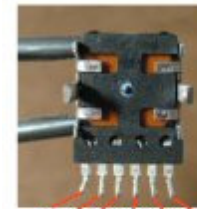
- Omit the bass boost switch and both R_B resistors (do NOT "jumper" them; leave them out). Use four short 22 gauge wires to connect pins A, B, C, and D to a 50k Ω potentiometer and a second knob. This results in adjustable bass boost via a control knob. Terminal connections for Vishay and Panasonic 50k Ω potentiometers are given below.

Tip: Try to minimize wire length. Unnecessarily long wires will add inductance and capacitance to the feedback loop, potentially causing unwanted noise or oscillation.



Connect:

(G2 & O2) <-> A
 I2 <-> B
 (G1 & O1) <-> C
 I1 <-> D



Connect:

(I2 and O2) <-> A
 G2 <-> B
 (I1 and O1) <-> C
 G1 <-> D

