# Noir Headphone Amp: Build Instructions

25 Sept 2019  revision F


Congratulations on your decision to construct a Noir headphone amp!  Noir is an easy-to-build project that can be completed in a couple of afternoons, even by first-time DIYers.  For easy stuffing and soldering, it contains only one printed circuit board, upon which all components are mounted, using builder-friendly thru hole packages.  Components *and their values* are clearly marked in silkscreened text on the top side of the board, providing a convenient double-check during assembly.  Off-board connections to panel mounted devices (volume control, input jacks, etc) are arranged around the perimeter of the circuit board, so they are directly aligned with their off-board destination.  This reduces wire length and makes “fly wire” connections easy to accomplish.  You’ll have a lot of fun building your Noir, and you’ll be delighted with the sound it delivers.  Let’s get started.

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# TOOLS NEEDED

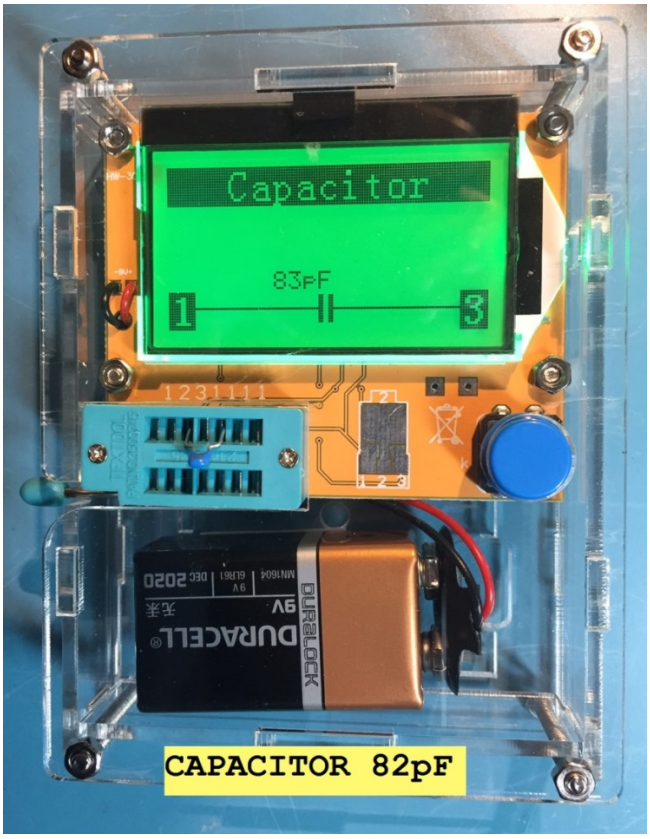
To assemble a Noir amplifier, you will need

| | |
|---|---|
| A Good Soldering Iron | Eutectic Solder |
| Flush-Cut Dikes | Wire Strippers |
| Long-Nose Pliers | Phillipps Head Screwdriver |
| Wire Cutters | Digital Multi Meter |
| Third Hand Jig or Panavise | Small Adjustable Wrench |
| Metric Hex Key Wrench | Blue Painters (“Masking”) Tape |

Not absolutely required, but very VERY strongly recommended:

eBay “Mega328” Component Tester with Acrylic Case

This little device measures resistors, capacitors, and inductors. It tells you whether the tiny little capacitor in your hand, whose tiny printing is unreadably small, is 100 pF or 2200 pF or 2.2 uF. It prevents a huge number of stuffing and soldering errors. Every diyAudio builder should own one. Fortunately they are not expensive: about USD 17.00 including case and shipping to the US. Search eBay, you’ll find many.



## MISC HARDWARE (nuts, bolts, washers) NEEDED

Mouser.com does carry a small selection of nuts, bolts, etc., but their prices are extremely high compared to a local hardware store or to the assortment kits sold on Amazon. Therefore the Mouser BOM does not include these mechanical parts, and you'll need to purchase them at a hardware store (or from Amazon). They are used to mount the PCB to the chassis floor, and to attach the MOSFETS to heatsinks

6 of: metric M3 hex nuts

6 of: M3 star washers

4 of: flat washers for M3 or 4-40 or 1/8" bolts

4 of: Phillips pan-head M3 bolts, length = 20mm or 25mm or 30mm {for PCB mount}

2 of: Phillips pan-head M3 bolts, length = 10mm {for MOSFET-to-heatsink attachment}

8 of: Cap Socket (Hex head) M4 bolts, length = 10mm {read discussion below}

1 of: volume control knob; eBay has hundreds to choose from, some very elaborate

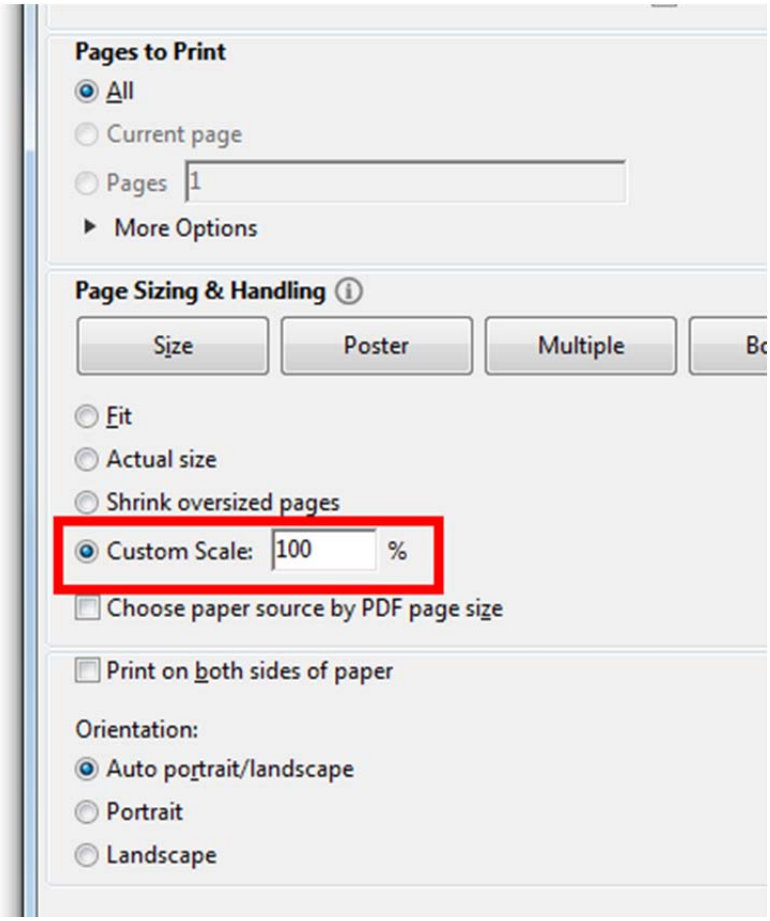
The ModuShop chassis from the diyAudio Store includes eight M4 bolts, whose job is to secure the front panel and the rear panel. They are flat head types that fit into countersunk holes. These are perfect if you decide to use the brushed aluminum front panel and back panel, and to drill all holes for volume control, headphone jack, etc., on your own drill press.

However if you intend to use the pre-drilled front and back panels made of black PCBoards, flat head bolts are not the best choice, because the PCB material is not countersunk. Instead, I recommend using M4 x 10mm Cap Socket screws with Hex Heads. These are sold inexpensively on Amazon (120 pieces for $12.38), search for "M4x10mm Thread 304 Stainless Steel Hex Socket Head Cap Screw Bolt". If you prefer to buy from your local hardware store, they look like this. You need eight pieces: four on the front panel, and another four on the back panel. See the photo of a completed Noir on page 1 of this document.

# PREPARING THE DRILLING TEMPLATE

The very last page of this document is a printable drilling template. Print it at 100% magnification, and ***double check the on-paper dimensions with a ruler***. Sometimes Adobe Acrobat scales the data it sends to a printer, resulting in incorrect final sizes on the printed page. Acrobat performs this scaling silently, with no warning, so it's the user's responsibility to check the final sizes on the printed page.

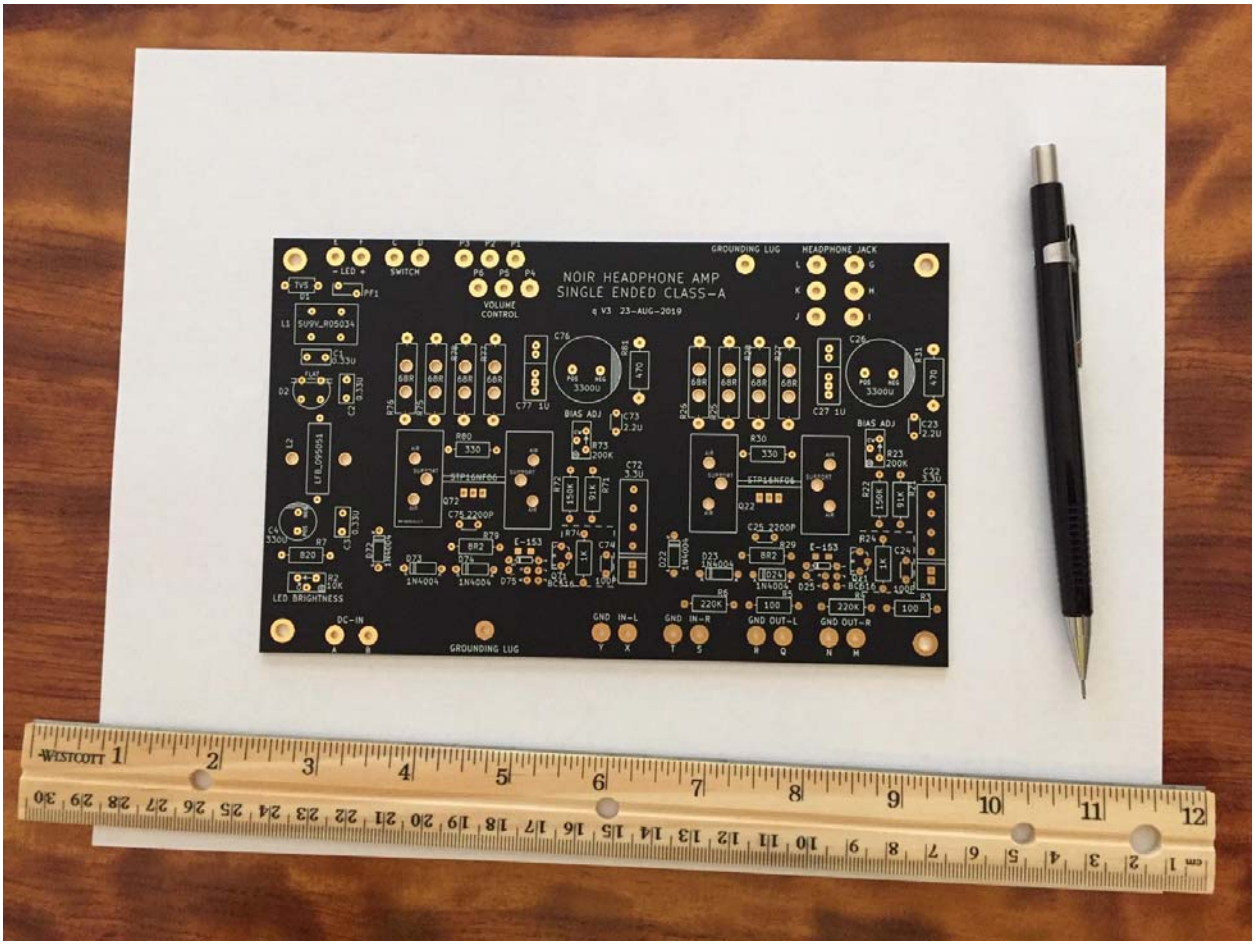
At least on my installation of Acroat Reader in a Windows computer, this is the necessary step to make Acrobat print without scaling the data:




Try it and see: on your printed page, if the center punch marks are exactly 170mm apart (horizontal) and 100mm apart (vertical): congratulations, everything worked correctly. If not, you can manually create a template reasonably quickly, using the steps shown on the next 2 pages.

To draw your own drilling template (if your printer's output is somehow incorrectly scaled):

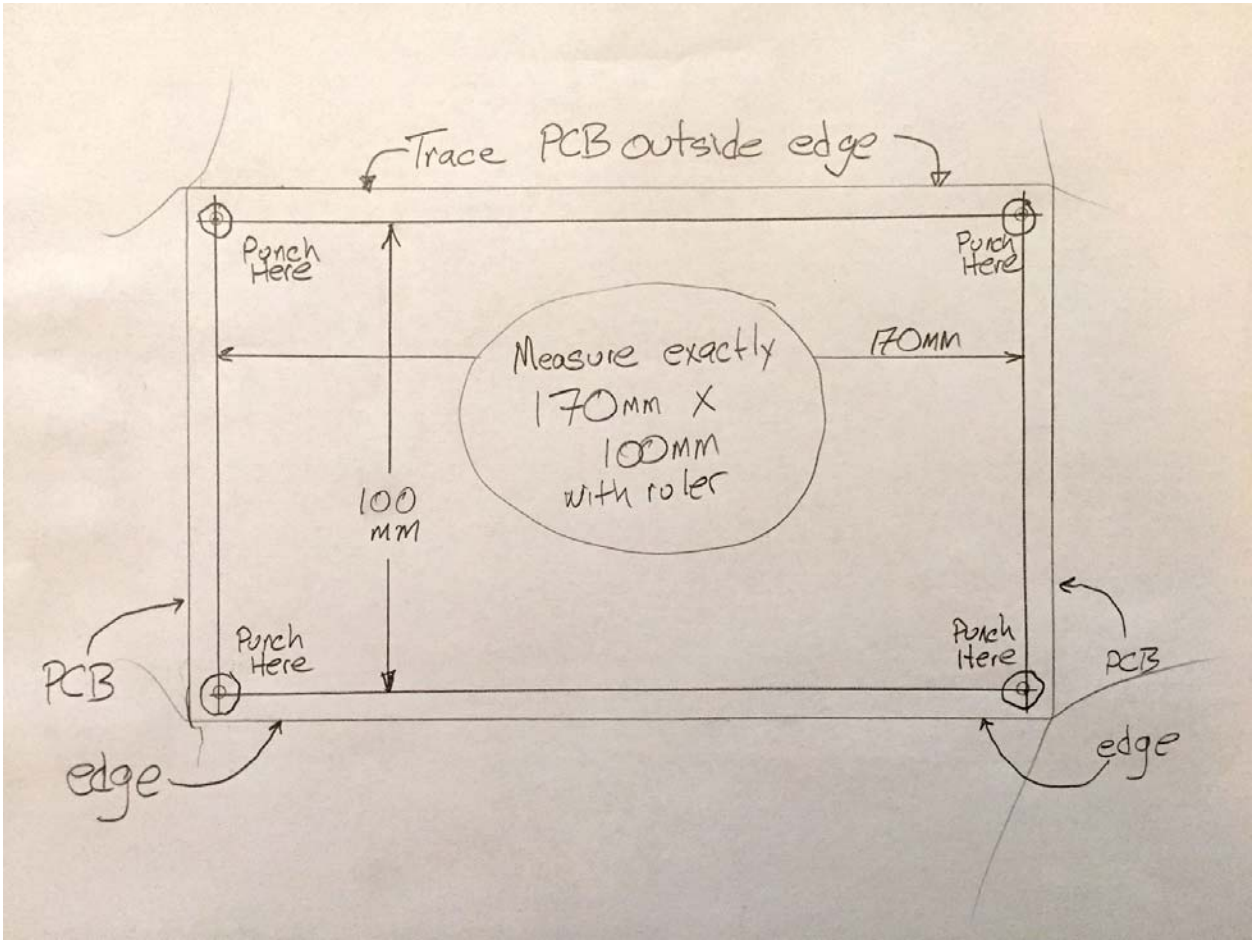
Start with the Noir printed circuit board, a piece of paper, a pencil, and a ruler. Center the PCB on the paper, hold it steady, and use the pencil to trace the outline of the board



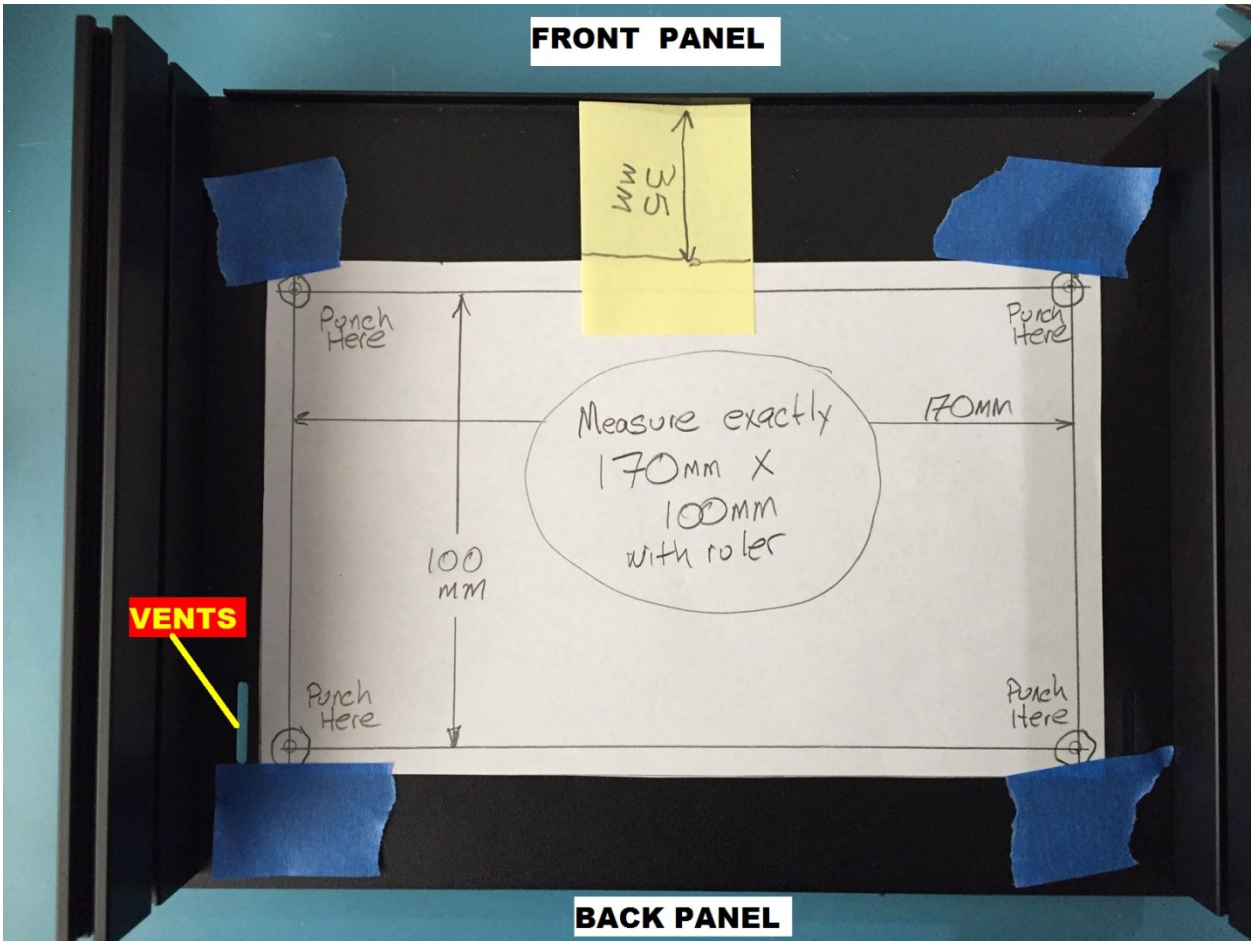
Then, trace the holes at the corners of the board.

On the PCB, the center-to-center distance of the mounting holes is 170mm (horizontal) and 100mm (vertical). Use the ruler to draw a rectangle through the traced holes, such that the rectangle's sides are EXACTLY 170mm by 100mm. You will center-punch the drill holes at the corners of this rectangle.

Use scissors to cut out the paper template, along the lines of the PCB edges.



# DRILLING AND SANDING THE PCB MOUNTING HOLES

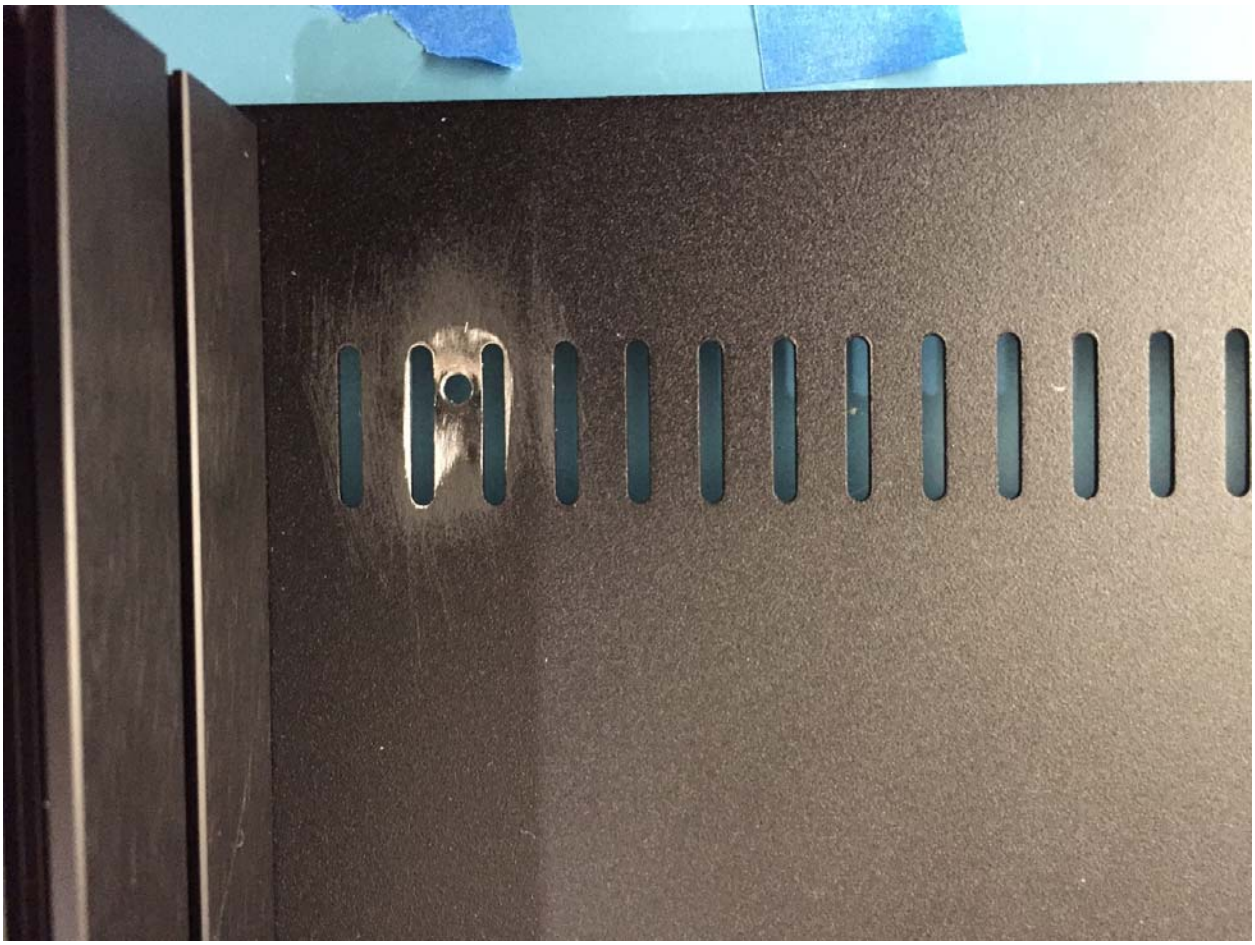



Tape the template to the bottom plate (floor) of the chassis as shown. It should be centered left-to-right, and it should be 35mm from the front panel bent "lip" of the chassis bottom plate.

Advanced builders will want to peek two photos ahead, to observe that it is possible to arrange the circuit board left-to-right so that one of the drill holes falls exactly in between ventilation slots. This hole is easier to drill.

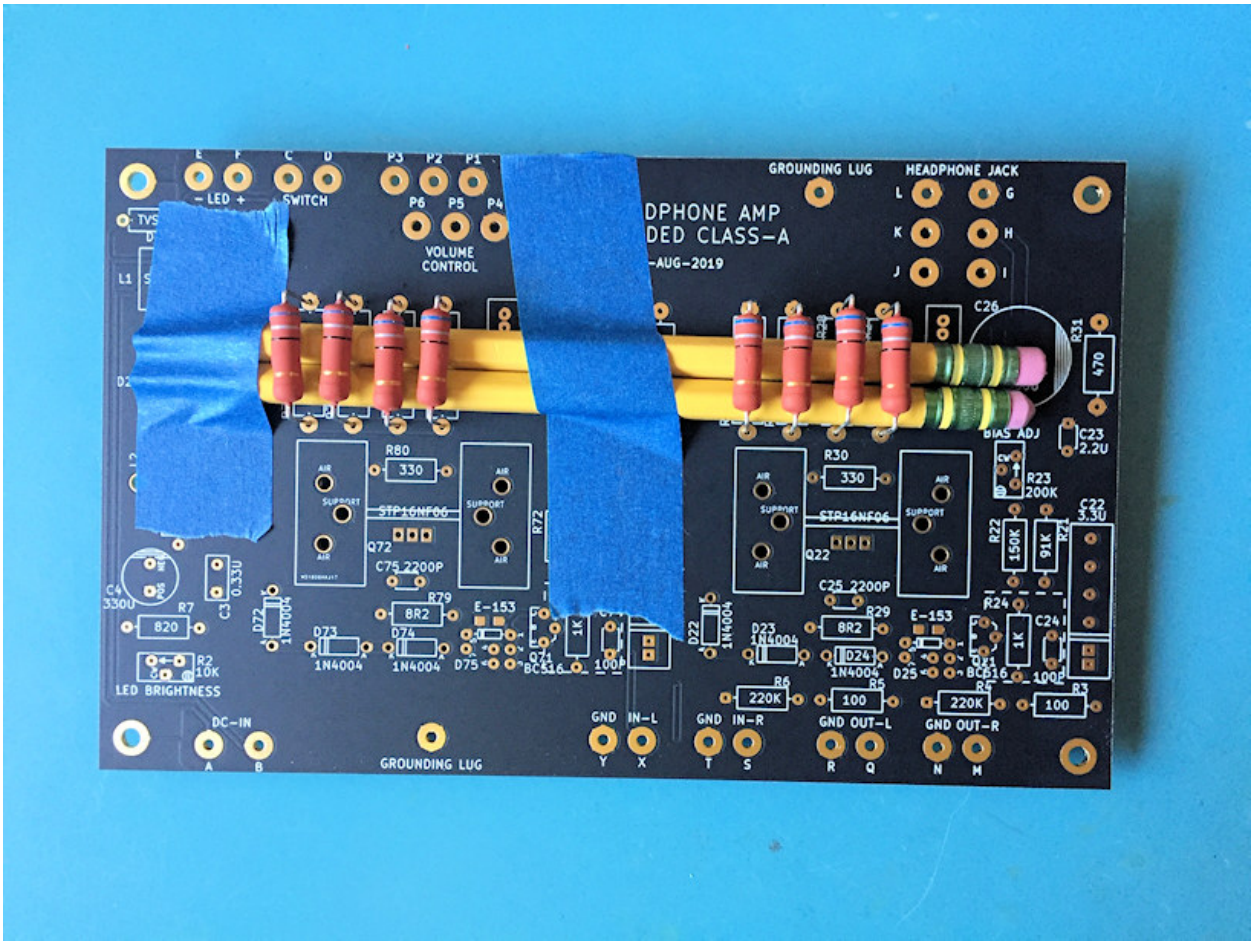
Caution: the chassis is made of sheet metal and can easily become warped by the pressure of center punching and/or drilling. Always support it from below with a large solid piece of scrap wood, when drilling or punching.

After drilling, use relatively coarse sandpaper to remove the black paint and expose the shiny steel, surrounding the drill holes, on the inside of the chassis.  (No need to do it on the outside of the chassis).  This exposed metal lets the mounting posts make good electrical contact to the bottom plate, extending the Faraday Cage which surrounds Noir and blocks hum.



Here's a close-up after drilling and sanding.  Please notice that the metal has been deflected (warped!) downward, unfortunately.  I put a huge stack of newspapers between the metal and the piece of wood underneath, when drilling.  This was a mistake, the newspapers had a lot of "give" but what I wanted was Support.  The metal deflected.  Oops!

# INSTALLING THE 3-WATT RESISTORS




Noir includes eight 3-Watt resistors: R25-28 and R75-78. All eight resistors are 68 ohms. These are the first components to install on the Printed Circuit board.

As seen in the photo above, a pair of pencils is used to elevate the resistors above the surface of the PCB for better ventilation. Be sure to put the pencil erasers on the right hand side (farthest away from “L1” footprint), otherwise they will bind and not easily slide beneath the resistors when you remove the pencils.

Bend each resistor’s leads to match the spacing of the drill holes. Stuff each resistor taking care to orient them all the same way: blue band toward front panel, gold band toward back panel. On the back (solder) side of the PCB, bend the leads outwards to hold each resistor in place. Solder either four resistors at a time, or all eight resistors at once. Then trim the leads flush and slide out the pencils.

# STUFFING AND SOLDERING THE PCB (in sequence)

The very first thing to do is: print a copy of the Noir circuit schematic on paper. You will refer to the schematic at every step, when choosing components to stuff and solder. Let's take an example. If you are about to stuff and solder component "R29", find R29 on the schematic. What is its correct value as shown on the schematic (answer: 8.2 ohms). Take the resistor R29 in your hand and measure its resistance, either on a DMM (good) or on a Mega328 component tester (much better). Are you holding an 8.2 ohm resistor in your hand, or did you pick up the wrong resistor by mistake? Thank goodness you measured!

Continuing the example: bend R29's leads and stuff it into the PCB at the R29 position marked on the white silkscreen graphic. Solder and trim its leads. Now, make a mark on component R29 in the schematic. I use a yellow highlighter pen; you may prefer to put a red check mark across the component, or to circle it, or some other approach. The idea is to keep track of what has, and what has not, been installed. It helps you see what remains to be done, and it forces you to look at the schematic again and again. The schematic is the roadmap for Noir, you need to refer to it constantly.

Keeping that procedure in mind, here is the recommended sequence of stuffing and soldering:

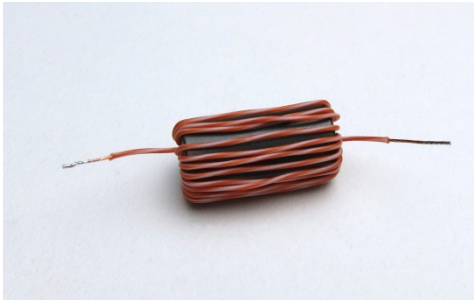
Part 1. Stuff and solder the Power Supply components at the left edge of the board.

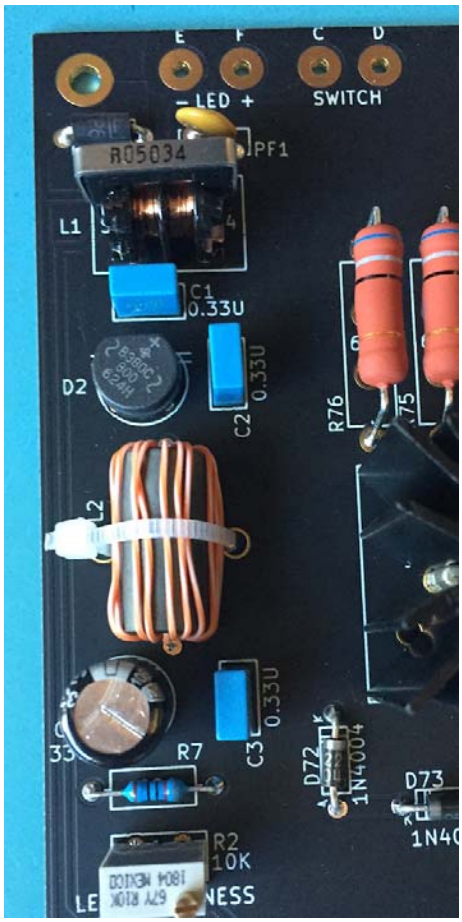
A. R7, C3, C2, C1, D1, D2: Measure each resistor and each capacitor on the Mega328. After verifying it is the correct value, stuff and solder and trim leads. Then do the next one.

B. PF1, C4, R2(trimmer): Measure on Mega328, stuff, solder, trim leads

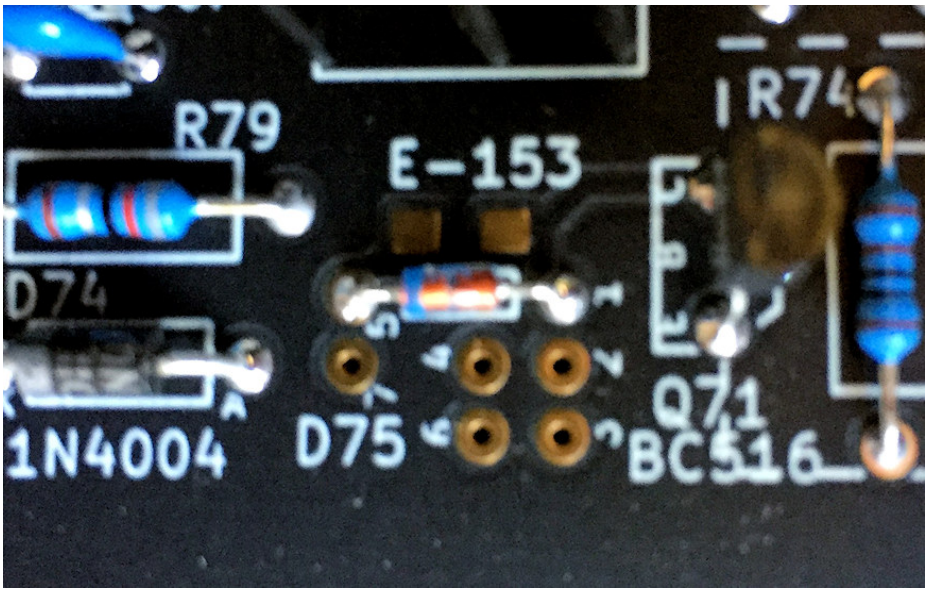
C. L1: stuff, solder, trim leads.

D. Wind 11 turns of AWG-28 through the center hole of ferrite core L2. If 11 complete turns won't fit through the hole, wind as many as will go. Trim ends to length, strip, and install in PCB. Solder wire ends and secure the assembly with a cable tie, as shown in the following photos.






Part 2. Stuff and solder the current regulator diodes D25 and D75. These have an unusual PCB "footprint" with lots of test points and not-used holes nearby. The blue band end ("cathode") of this diode goes into hole 5, and the other end of this diode ("anode") goes into hole 1. Just as shown on the white silkscreened printing on the PCB



Part 3. Stuff and solder the four output jack support resistors, R3-R6. They are located at the bottom right of the PCB. Measure the value on Mega328, stuff, solder. Repeat four times.

Part 4. Stuff and solder all remaining fixed resistors for the Left amplifier channel, namely R71-R81. Omit trimmer R73 for now, and recall that you already soldered R75-R78. Measure their resistance before stuffing.

Part 5. Stuff and solder the remaining diodes and small capacitors for the Left amplifier channel.

A. D72, D73, D74: stuff, solder, trim leads

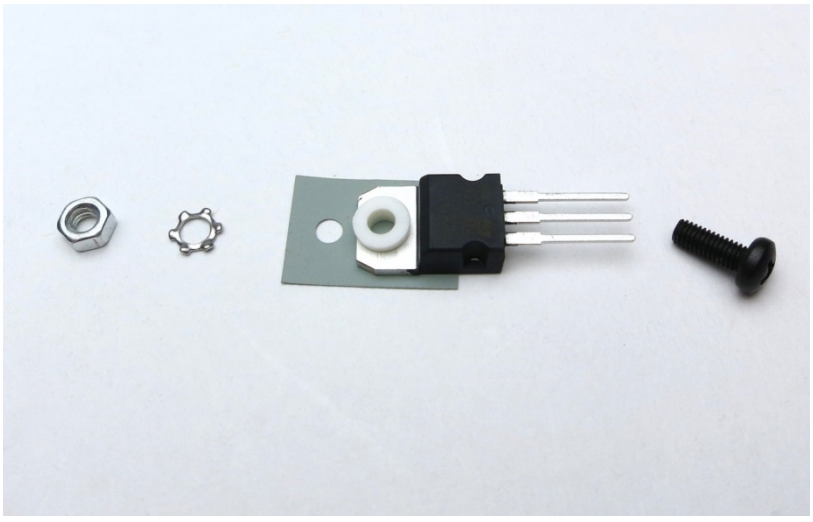
B. C73, C74, C75, C77: Measure on Mega328, stuff, solder, trim leads

Part 6: Stuff and solder the large capacitors and the trimmer potentiometer for the Left amplifier channel: C72, C76, and R73.

Part 7: Mount a TO-92 heatsink onto transistor Q71. Stuff into PCB, leaving about 1cm long leads between PCB and transistor body. Solder and trim leads.

Part 8: Attach a heatsink to each of the power MOSFETs (Q72 AND Q22). Create both MOSFET-heatsink assemblies (but don't solder!) in this one step. See the photos below.

A grey "Sil-Pad" insulator is placed between the MOSFET's backside metal tab, and the heatsink. An insulated Shoulder Washer a/k/a/ Bushing prevents the M3 bolt from making electrical contact with the metal tab. Then a star washer and M3 nut secure the assembly to the heatsink.



Part 9. Stuff one of the just-completed MOSFET-heatsink assemblies, into position Q72. The silver colored pegs on the bottom of the heatsink, fit into the holes on the PCB labeled "SUPPORT". Using lots of flux and lots of time, solder the two support pegs to the PCB. Then solder the three leads of the MOSFET to the PCB. Trim the MOSFET leads but leave the large support pegs alone.

Part 10. Stuff and solder all remaining fixed resistors for the Right amplifier channel, namely R21-R31. Omit trimmer R23 for now, and recall that you already soldered R25-R28. Measure on Mega328 before stuffing.

Part 11. Stuff and solder the remaining diodes and small capacitors for the Right amplifier channel.

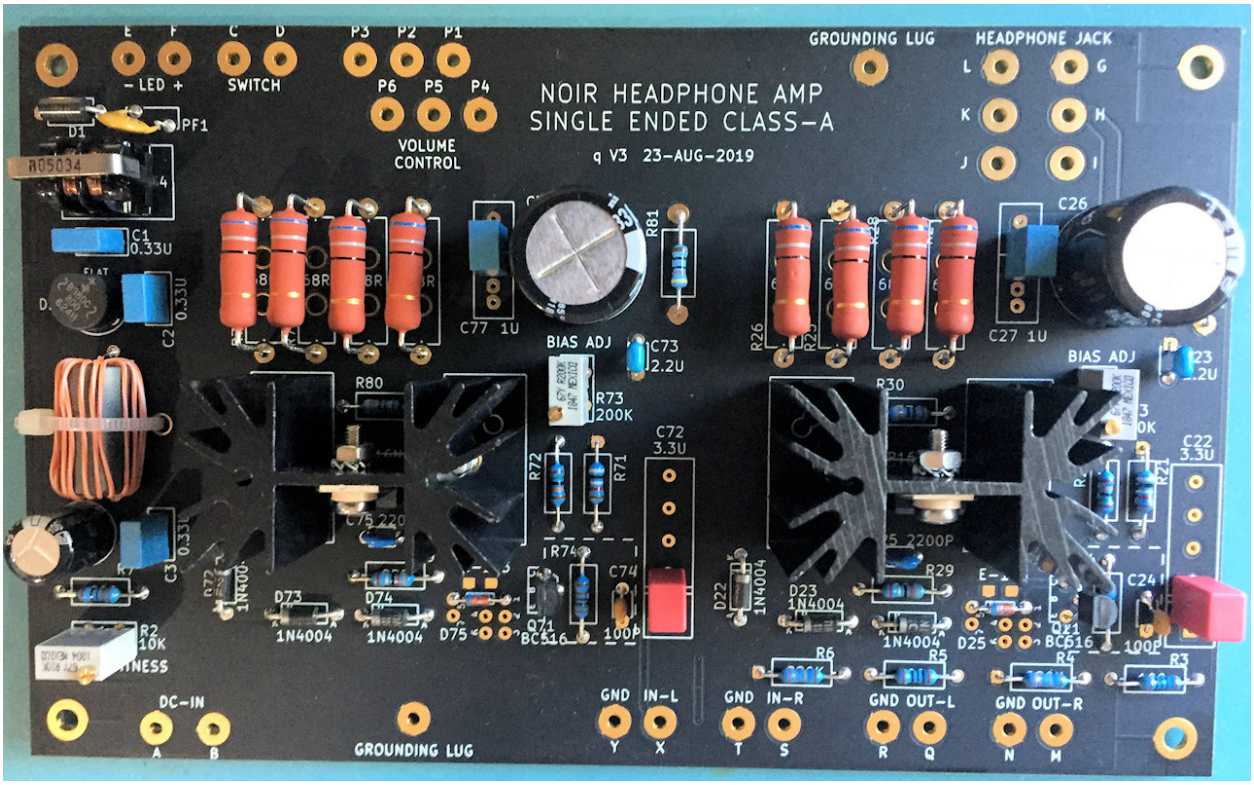
A. D22, D23, D24: stuff, solder, trim leads

B. C23, C24, C25, C27: Measure on Mega328, stuff, solder, trim leads

Part 12: Stuff and solder the large capacitors and the trimmer potentiometer for the Right amplifier channel: C22, C26, and R23.

Part 13: Mount a TO-92 heatsink onto transistor Q21. Stuff into PCB, leaving about 1cm long leads between PCB and transistor body. Solder and trim leads.

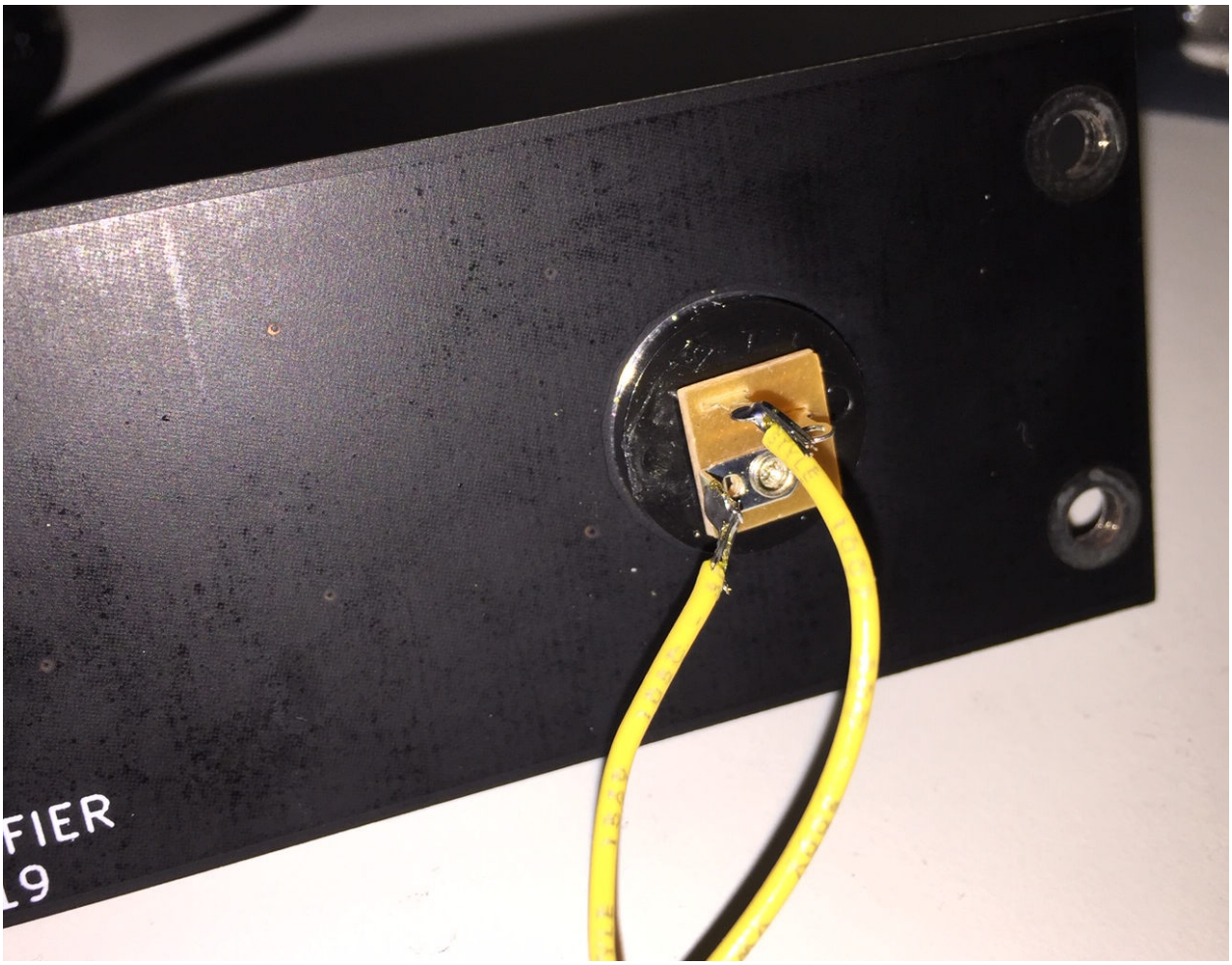
Part 14. Stuff the other MOSFET-heatsink assembly into position Q22. The silver colored pegs on the bottom of the heatsink, fit into the holes on the PCB labeled “SUPPORT”. Using lots of flux and lots of time, solder the two support pegs to the PCB. Then solder the three leads of the MOSFET to the PCB. Trim the MOSFET leads but leave the large support pegs alone. Your board should now look like this:



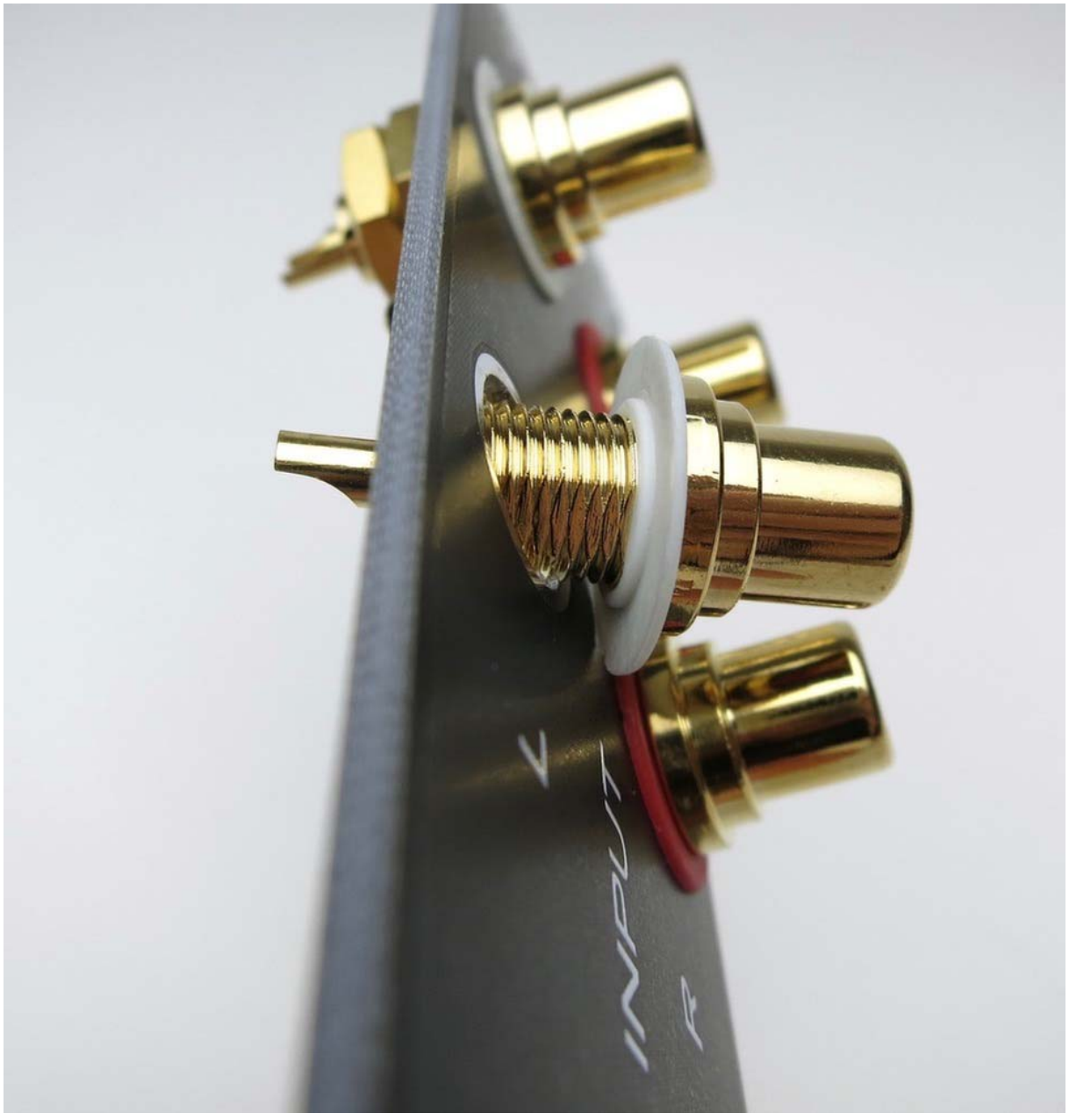
# ASSEMBLING THE REAR PANEL & FLY-WIRES TO PCB

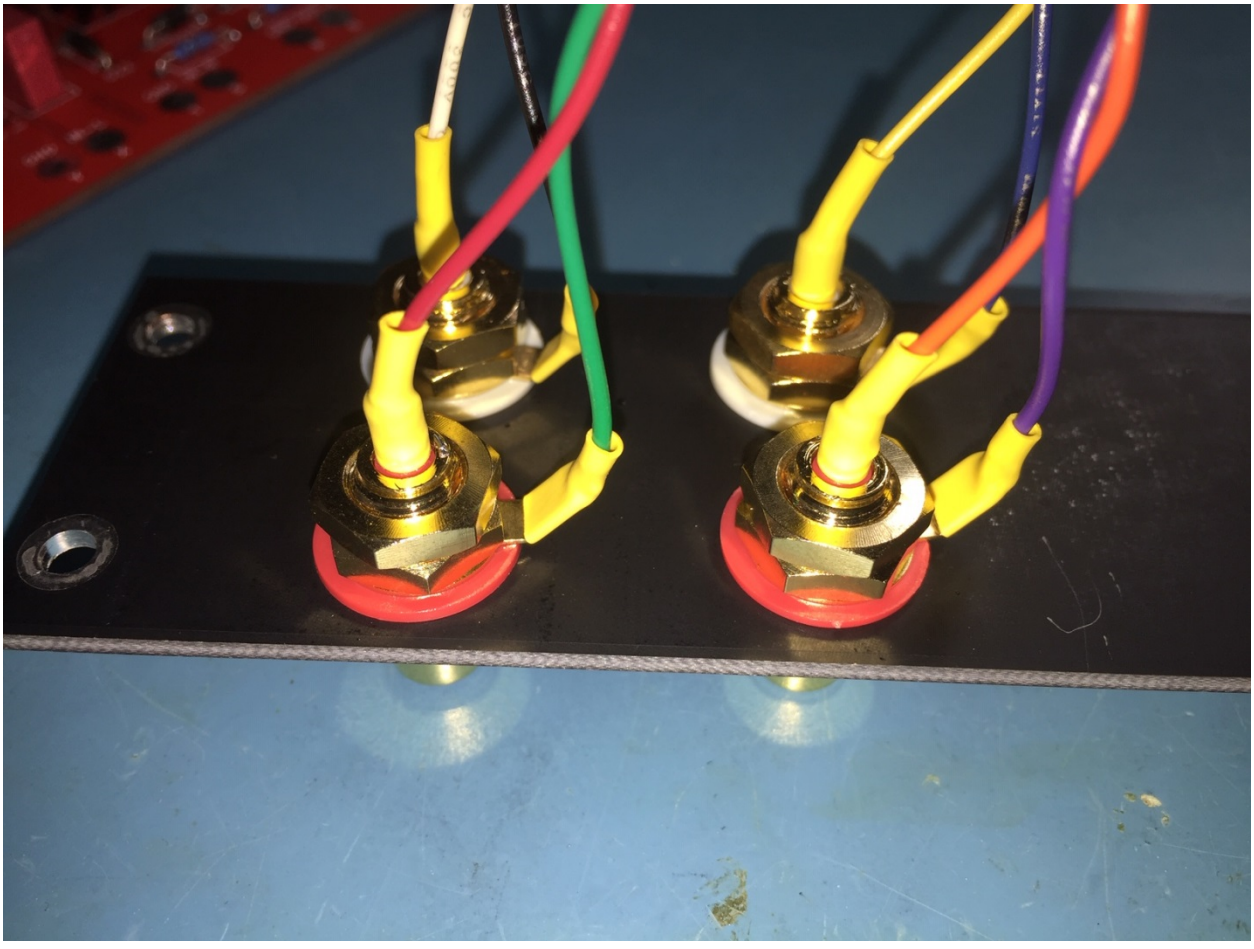
A word about fly-wires in the Noir project: you can use either stranded wire or solid-core wire to make the PCB-to-panel “fly-wire” connections; either will work. However, after building five or six copies of Noir, I have decided I have a slight preference for solid-core fly wires. I find they stay in place better when soldering, it’s easier to make twisted pairs of signal-and-ground, it’s easier to bend them into a desired path and keep that shape, and they seems to resist breaking better. So I use insulated AWG-26 solid core wire for the fly-wires in my Noirs.

Noir’s DC input “barrel jack” mounts to the rear panel. The jack has three terminals but we only connect to two of them; the “switched” feature of the jack is not used by Noir. Plug your wall wart into the jack and use your voltmeter to find the two pins that carry 24V DC. Those are the two pins you want to solder wires onto. It doesn’t matter which one carries plus and which one carries minus, the circuit board design accepts both. Thus it doesn’t matter whether the wall wart’s plug is center-positive or center-negative; Noir handles either one. Please see the photo below. Initially cut the wires too long, and trim them to length later. You could add heatshrink tubing over the solder joints if desired, for strain relief and for a tidy appearance.



Noir's inputs and preamp-outputs use RCA jacks on the rear panel. The gold plated jacks in the BOM consist of six pieces. They mount to the rear panel as illustrated in these four photos



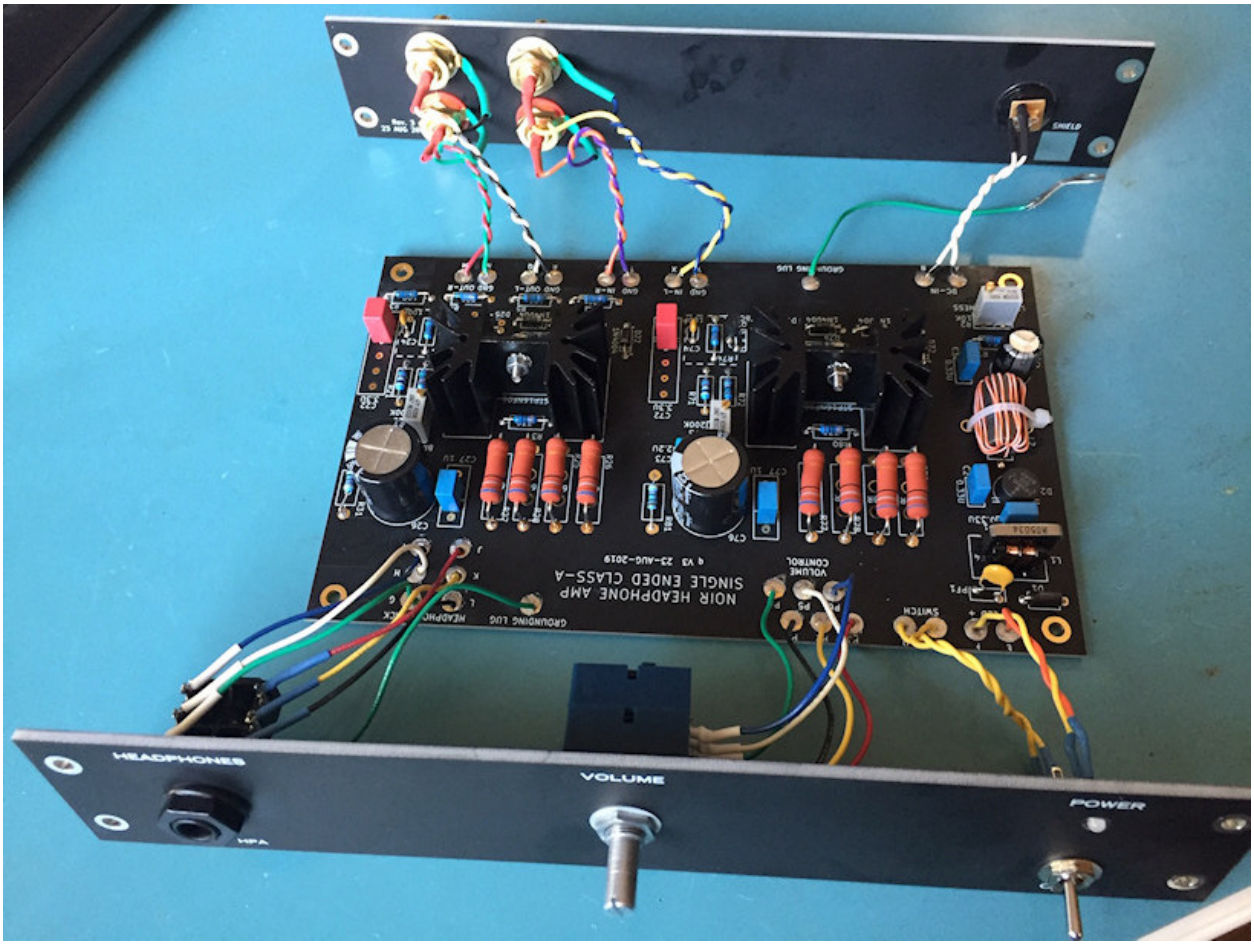


(Noir follows the convention that Red = RightChannel and White = LeftChannel).

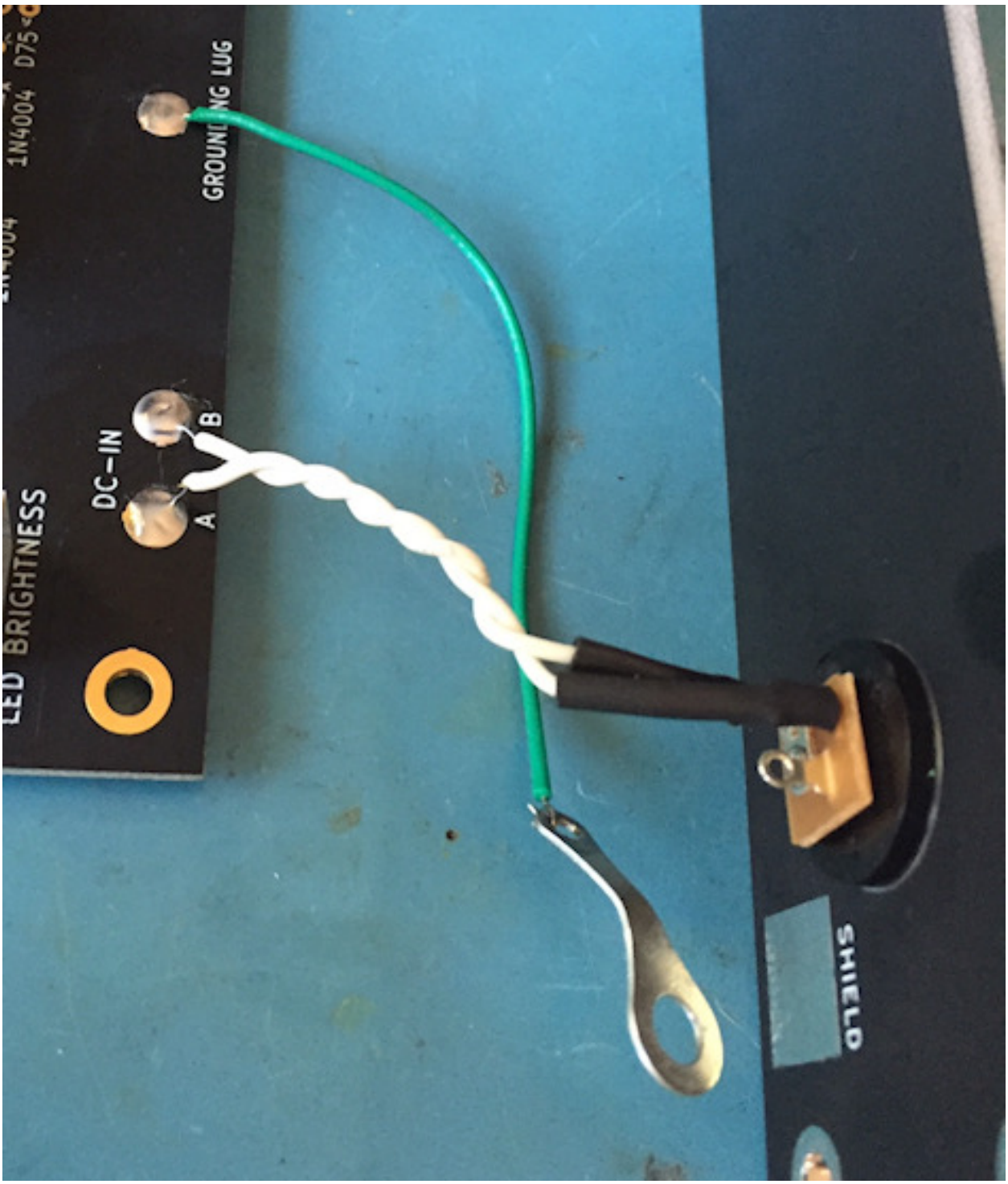
Assemble all four RCA jacks onto the rear panel and tighten the nuts. Then cut off two pieces of wire, making them far longer than necessary. For example cut a six-inch (15 cm) black wire and a six-inch white wire. Strip the ends, and solder the black wire to the grounding lug. Solder the white wire to the center connector "cup". Add shrink tubing if desired (fourth photo). Gently twist the black and white wires together forming a twisted pair. Repeat this process three more times for the three remaining RCA jacks.

Once all five jacks on the rear panel have been soldered, bring in the stuffed and soldered amplifier PCB to connect the fly wires. You will find it easier to do this with the PCB alone (i.e. before it's bolted into the chassis); you'll want to turn everything upside down to trim leads, inspect joints, etc., which you can't do if it's mounted on the chassis.

CHECK THE SCHEMATIC to be sure you know which fly-wires connect to which PCB holes. Then solder them in, one by one. A third hand jig and a lot of masking tape will come in handy to keep the two boards and the wires being soldered, in the positions you desire.

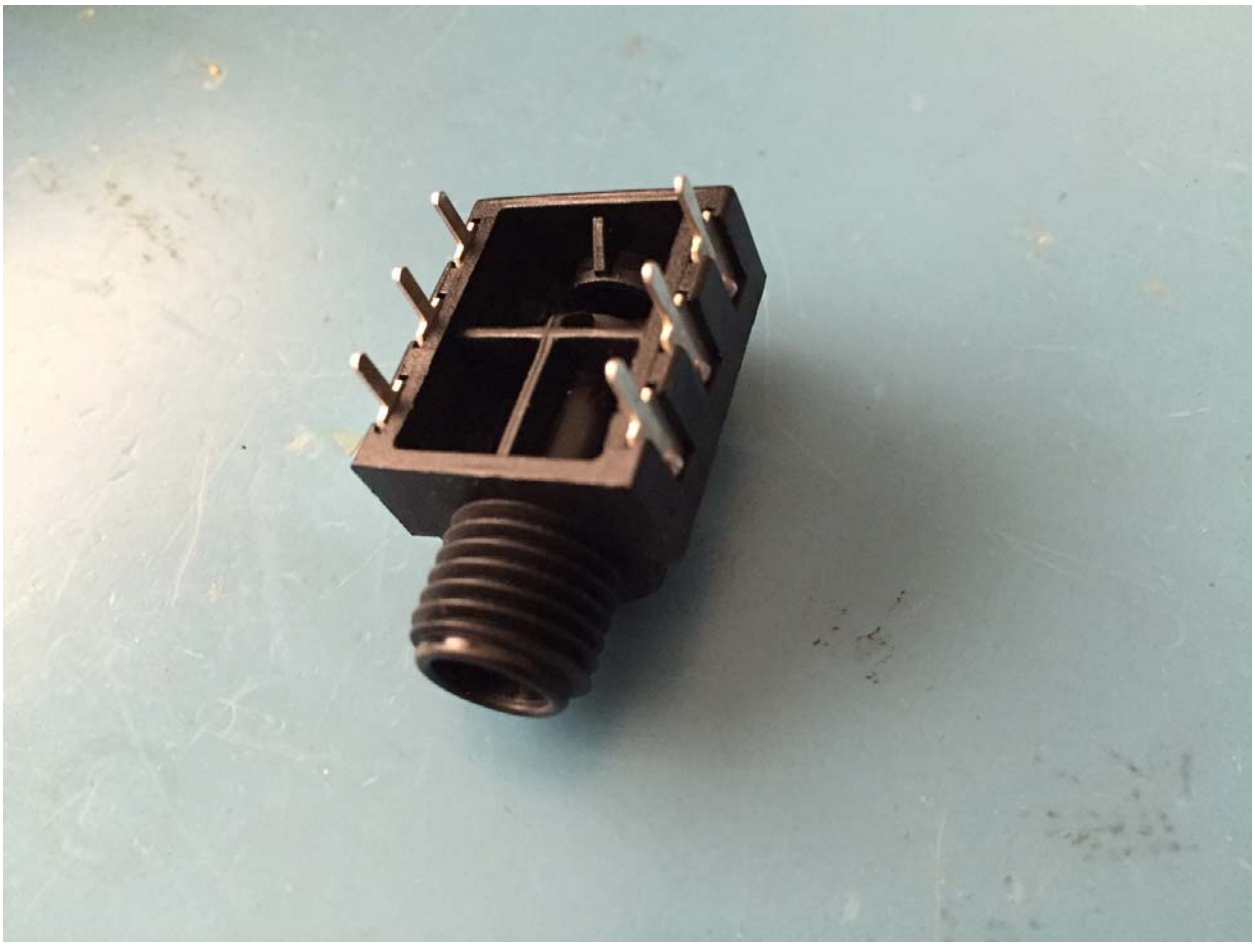


There is one more fly-wire which solders to the PCB and is routed to the rear panel. It has a connection hole on the PCB labeled “GROUNDING LUG”. The other end of the fly-wire can either (a) solder directly to the “SHIELD” solder-pad on the inside face of the rear panel (photo on p.29) or (b) solder to a grounding lug as shown below. This lug fits over one of the M4 bolts that attaches the rear panel to the rest of the chassis.

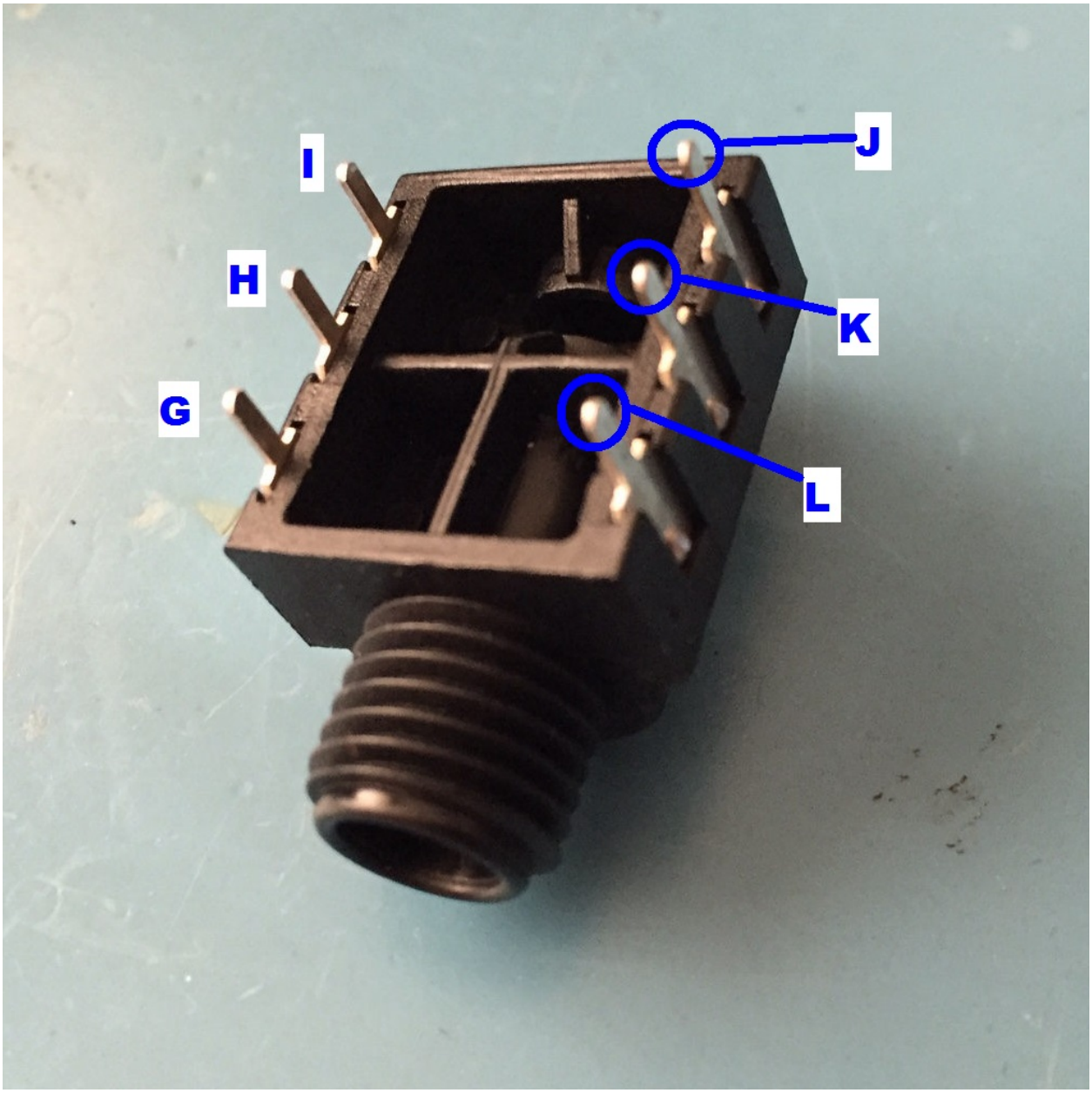


# ASSEMBLING AND WIRING THE HEADPHONE JACK

Here is the Neutrik headphone jack used in Noir. It has six pins because it is a “switching” jack: when a headphone plug is inserted into the jack, the RCA preamp-outputs become disconnected (floating!). Thus the Noir drives EITHER its RCA preamp-outputs on the back panel, OR a headphone plug on the front panel, but never both at the same time.

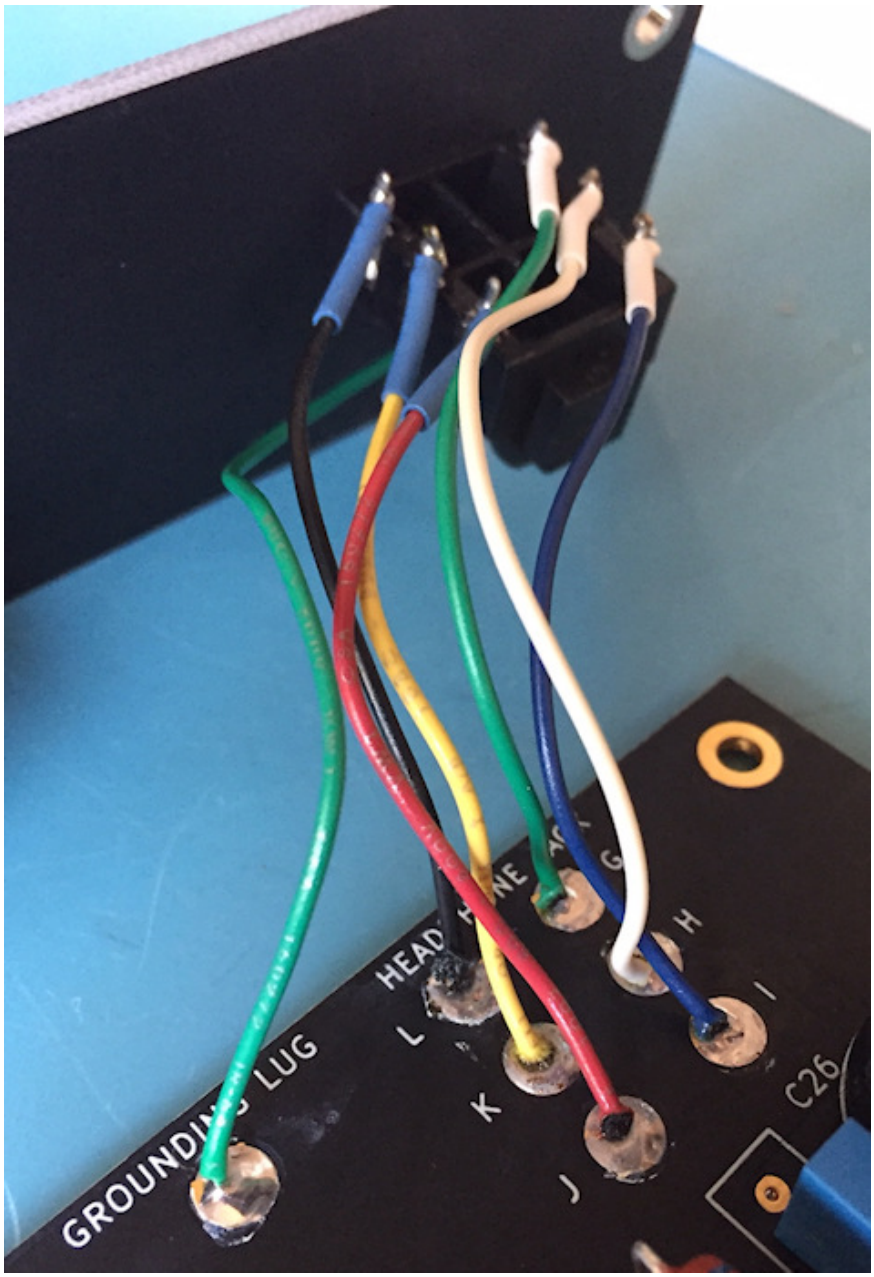


I have chosen to label the six pins of the Neutrik headphone jack, using the six letters G H I J K L as shown on the next photo:




The letters G H I J K L also appear on the printed circuit board, and on the circuit schematic diagram. Check the schematic now, and find them. They tell you how to connect fly-wires between the headphone jack and the Noir printed circuit board. Please print this page of the Build instructions on paper, and keep it nearby on your work bench, as you begin to fly-wire the headphone jack.

Mount the Neutrik jack on the front panel with the pins pointing up (away from chassis bottom) then from the front side add the plastic washer and tighten the plastic nut.




Cut six pieces of wire that are far too long (6 inches). Here I have used six different wire colors, to make it easy to tell them apart in the photos. I soldered a green wire to Neutrik terminal "G", a white wire to "H", a blue wire to "I", a red wire to "J", a yellow wire to "K", and a black wire to "L". You can add heatshrink tubing over these joints if you wish.

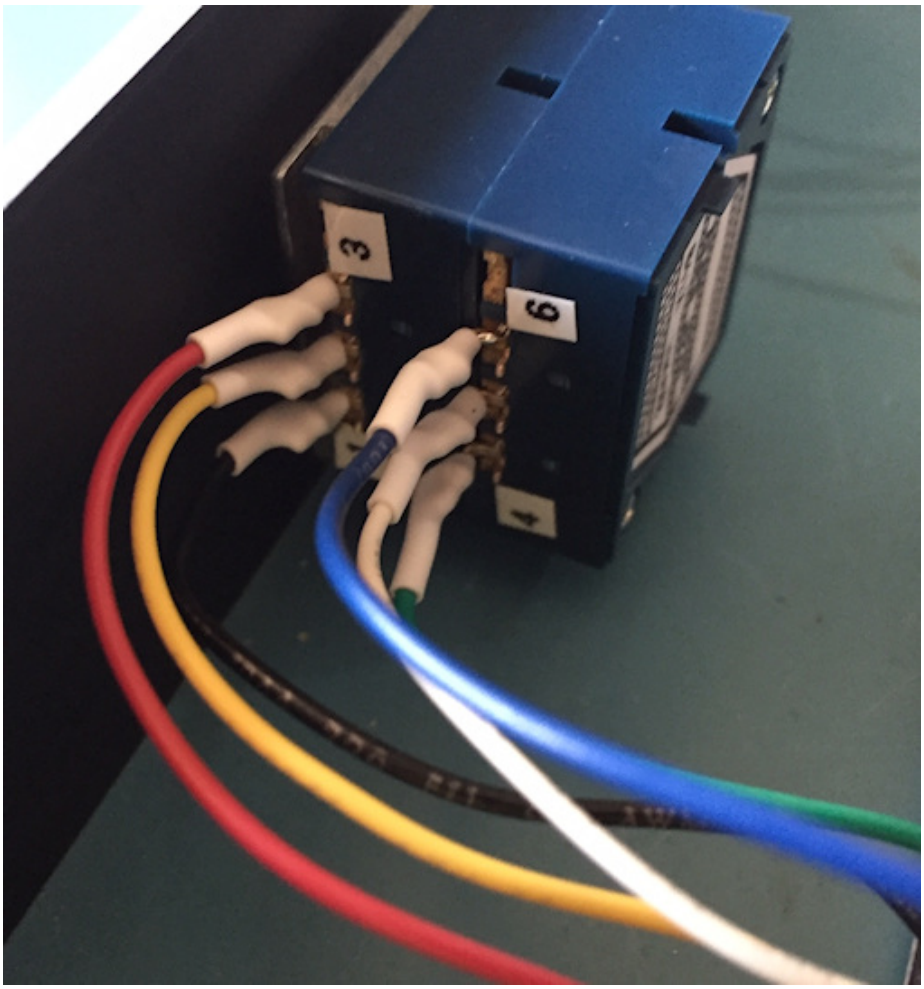
Now bring in the stuffed and soldered amplifier PCB to connect the fly wires. Pull each wire to its corresponding hole on the PCB and trim to length – BUT leave about 1 inch of extra length, to have some "slack" when assembling the chassis. Strip the ends and solder the six fly-wires in place. Also solder a six inch wire to the "GROUNDING LUG" connection point, and solder the other end either to the "SHIELD" pad on the front panel (if that's your choice), or leave it unconnected for now. You'll solder it to a grounding lug in another few pages.

# ASSEMBLING AND WIRING THE VOLUME CONTROL

I used an adhesive label-maker to create stick-on labels “1” “3” “4” “6” in the smallest available type, and then I cut them out with sewing scissors. These were stuck onto the ALPS Blue Velvet potentiometer as shown in the photo, for a visual reminder about which pin is which. (ALPS marks the pin numbers on the white printed label at the rear, which I found less helpful than putting stickers right on the pins themselves). However, you may not need stickers in your Noir build, since you have these nice photos! Just print out this page of the Build Instructions.

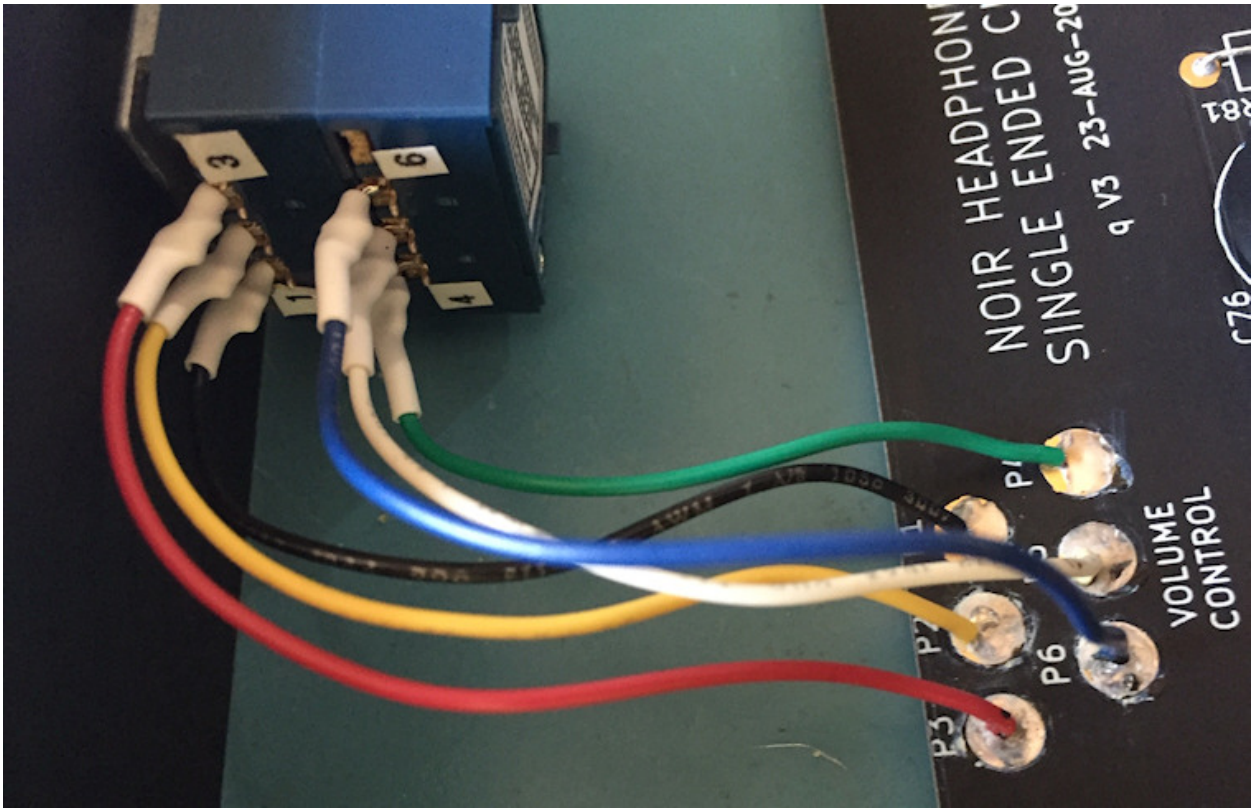
Once again I used six different wire colors for the six potentiometer pins: Black is pin 1, Yellow is pin 2, Red is pin 3, Green is pin 4, White is pin 5, Blue is pin 6. Check the schematic right now, to see the pin numbering for the pot. The labels on the schematic match the labels on the PCB.

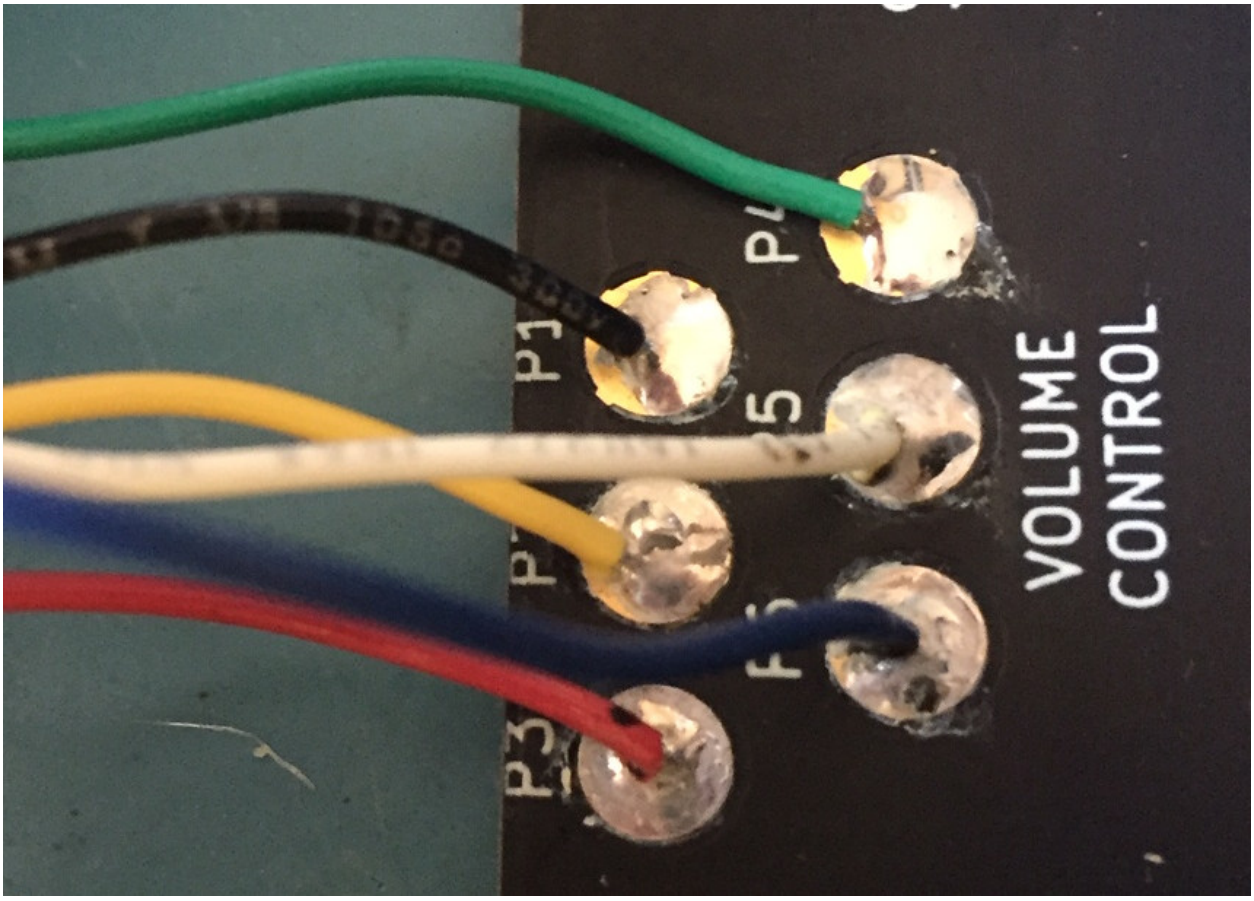
Mount the pot to the front panel, including the metal guide pin. Add the metal washer on the front panel, and then install and tighten the nut.



Cut six pieces of wire that are far too long (6 inches), and solder them to the six pins of the ALPS potentiometer. Pins 1,2,3 run as a bundle, to the front three connections on the PCB. Similarly pins 4,5,6 run as a second bundle, to the back three connections on the PCB. You could add heatshrink tubing over the solder joints at this point, if you wish. Some builders use one 3-wire microphone cable for pins 1,2,3 and then a second 3-wire mic cable for pins 4,5,6. Check the schematic, you'll see that the grounded "shield" of the cables should be used for pins 1 and 4.

Now bring in the stuffed and soldered amplifier PCB to connect the fly wires. Pull each wire to its corresponding hole on the PCB and trim to length – BUT leave about 1 inch of extra length, to have some "slack" when assembling the chassis. Strip the ends and solder the six fly-wires in place. Pin 1 goes to P1, Pin 2 goes to P2, etc.

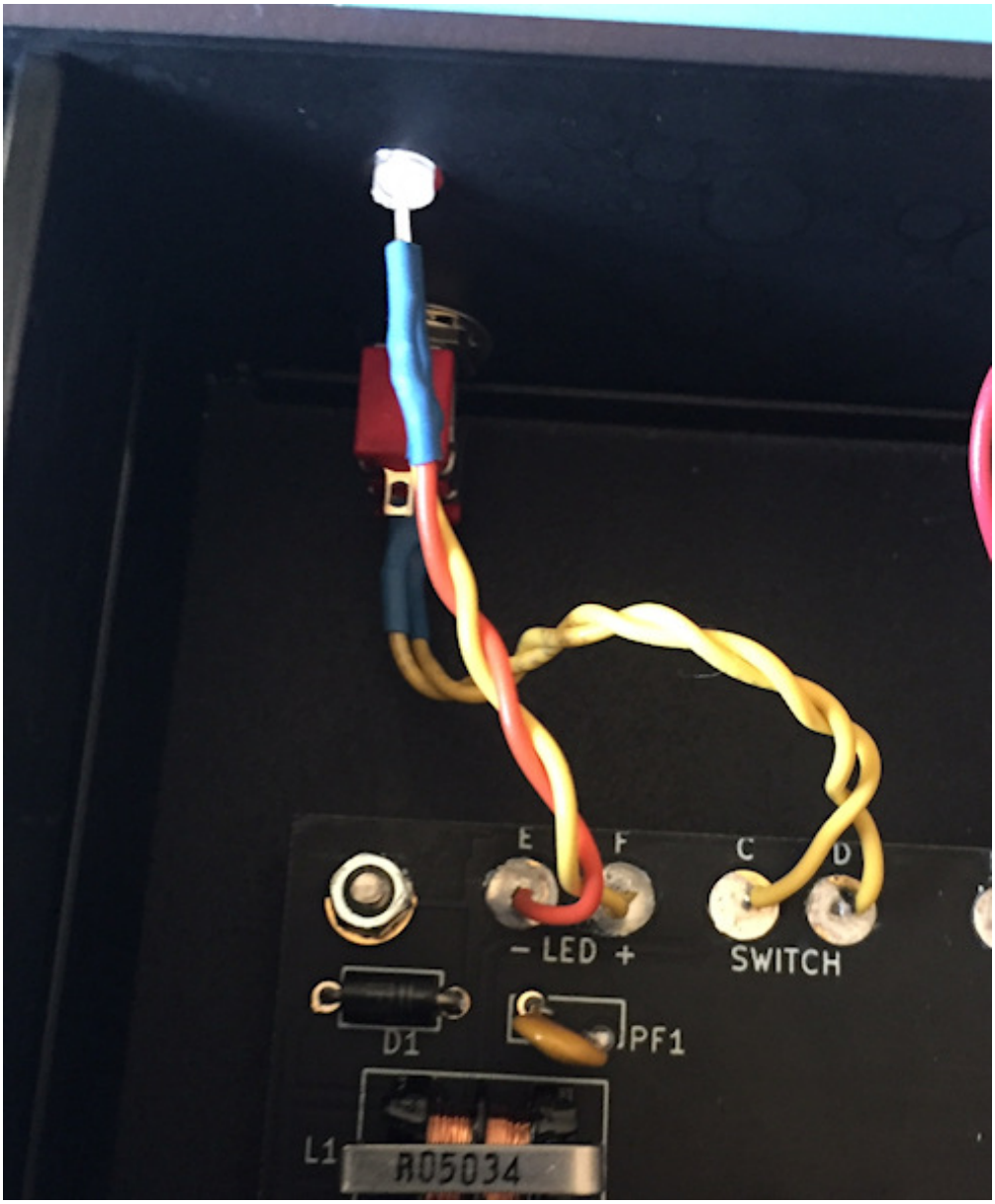



VOLUME
CONTROL

# COMPLETING THE FRONT PANEL

The Noir Bill Of Materials calls for a bidirectional LED. Connect it one way and it glows yellow, reverse the terminals and it glows green. Presto, it is impossible to connect this LED “wrong,” it will always glow one color or the other, no matter which way you hook it up. If you decide to substitute a normal (not bidirectional) LED, the required polarity is marked on the schematic and on the PCB. Use color coded fly-wires to ensure you get the polarity correct.

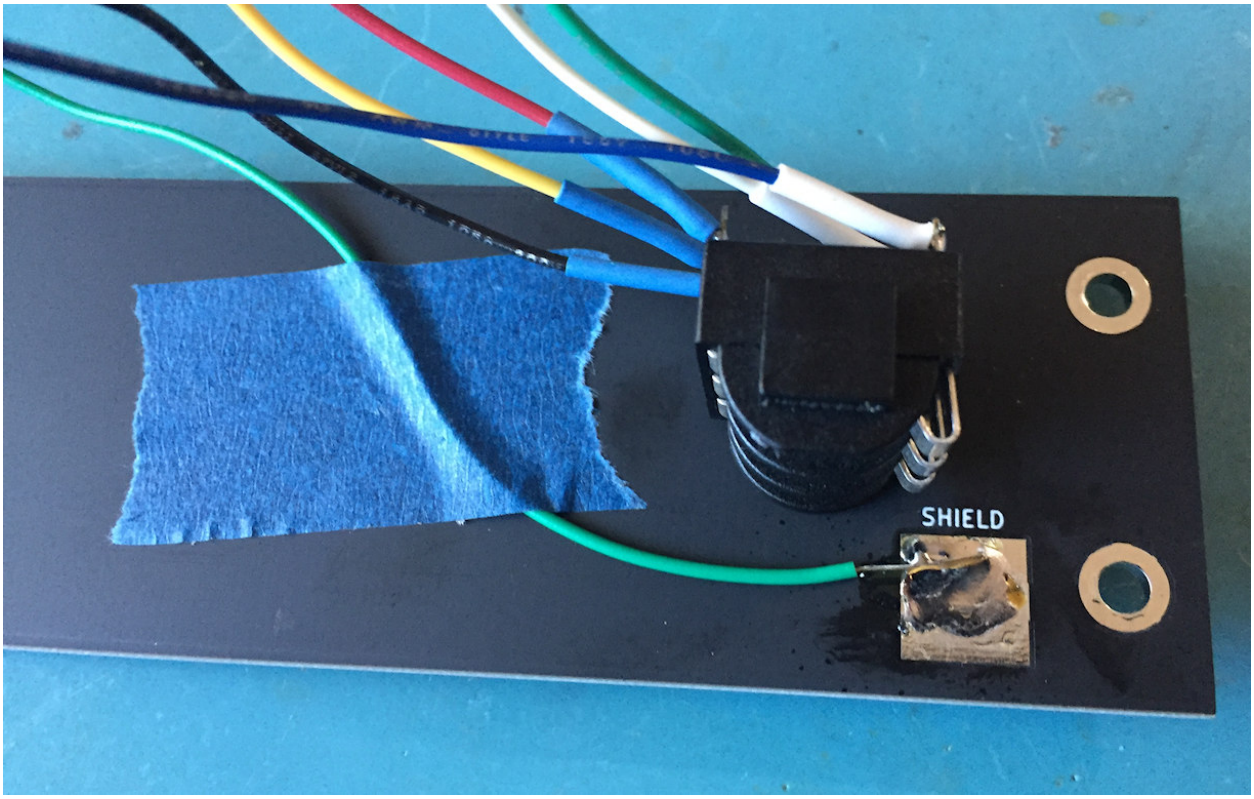
However if you are happy with the bidirectional LED, and if you don’t care about its color, you can use same-color flywires for both LED legs.



Cut four pieces of wire that are far too long (6 inches). Solder two wires to the terminals of the power switch, and two wires to the terminals of the LED. You can add heatshrink tubing over these joints if you wish.

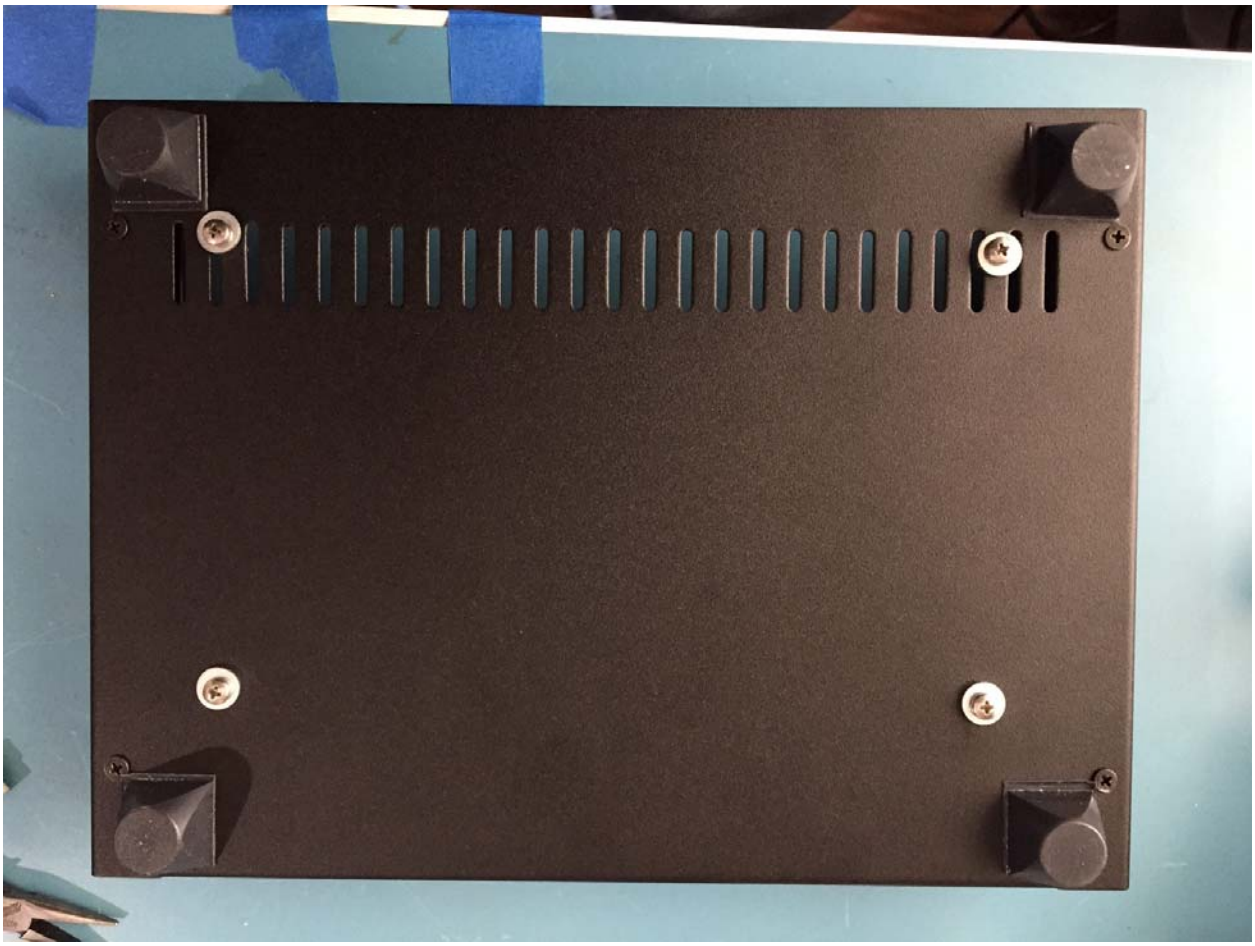
Now bring in the stuffed and soldered amplifier PCB to connect the fly wires. Pull each wire to its corresponding hole on the PCB and trim to length – BUT leave about 1 inch of extra length, to have some "slack" when assembling the chassis. Strip the ends and solder the four fly-wires in place.

The photo below shows the front panel "GROUNDING LUG" wire (temporarily taped down) soldered the "SHIELD" solder-pad on the inside face of the front panel. You also have the option to use a solder lug at the end of this wire; the lug slips over an M4 bolt that attaches the front panel to the rest of the chassis.



# SECURING THE PCB INTO THE CHASSIS

Insert the four M3 bolts (length = 20 to 30mm) and washers, and snug them down with the M3 hex spacers (5mm tall) on the inside. The hex spacers rest upon the bare metal on the inside surface, which you created when you sanded the bottom plate right after drilling. Don't install the feet just yet; wait until everything is bolted together. This way you can be sure you haven't accidentally covered any screw heads when attaching the feet.



Slide the PCB down onto the four mounting bolts and secure it with star washers and hex nuts. Be sure to orient the PCB so the front panel is on the side with the bent-upward "lip". Another double-check: the perforated vent holes should be on the rear panel side of the chassis.

Now that the PCB is mounted in the chassis, if you decided not to solder the GROUNDING LUG wires to the SHIELD pads on the inside face of the front & rear panel, (i.e. you decided you would use lugs instead), it's time to trim those wires to length (leaving about 1 inch of slack) and solder a lug to each of those wires.

# BOLTING EVERYTHING TOGETHER

Step 1: attach the aluminum side panels to the chassis floor. Don't tighten the screws all the way, because you will probably want to make very small adjustments at the end.

Step 2: if using the PCB pre-drilled, silkscreened front panel, use a black "Sharpie" or "Marks-a-Lot" marker to blacken the edges of the front panel.

Step 3: attach the front panel to the side panels, using four M4 Cap Socket bolts (10mm long). Slip the grounding lug loop over the bottom right bolt, between the front panel and the side panel. Tighten up the bolts but not all the way; you'll make adjustments at the end.

Step 4: slide two M3 nuts into their channel on the left side panel. Then slide two more M3 nuts into their channel on the right side panel.

Step 5: taking care not to tip the chassis and let the M3 nuts escape, attach the rear panel to the side panels. Use four M4 Cap Socket bolts. Slip the grounding lug loop over the bottom right bolt, between the rear panel and the side panel. Tighten up the bolts but not all the way.

Step 6: attach the chassis top. A magnetic screwdriver will help, it draws the M3 nut upwards to meet the M3 screw coming downwards. Tighten the screws but not all the way.

Step 7: adjust the side panels so the front panel securely abuts the "lip" in the bottom chassis, and so the front panel meets the side panels with as little gap as possible. Tighten the M4 bolts that secure the front panel.

Step 8: now study the rear panel. Adjust the chassis so the rear panel snugly meets the side panels with as little gap as possible. Tighten the M4 bolts that secure the rear panel.

Step 9: tighten the four screws on the bottom panel.

Step 10: tighten the four screws on the top panel.

Step 11: attach the adhesive "feet" to the bottom of the chassis, making sure you don't cover up any screw heads.

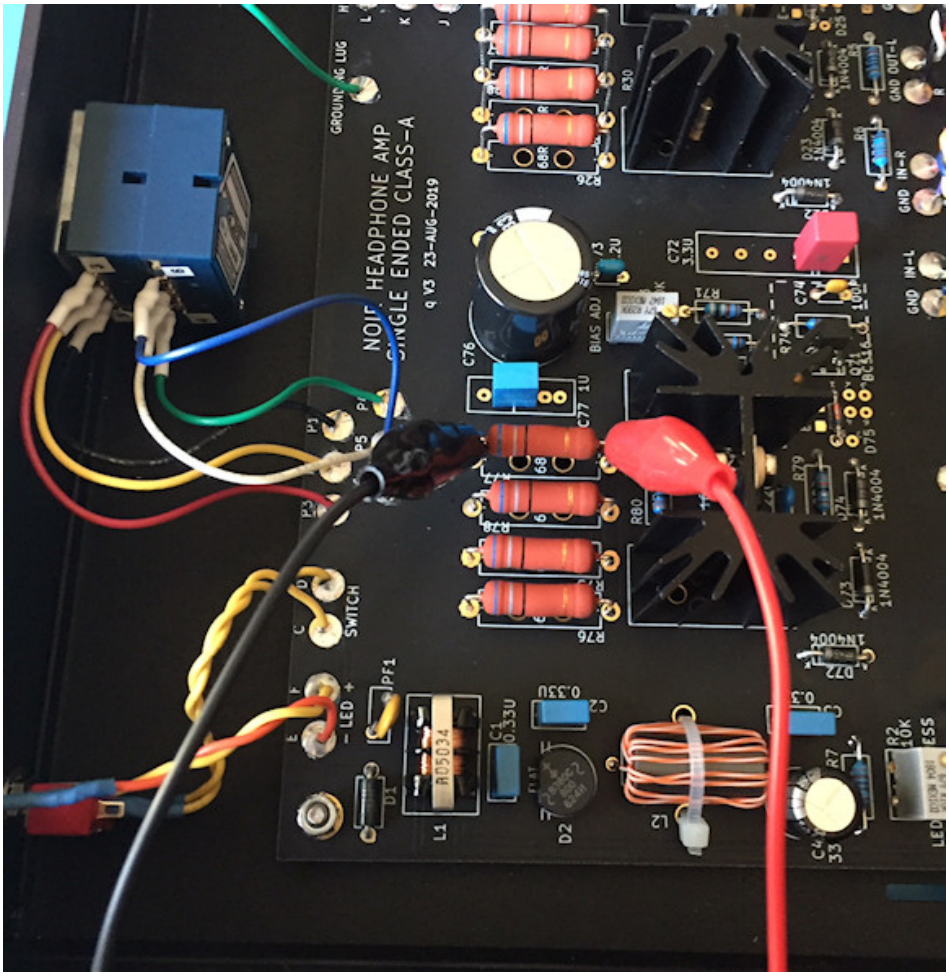
# ATTACHING THE VOLUME KNOB

Now that the chassis is assembled, mount the volume control knob on the shaft of the ALPS Blue Velvet potentiometer. Slide it fore and aft (towards the panel / away from the panel). How close to the front panel can the knob be positioned? Can you make them touch? Study the minimum possible gap; are you happy with it? Or do you want the knob to be even closer to the front panel than it can go?

If you feel the knob is too far away from the front panel, study the pot and the knob. Decide whether the problem can be solved simply by shortening the shaft of the potentiometer. Make this decision carefully; if you make a mistake here, you will need to buy another (expensive!) potentiometer and you will need to undo and re-do six flywires between the PCB and pot.

After careful consideration, if you've decided to cut off a length of the potentimeter's shaft, I recommend sealing the chassis tightly before cutting, so no metal dust or hacksaw swarf can get inside. When I did this, I used lots of photocopier paper and blue masking tape:

# POWER UP AND BIAS ADJUSTMENT




Before the first power-up, twist the knobs of bias trimpots R23 and R73, at least 10 full rotations counter-clockwise (“to the left”). This reduces the bias current so components don’t overheat while you’re doing the adjustment.

To set the left channel bias, connect your voltmeter across R77 as shown above. Then slowly adjust trimmer potentiometer R73 until the voltage across R77 is 5.10 volts. Five point one zero volts.

To set the right channel bias, connect your voltmeter across R27. Then slowly adjust trim pot R23 until the voltage across R27 is 5.10 volts.

Wait 10-15 minutes for the circuits (and the wall wart!) to fully warm up to thermal equilibrium, then repeat the measure-and-adjust procedure, one more time.

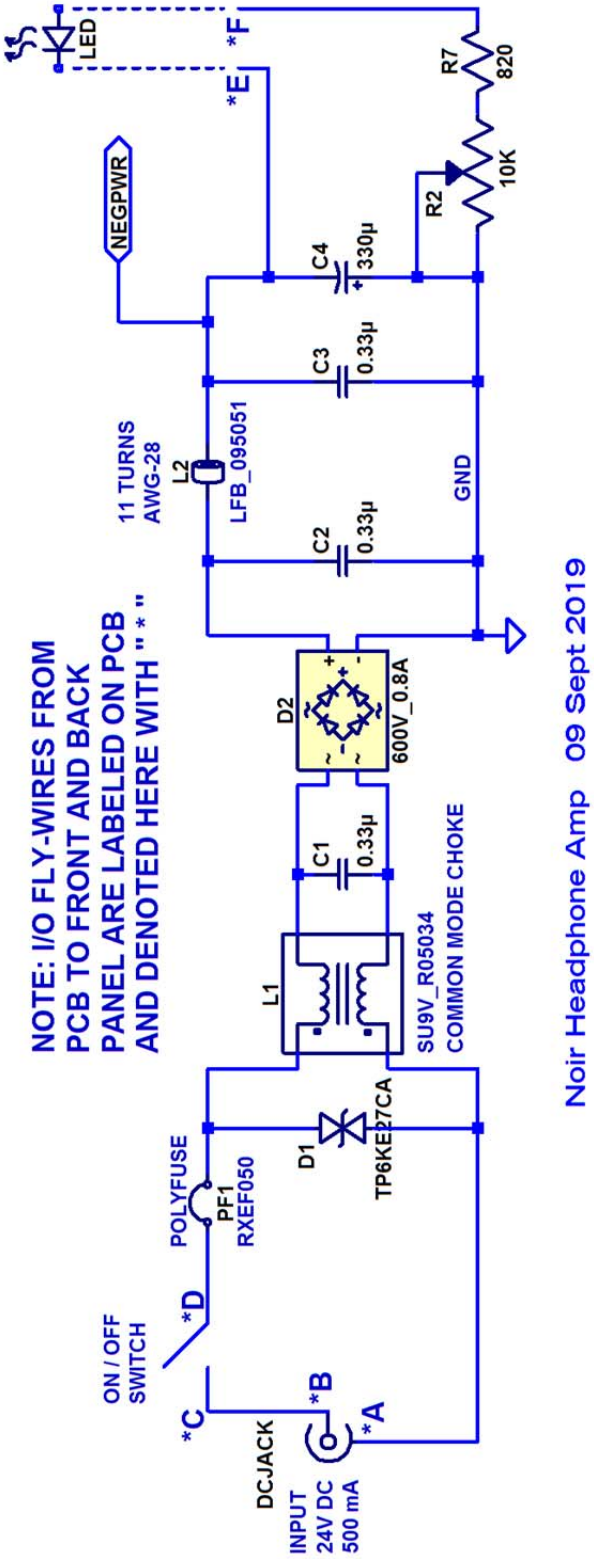
# LED BRIGHTNESS ADJUSTMENT

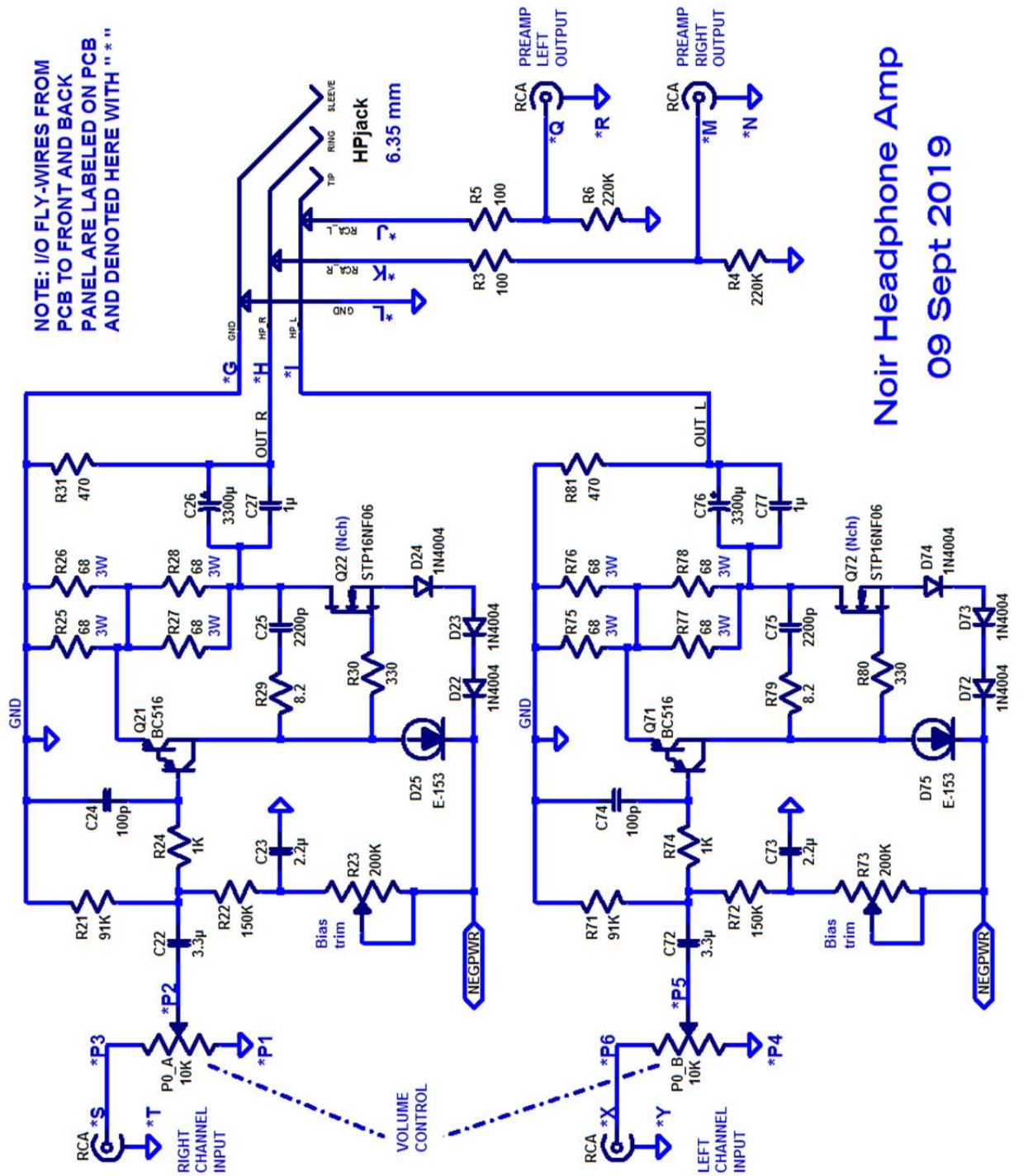
Trimmer potentiometer R2 lets you adjust the current through the LED, across a certain range. This varies the brightness of the LED, giving each builder the opportunity to set the LED as bright or as dim as he/she sees fit.

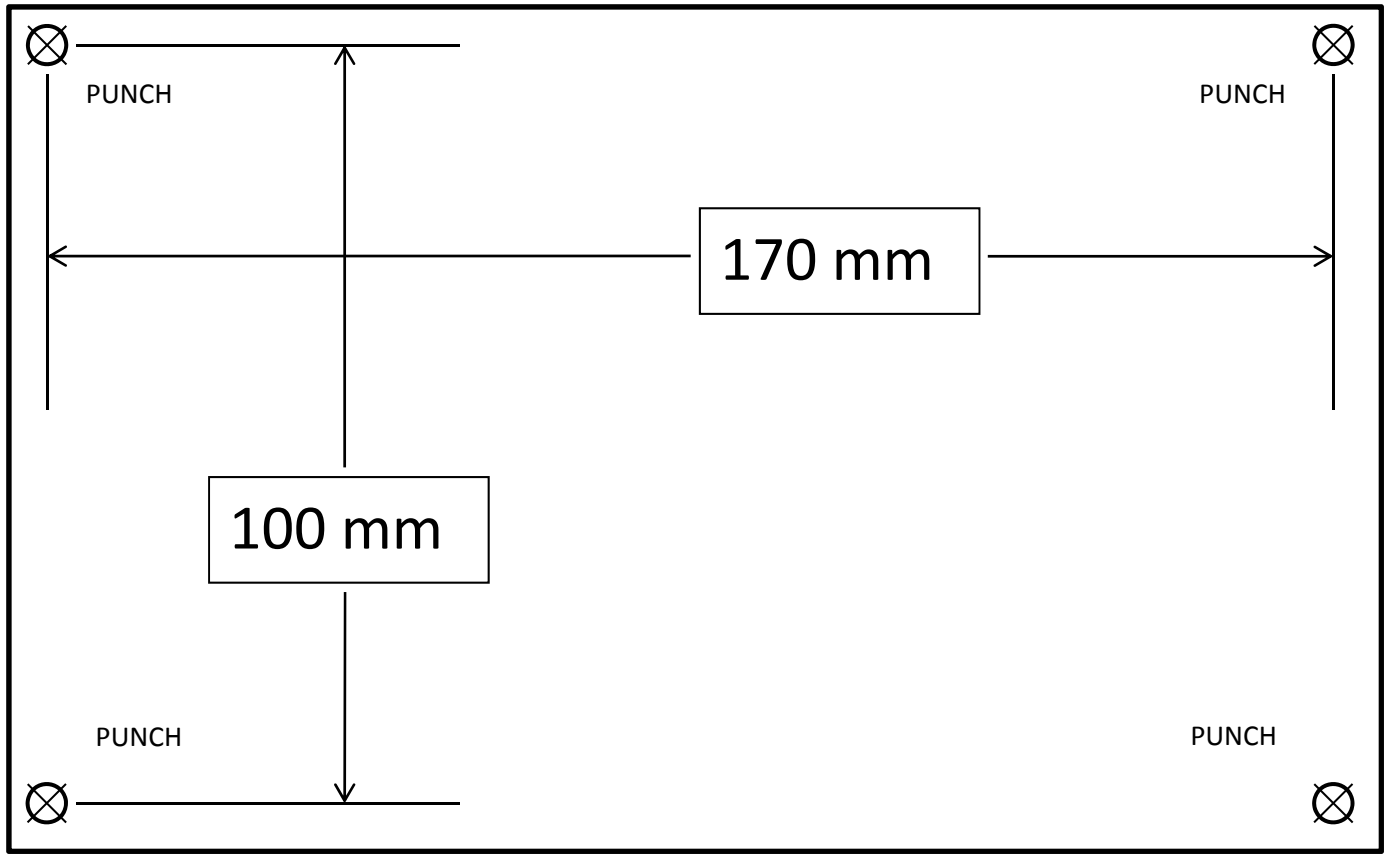
Before the first power-up, twist the knob of trimpot R2, at least 10 full rotations counter-clockwise ("to the left"). This reduces LED current so you don't accidentally injure the LED before adjustment begins.

Now slowly increase the brightness by turning the knob of R2 clockwise ("to the right"), slowly. When you get the LED brightness you want, stop dialing.

# CIRCUIT SCHEMATIC




Noir Headphone Amp
09 Sept 2019
NOTE: I/O FLY-WIRES FROM PCB TO FRONT AND BACK PANEL ARE LABELED ON PCB AND DENOTED HERE WITH " * "
HPjack 6.35 mm
TIP
RING
SLEEVE
GND
HP_R
HP_L
*G
*H
*I
*J
*K
*L
R5 100
R3 100
R6 220K
R4 220K
RCA
PREAMP LEFT OUTPUT
PREAMP RIGHT OUTPUT
*Q
*R
*M
*N
OUT R
OUT L
R31 470
R81 470
C26 3300µ
C27 1µ
C76 3300µ
C77 1µ
R26 68 3W
R28 68 3W
R25 68 3W
R27 68 3W
R76 68 3W
R78 68 3W
R75 68 3W
R77 68 3W
Q22 (Nch) STP16NF06
Q72 (Nch) STP16NF06
D24 1N4004
D74 1N4004
D23 1N4004
D22 1N4004
D73 1N4004
D72 1N4004
C25 2200p
C75 2200p
R29 8.2
R30 330
R79 8.2
R80 330
GND
Q21 BC516
Q71 BC516
D25 E-153
D75 E-153
C24 100p
C74 100p
R24 1K
R74 1K
C23 2.2µ
C73 2.2µ
R23 200K
R73 200K
R21 91K
R22 150K
R71 91K
R72 150K
Bias trim
C22 3.3µ
C72 3.3µ
NEGPWR
*P2
*P5
*P3
*P1
*P6
*P4
P0_A 10K
P0_B 10K
VOLUME CONTROL
RCA
*S
*T
*X
*Y
RIGHT CHANNEL INPUT
LEFT CHANNEL INPUT


PUNCH
PUNCH
170 mm
100 mm
PUNCH
PUNCH