Assembly Step		Corresponding Component(s)	Comments
Electrical Assembly (top side)		TOP SIDE COMPONENTS	
Step 1	Solder the SMD mosfets	Q1, Q2	Orientation doesn't matter for these, because there's only one way they can be put on.
Step 2	Solder the HPF components	R1, C1	Orientation doesn't matter for these.
Step 3	Solder the leg resistors for the offset adjust circuit.	R3, R4, R5, R6, R7, R8	Orientation doesn't matter for these.
Step 4	Solder the LED choke resistors	R9, R10	Orientation doesn't matter for these.
Step 5	Solder the gain resistor for U2	R2	Orientation doesn't matter for these.
Step 6	Solder the gain resistors for U1, U3, U4, U5	G1, G3, G4, G5	Orientation doesn't matter for these.
Step 7	Solder the 8-DIP sockets for the five ICs	(U1, U2, U3, U4, U5)	Check your orientation! the notch should go to the right of the board (away from the power switch) for every socket.
Step 8	Solder all of the 0.1uF decoupling capacitors	C4, C6, C8, C10, C12, C13, C16, C17, C21	Orientation doesn't matter for these.
Step 9	Solder all of the 0.47uF decoupling capacitors	C3, C5, C7, C9, C11, C14, C15, C18, C19	Orientation doesn't matter for these.
Step 10	Solder all of the 1uF decoupling capacitors	C20, C22	Orientation doesn't matter for these.
Step 11	Solder the LEDs	VCC_LED, VEE_LED	Make sure your polarity is correct! You wouldn't you have egg on your face if you put the LEDs in backwards. And try to keep the LEDs flush and well-aligned because it effects how much of the light you can see once the enclosure is buttoned up.
Step 12	Solder the potentiometers	POT1, POT2, POT3	Orientation doesn't matter for these because there's only one way they can go in, but alignment matters a lot. Make sure the body of the potentiometer is flush to the board, so that the shaft comes out at a right angle to the plane. This is important for downstream mechanical assembly.
Step 13	Solder the toggle switch.	S2	Orientation doesn't matter for this part, but alignment does. the footprint for this switch isn't perfect - getting the toggle switch to be perfectly aligned is a bit of a pain. tack down JUST THE MIDDLE PIN and fiddle with the joint until it looks like everything's straight and square. THEN solder the outer two pins. AND ONLY THEN go back and solder the middle pin.
Step 14	Install the ICs in their corresponding 8-DIP sockets.	U1, U2, U3, U4, U6	Mind the orientation! Line up the notch on the IC with the notch on the socket!
Electrical Assembly (bottom side)		BOTTOM SIDE COMPONENTS	
Step 15	Solder the Power Connectors	P1, P2	Do your best to keep these connectors flush. The access for the wire should face the outer edge of the PCB.
Step 16	Solder the BNC Connectors	BNC1, BNC2, BNC3, BNC4	Orientation doesn't matter for these because there's only one way they can go in - but alignment matters a lot. Solder the signal pins first. Make sure the BNC connector is actually coming out at right angles. Then solder the ground lugs. You might need a larger iron tip for the lugs.
Mechanical Assembly (enclosure prep)			
Step 17 (with many sub-parts)	Mark and drill holes in the enclosure for all of the electro-mechanical components that stick out of the enclosure.		The mechanical engineering component of this project still needs work. This is all currently being done by hand.
Step 17-A	Mark the enclosure lid with centers for the top-side mechanical drills (12x)		
Step 17-B	Drill 1/16" pilot holes at the centers (12)	BP1, BP2, BP3, BP4, BP5, BP6, POT1, POT2, POT3, S2, VCC_LED, VEE_LED	The pilot holes allow you to more accurately make larger drills. Alignment matters - and be careful! The pilot holes for the LED are how we'll be able to see whether the indicator lights are on/off.
Step 17-C	Drill the 6 holes for the binding posts	BP1, BP2, BP3, BP4, BP5, BP6	Drill Dimensions = 0.328" +/- 0.005

Assembly Step		Corresponding Component(s)	Comments
Step 17-D	Drill the 3 holes for the potentiometer shafts	POT1, POT2, POT3	Drill Dimensions = 0.25" (this is toleranced to allow some slop)
Step 17-E	Drill the hole for the toggle switch	S2	Drill Dimensions = 0.256" +/- 0.005 ---BUT--- you can get away with using a 0.25" bit. There's enough slop in the alignment for the other interfacing components that a tight fit for the toggle switch won't ruin the interface.
Step 17-F	Mark the enclosure body with the centers for the BNC drills (4x)	BNC1, BNC2, BNC3, BNC4	CHALLENGE ALERT: Since I was doing all of my drills by hand on a drill press, I had serious alignment issues with marking the body of the enclosure so that the BNCs are perfectly aligned in vertically and horizontally when the case is closed. I compensated by increasing the drill size and using a sealing ring + nut to protect the sloppy drill from potential splashes. This needs work.
Step 17-G	Drill the 4 holes for the BNC connectors	BNC1, BNC2, BNC3, BNC4	Drill Dimensions = 0.505" +0.005/-0.000 --- THIS MEANS --- The drill hole should really be slightly larger than 0.5" in order to work because the alignment issue requires more slop for everything to fit together.
Mechanical Enclosure (additional prep)			
Step 18	Fake Light-Pipes!	drill holes for VCC_LED and VEE_LED	Now for the two pilot holes that you drilled over the two indicator! Mix up clear 2-part DEVCON 5-minute epoxy. Wait for it to begin to thicken. When the epoxy is thick enough that it flows without running everywhere, dab some of it into the drill holes from the INSIDE face of the lid. Hold the lid so that the epoxy runs into the drill and slightly bubbles out of the OUTSIDE face. Let cure completely. Contratulations, now you have a sealed, optically translucent window that you'll be able to see the LEDs through.
Mechanical Assembly (combo PCB + Enclosure)			
Step 19	Screw the 6 binding posts to the lid of the enclosure.	BP1, BP2, BP3, BP4, BP5, BP6	Mind the colors! - the three DC inputs (DC1, DC2, DC3) should all be the same color. The two differential inputs (DIFF- and DIFF+) should have separate colors, and Black is ALWAYS, ALWAYS ground.
Step 20	Put the PCB and the lid together		This is where you see whether or not all of your holes were properly sized and registered. The switch should now poke up out of the top of the lid, as should the three potentiometer shafts. The binding posts should come down through the corresponding holes on the PCB.
Step 21	LOOSELY Install washer and nut for the panel-mount switch	S2	The washer and nut ship with the switch. There's a small notch on the threaded body of the switch that aligns with a tab on the washer. DON'T TIGHTEN THIS DOWN ALL THE WAY - the switch body is shorter than the binding posts. This could be improved by finding a way to shim the switch bushing/body to the correct height for assembly.
Step 22	Install the knobs	POT1, POT2, POT3	Push the knobs onto the shafts of the potentiometers. You will need to hold the circuit board in place, because this takes some force.
Electro-Mechanical Assembly			
Step 23 (with several options)	Electrically connect the binding posts to their corresponding inputs on the PCB.		
Step 23 - Option A	Directly Solder the Binding Posts to the PCB	BP1, BP2, BP3, BP4, BP5, BP6	This is what I did for the first 5 units. This is ideal from a circuit noise perspective because the direct connections minimize trace length. I made some effort in the layout to keep the trace length fairly equal between input signals in order to minimize 60Hz differential pickups. However. It actually made it very difficult to put the enclosure together, because direct soldering the binding posts removes any mechnical play, and you need that play to get everything into the enclosure.
Step 23 - Option B	Tack-solder a free-hanging wire to the Binding Post. Solder the other end to the PCB	BP1, BP2, BP3, BP4, BP5, BP6	
Step 23 - Option C	Wire-wrap/screw a wire to the binding post from beneath. Solder the other end to the PCB.	BP1, BP2, BP3, BP4, BP5, BP6	

Assembly Step		Corresponding Component(s)	Comments
Step 23 - Option D	Remove the knobs. Remove the switch hardware. Install P3, P4, R12, R13, R14. And repeat Option C - but use the screw terminals (P3, P4) instead of soldering the end of the free-hanging wire directly to the PCB.	BP1, BP2, BP3, BP4, BP5, BP6, P3, P4, R12, R13, R14	This is probably the most viable option - I prefer it over the screw terminals because I prefer direct-soldering with stranded wire whenever possible. Especially when disassembly will be a rare event. Screw terminals tend to strip out easier than I'd like. In order to make this viable, though - you have to make sure the binding posts you bought shipped with all the mounting hardware. ALSO: MINIMIZE WIRE LENGTH. You want to make all of the input wires short, and ideally the same length. Why? Because having spaghetti wiring or vastly different wire lengths will directly inject differential 60Hz noise into your system. That's bad!
Step 23 - Option E	Remove the knobs. Remove the switch hardware. Install P3, P4, R12, R13, R14. And repeat Option D - but use the screw terminals (P3, P4) instead of soldering the end of the free-hanging wire directly to the PCB.	BP1, BP2, BP3, BP4, BP5, BP6, P3, P4, R12, R13, R14	
Mechanical Assembly Continued (combo PCB + Enclosure)			
Step 24	Connect the battery holders to the input power screw terminals.	P1, P2	The battery packs should be electrically "stacked" in a series configuration.
Step 25	Install batteries, close battery holders using screws.		
Step 26	Back battery holder with double-sided tape - stick to inside bottom of enclosure.		
Step 27	Slide BNC connectors through the holes, fit enclosure lid to body.		
Step 28	Add BNC sealing ring and retaining nut.		
Step 29	Screw enclosure shut.		