

GDIY 51x Floor Box PSU Assembly Aid



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****Time to begin starting with the PCB****

1. Populate the PCB with all components **except** leave out the following:
LED1-LED5,
Regulators IC1-IC5,
& the six largest capacitors which are C2, C3, C9, C18, C27 & C36.
Refer to the 51PSU-V2 BOM for the four resistors whose value will change depending on if you are building the 24V 51x version or the all 16V VPR version.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-1.jpg>
2. Prepare both heatsink sides with the small Keystone brackets, black #6 screws and the #6 Keps nuts. Make sure the brackets are square and not on an angle at all. For alignment, push the brackets down, towards the bottom of the respective heatsink side before fully tightening.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-2.jpg>
3. Install the PCB to the heatsink sides using the #4 x 3/16" screws. Each screw will have a #4 split lock washer above the PCB. Snug the screws but do not fully tighten yet. By design, there should be a small, equal space of about .03" between both PCB edges and the heatsink sides.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-3.jpg>
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-4.jpg>
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-5.jpg>
4. Stand the heatsink side/PCB assembly up on its front end so the PCB is towards your table or bench. Install the rear panel using four of the black #8 self-tapping Phillips screws. Make sure to start these so they are threading in nice and straight. I try to center the rear panel holes over the round grooves in the heatsink side extrusions. The panel will be flush with the top and bottom of the extrusions but protrude past each side by around .1". This will be a temporary fitting of the rear panel.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-6.jpg>
5. Install the 4" black anodized aluminum handle to the front panel using two of the #8 x 1/2" Phillips screws and two of the #8 outside tooth lock washers.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-7.jpg>
6. Install the front panel in the same fashion as we did with the rear. This will be final for the front panel.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-8.jpg>
7. Secure the four PCB mounting screws completely. You may need to loosen all four to adjust/align before tightening completely.
8. Install all five status LED's. Be sure to put the shorter cathode lead to the pad that the arrow is pointing to. When I trim the leads, I make sure to trim the anode lead a little longer so I don't get the orientation wrong.
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-9.jpg>



****Tip:** A more blunt or flat chisel tip is a little easier for the LED install as the pads can be hard to heat with a tiny conical tip like we all like for DOA assembly. I also temporarily increase my iron temp to about 800°F for the LED's. Here is the iron tip I use.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-10.jpg>

9. Following the BOM, install the five IC regulators with a silicone rubber pad between the respective heatsink side and each regulator. Install the insulating shoulder washer, #4 split lock washer and #4 small pattern hex nut as shown. Keep them straight and centered in their holes. Tighten the screws completely before soldering.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-11.jpg>

10. Flip the assembly over, without removing the PCB, solder the pins for all five regulators. Install the remainder of the capacitors. Save one of the longer leads from either C2 or C3 for the voltage select switch.

11. Install the fuses. F1 will get a 160mA fuse while F2-F5 will get 1.5A fuses. These are all 250V fast blow fuses.

****Star Ground and some enclosure assembly****

12. Install the black #6 star ground screw using one of the #6 Keps nuts.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-12.jpg>

13. Locate the supplied green/yellow hook-up wire. Cut two pieces to 4" long. Don't go any longer than 4" as the remaining 10" piece will be the perfect length for a later use. Install a #6 ring terminal on an end of each 4" piece of wire. Cut two pieces of heat shrink to 3/4" and apply to the ring terminal end of each wire. Strip the insulation exposing approximately 1/4" of the stranded wire. Twist and tin with solder. Run these from the two JP2 screw terminal points to the star ground stud. Keep them low so they do not later interfere with the toroid's secondary leads. Twisting is not really necessary. I just do it to help keep things neat.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-13.jpg>

14. Install the four #8 x 1/2" Phillips screws thru the rubber bumps, then thru the small red anodized fillers with #8 lock washers and #8 hex nuts on the inside of the bottom panel. The rubber bumps have steel washers molded inside of them so you can tighten them down pretty hard.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-14.jpg>

15. Locate the M6 bolt for the toroid. Slip a large fender washer over the bolt and insert thru the provided hole in the bottom panel. Slip the other fender washer on from the top of the panel followed by a M6 Keps nut. Tighten down completely. I do not use the standard nut that comes with the toroid.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-15.jpg>

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-16.jpg>

16. Slip one of the black foam rubber pads for the toroid over the bolt and stretch it over the M6 Keps nut.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-17.jpg>



17. Remove the rear panel from the assembly. Slide the bottom panel into position inside the grooves of the heatsink extrusions.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-18.jpg>

****Rear panel & toroidal primary connections****

Due to supply difficulties, starting November 2014, the Floor Box kits will ship with a new style of IEC. Please see the SNET IEC Addendum for details. The overall concept is identical but a few little things need to be observed. The below directions still pertain to the original Bulgín IEC. Directions highlighted in this same green are different. Updated steps are in the addendum. The main difference is that the FASTON connectors are now for .187" terminals instead of the previous .250" version. There is also one less FASTON used at the fused terminal of the IEC. This connection is now directly soldered.

18. Solder the cut-off lead we saved from the capacitor earlier between pins 1B and 2B of the voltage select switch.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-19.jpg>

19. Install the voltage select switch to the rear panel using the two black #4 x 5/16" Phillips screws, #4 split lock washers and #4 hex nuts. Make sure to straighten and center the switch in the panel cutout before fully tightening.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-20.jpg>

20. Cut a piece of the black hookup wire to 2-1/4" in length. **Solder it between two of the .250" FASTON connectors.** Install one end to the lower terminal of the illuminated switch. **Cut two pieces of heat shrink to 1" long and slide them onto the black wire. Connect the other FASTON to the "L" terminal of the IEC. Fully seat both pieces of heat shrink and activate them. If you have the US toroid, these two (and only these two) connectors will need to be slightly bent downward or they will interfere with the toroid once installed.** Double check but the European toroid should be fine.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-21.jpg>

21. Install the IEC switch by snapping it into position in the rear panel. If the IEC assembly seems rather loose, a gentle prying of all four locking tabs will generally snug it right up.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-22.jpg>

****Special note:** The following references to the toroidal transformer connections are all made in consideration of the US toroids. If you have the European version from Volker or Cemal, please refer to the correct datasheet for the proper wiring of the primary and secondary leads.

****Warning!!! Wiring of the toroidal transformer is a serious and potentially dangerous task that could result in bodily injury or possible death. If you are unsure what you are doing, please contact a qualified electrician to carry out the following connections.**

22. Cut the green/yellow screen wire of the toroid to a length of 4" from the core. Install a #6 ring terminal and a 3/4" long piece of heat shrink to the lead. Activate the heat shrink.



23. Lower the toroid over the M6 mounting bolt. Slip the ring terminal from the screen lead over the star ground stud. Slide the foam rubber pad over the M6 bolt followed by the steel mounting dish, small steel washer and the remaining M6 Keps nut. Before fully tightening the Keps nut, center the toroid and turn it so that the space between the green/yellow screen lead and the first red secondary lead are closest to the heatsink side. Use a 10mm socket to tighten the nut. It must be snug but not too tight or you may crush the foam rubber pad.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-23.jpg>

24. Gather and pull the four primary leads towards the rear of the enclosure. Put a cable tie on them about 1/4" in from the end of the heatsink side.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-24.jpg>

25. Lay the rear panel face down nearly up against the rear of the Floor Box enclosure. Pull each primary lead toward its respective position on the voltage select switch and trim them.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-25.jpg>

26. Solder a .110" FASTON connector onto the toroid's gray primary lead. Solder another .110" FASTON connector onto the toroid's violet primary lead.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-26.jpg>

27. Cut a 3" piece of the black hookup wire. **Install a .250" FASTON onto one end.** Solder the other end to one of the .110" FASTONS along with the toroid's brown primary lead.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-26.jpg>

28. Cut a 2-1/2" piece of the white hookup wire. **Install a .250" FASTON onto one end.**

29. Cut a 3-3/8" piece of the white hookup wire. **Solder one end to a .250" FASTON along with the unused end of the previous 2-1/2" white wire.**

30. Solder the unused end of the 3-3/8" white wire to a .110" FASTON along with the toroid's blue primary lead.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-26.jpg>

31. Install seven pieces of 1" long heat shrink to the recently completed rear panel connectors.

32. Add a second cable tie to the primary leads about 1" from the first one, in the direction of the voltage select switch.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-27.jpg>

33. Make the seven rear panel FASTON connections. Once all the FASTONS are properly seated, position and activate all seven pieces of heat shrink.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-28.jpg>

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-29.jpg>



34. Install the last #6 ring terminal on the remaining 10" piece of green/yellow hookup wire. Activate a 3/4" piece of heat shrink over this ring terminal. **Install the last .250" FASTON to the other end of the green/yellow hookup wire.** Slip a 1" piece of heat shrink onto this end of the wire. Install the FASTON to the "Earth" terminal of the IEC. Position and activate the heat shrink. Route the ring terminal end around the toroid and to the star ground stud. Arrange the four ring terminals nicely. Install and fully tighten the final #6 Keps nut on the star ground stud. Install the rear panel to the Floor Box assembly.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-30.jpg>

****Toroidal secondary connections and final assembly steps****

35. Reference the datasheet for your particular transformer. Cut, strip, tin, gather and connect the toroid's secondary windings as you see fit. It is a tight and cramped area so just take your time. Be sure not to cut any of the leads too short!!! The "1" and "2" silk labels to the right of the JP3 header are to aid in maintaining the polarity of the secondary windings. Cemal had recommended this somewhere in the past. While maybe not 100% necessary, I thought it was a good idea and it would be in good practice to include it. The numbers are basically the order that the groups of colored leads come off the toroid's core. I believe the order is reversed for the European toroid but still the same principal.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-31.jpg>

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-32.jpg>

36. Install a slow blow fuse (1.25A for 230V AC Mains or 2.5A for 115V AC Mains) in the fuse holder of the IEC. Make sure the illuminated switch is down or in the "Off" position.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-33.jpg>

37. Make sure the voltage select switch is properly set for the AC voltage in your country. Connect the Floor Box PSU to the wall with the appropriate AC cord. Flip the switch to "On". The red switch should illuminate.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-34.jpg>

38. Flip the IEC switch to "Off". Set your DMM to read DC voltage. Connect the black lead to the star ground stud. I like to use an alligator clip for this lead so I have no worries about it popping off. Flip the IEC switch to "On". With your red probe, make your way down the JP1 screw terminals checking the DC voltages. All five rails should be very close to the desired voltage due to Volker's hard work with the original circuit and component calculations. Monitor your DMM and adjust the respective trimmer as required. I use an all plastic tool for these trimmer adjustments. Be very careful so you don't slip off an adjustment screw and short something. I go 0.5V high for the 48V rail and 0.7V high for the remaining rails. This will help compensate for the forward voltage drop over the protection diodes that are commonly used on the individual modules. Don't worry about doing this under a load as the PSU's sag under full load is only a bit over 125mV.

<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-35.jpg>

39. Check the five status LED's. If all of your DC voltages are correct at the JP1 terminal but some of the LED's don't illuminate, then those LED's are in backwards. Oops.

40. If required, install the nylon hole plug in the #2 DC Output hole.



41. Install the female cable mount Neutrik connector on your DC cable as required by your build. If you are building a VPR PSU, there will only be five of the seven wires used from the DC cable. Just clip back the unused two when prepping the cable. *(See the connection chart at the end of this document)*
42. Install the Heyco cord grip(s) as required by your build.
43. Prepare and install the PSU end of the DC cable(s). If you are building a Dual VPR version with two DC cables, each of the five wires from the DC cables will go to its own screw terminal. If you are building a 51x version with two DC cables, the screw terminals will be shared for the four main voltage rails. Duplicate terminals for GND, CHA and 48V can be found at each end of JP1. *(See the connection chart at the end of this document)*
<http://capi-gear.com/catalog/images/FB-build/FB-PSU-build-36.jpg>
44. With the front panel connections complete, disconnect the AC cable from the Floor Box PSU and remove the rear panel. Slide the top panel into position in the heatsink grooves. See the pic on the first page of this document for proper orientation of the top panel. Insert the grilles into each heatsink side. There are grooves at the top and bottom of the extrusion area where the regulator screws reside. Reinstall the rear panel. By design, the top and bottom panels are approximately .04” shorter than the heatsink sides.
45. Connect the DC cable(s) to your rack(s). With your DMM and the follow pin-out legend, verify that you have the expected DC voltages on the proper card edge connector positions.



	VPR Alliance Neutrik 5-Pin	51X Alliance Neutrik 7-Pin	7-Core Cable Designation
CHASSIS	1	1	Green/Yellow
PSU/GND	2	2	2
+16V	3	3	3
-16V	4	4	4
+48V	5	5	5
+24V		6	6
-24V		7	1



GDIY 51X Alliance	
Pin #	511 Backplane
1	CHASSIS
2	Output +
3	N/C
4	Output -
5	PSU/Audio GND
6	Stereo Link
7	N/C
8	Input -
9	N/C
10	Input +
11	N/C
12	+16V DC
13	PSU/Audio GND
14	-16V DC
15	+48V Phantom
16	N/C
17	+24V DC
18	-24V DC

Classic Audio Products of IL	
Pin #	508 Backplane
1	CHASSIS
2	Output +
3	Output + (Unbal)
4	Output -
5	PSU/Audio GND
6	DC Link
7	N/C
8	Input -
9	Input + (Unbal)
10	Input +
11	N/C
12	+16V DC
13	PSU/Audio GND
14	-16V DC
15	+48V Phantom
16	N/C
17	+24V DC
18	-24V DC

Standard VPR Alliance	
Pin #	VPR Backplane
1	CHASSIS
2	Output + (+4)
3	Output + (-2)
4	Output -
5	Audio GND
6	525 Stereo Link
7	Input - (-2)
8	Input - (+4)
9	Input + (-2)
10	Input + (+4)
11	Gain Adjust
12	+16V DC
13	PSU GND
14	-16V DC
15	+48V Phantom

OPTIONAL

