

SECTION 2 – PARTS INSTALLATION - continued



Figure 6

The 8-pin tube sockets included with the kit are Belton Micallex sockets, and not ceramic as shown. They do however have the same pin orientation as the sockets shown in Figure 6.

Note the orientation of the keyway for the 8-pin sockets. The power tube sockets, shown to the left and right of the toggle switch, each of the keyways are facing away from the toggle switch. The 8-pin rectifier tube socket is shown above the terminal strip on the right. The keyway is also facing away from the toggle switch.

The 9-pin socket included in the kit is a bottom-mount socket instead of top-mount as shown. It has the same pin configuration.

Figure 7 shows the orientation of the 9-pin driver tube socket.



Figure 7

SECTION 2 – PARTS INSTALLATION - continued

1. Install the (8) 4-40 x 3/4" standoffs using (8) 4-40 x 3/8" screws and install the (2) turret boards on top of the standoffs using (8) 4-40 x 1/4" screws as shown below in Figure 8.



Figure 8

2. Install the two Hammond 155H filter chokes using 4-40 x 3/8" screws and locknuts as shown in Figures 9 & 10.



Figure 9



Figure 10

3. Install the #6 ground lug near the power entry module cutout using a #6-32 x 3/8" screw and locknut as shown in Figure 11.



Figure 11

SECTION 2 – PARTS INSTALLATION - continued

4. Install the two isolated RCA jacks as shown in Figure 12. Make sure that the small raised rib of the plastic isolator bushings are seated into the hole on both sides of the chassis.

IMPORTANT NOTE: When I received these jacks, one of the nuts was missing. The jacks you receive will include (2) nuts. Figure 12 shows the ground ring between the inside plastic bushing and the nut. When you install the jacks, install one nut after the plastic bushing, then the ground ring, then the second nut.



Figure 12

5. Install the speaker binding posts as shown in Figure 13, 14, & 15.

Figure 13

Figure 14



Figure 15

IMPORTANT NOTE: Make sure the reduced side of the isolator bushings are fully seated into the holes on either side of the chassis.

## SECTION 2 – PARTS INSTALLATION – continued

6. Install the Alps 100K dual-gang volume control as shown in Figure 16 & 17.

NOTE: Figure 17 does not show it, however before installing the volume control, if you cut 3/16" off of the shaft using a Dremel or fine-tooth hacksaw, the volume control knob, when installed, will attach closer to the chassis.



Figure 16



Figure 17

We are now ready to begin wiring the amplifier.

### ATTENTION

Some of the photos in SECTION 3 – WIRING may show the power switch, power entry module, power supply filter capacitors, or walnut chassis side panels already installed. **DO NOT INSTALL ANY OF THESE ITEMS AT THIS TIME.** These items will be installed in SECTION 4 – FINAL ASSEMBLY & TESTING.

**VERY IMPORTANT:** As you are wiring the amp, use the multimeter set for ohms, and check continuity for every point-to-point connection as you make them. This is especially important for the heater and high voltage wiring. You want to be absolutely sure that no shorts exist between the two conductors of the heater circuit or between positive and negative of the high-voltage power supply circuit before powering up the amp for the first time. Make sure you perform these checks **BEFORE** connecting the power transformer secondaries as you will then be reading the resistance of the transformer windings.

### SECTION 3 – WIRING

1. Install the heater wiring. Polarity is not important as the heater voltage is AC.
  - 1.1. Tightly twist the two supplied strands of brown wire together forming a twisted pair.
  - 1.2. Solder in place the heater wire connections using lengths required to reach the terminal strip as shown in Figure 18:
    - 1.2.1. 8-pin power tube socket – pins 2 & 7
    - 1.2.2. 9-pin driver tube socket – pins 4 & 5



Figure 18

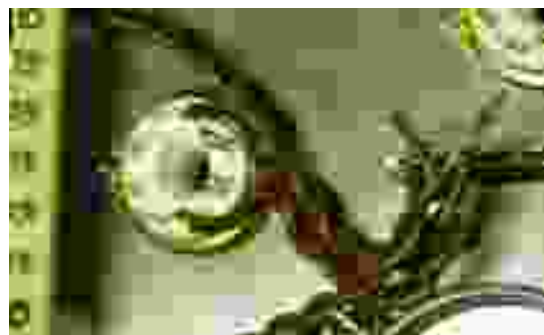


Figure 19



1. Figure 20



Figure 21



Figure 22



Figure 23

SECTION 3 – WIRING - continued

1.3. Solder the shielded wires to the audio input jacks.

1.3.1. Tin the solder cup of each of the input jacks as shown in Figure 26.



Figure 26



Figure 27

1.3.2. Solder the center conductor and shield to the audio jack as shown in Figure 27.

1.4. Route the shielded wires to the volume control.

1.4.1. Install (4) self-adhesive tie-wrap mounts in the locations shown in Figure 28.

NOTE: This one of the photos I somehow neglected to take at the beginning.

1.4.2. Keep the cable that is connected to the right-channel (red jack) closest to the bottom of the chassis, and tie-wrap the cables towards the volume control.

NOTE: Before attaching the tie-wrap closest to the volume control, cut the shielded wire to length so that it extends 3 inches past the volume control.



Figure 28

SECTION 3 – WIRING - continued

- 1.4.3. Strip back the cables 3 inches and prepare them as shown in Figure 29. Then attach the cables to the final tie-wrap mount
- 1.4.3.1. Make sure the cable from the right-channel jack is still closest to the bottom of the chassis.



Figure 29

- 1.5. Solder the center conductors of both shielded cables to the volume control terminals.
- 1.5.1. Refer to Figure 30 & 31. The left-channel (white jack) wire goes to the terminal closest to the front of the chassis.



Figure 30



Figure 31

SECTION 3 – WIRING – continued

2. Strip, tin, and form one end of two 3 inch lengths of white wire as shown in Figure 32.



Figure 32



Figure 33

3. Refer to Figures 33, 34, & 35. Solder the hooked end of each white wire and one end of a 1Mohm resistor to the 2 center terminals of the volume control. Leave the other end of the resistors unconnected for now.

NOTE: I missed this step during my initial build so I had to take the Figure 35 photo after the fact.



Figure 34



Figure 35



SECTION 3 – WIRING – continued

4. Refer to Figure 38. Cut a 3 inch length of black wire, strip, tin, form hook, and solder to the volume control along with the shields from the previous step.
5. Referring back to Figure 35, solder the remaining end of each resistor to the shield wire.



Figure 38



Figure 39

6. Refer to Figure 38. Cut another 3 inch length of black wire and along with the black wire from the volume control solder both to pin 9 of the 9-pin driver tube socket. Leave the other end unconnected at this time.
7. Refer to Figure 39. Cut a 6 inch length of yellow wire and solder one end to terminal 8 of the 9-pin tube socket.
8. Refer to Figure 40. Connect the other end of the yellow wire to the 2<sup>nd</sup> turret board terminal as shown. Strip back enough insulation to wrap the wire at least 1-1/2 times around the turret board terminal.
9. Cut another appropriate length of yellow wire and repeat the process from pin 3 of the 9-pin socket to the 2<sup>nd</sup> terminal on the other turret board.

SECTION 3 – WIRING – continued



Figure 40

10. Refer to Figure 41 & 42. Prepare the two 47Kohm resistors by shrinking a piece of heat-shrink tubing on of the leads of each resistor. Leave just enough of the leads exposed to bend a small hook in the end of the lead. Hook one of the resistors through pin 1 & the other resistor through pin 6 of the 9-pin socket but do not solder yet.
11. Cut a 4 inch length of orange wire, strip the end, and solder it along with the resistor to pin 6 of the 9-pin socket.
12. Cut a 2-1/2 inch length of orange wire and repeat the process for pin 1 of the 9-pin socket.



Figure 41

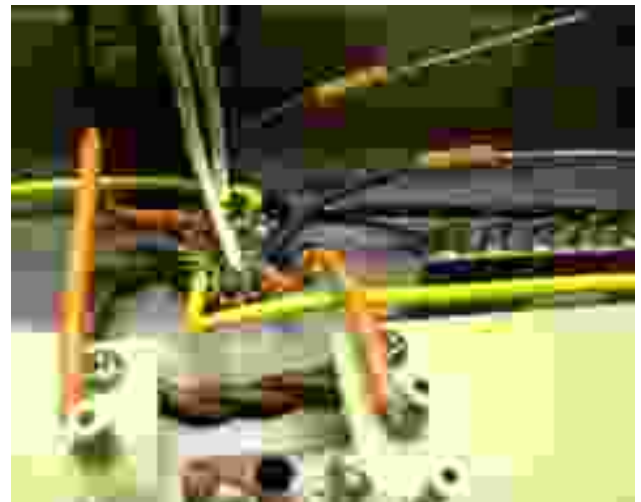


Figure 42

13. Solder the other end of each orange wire to the 1<sup>st</sup> terminal of each turret board as shown in Figure 42.

SECTION 3 – WIRING – continued

14. Refer to Figure 57. Solder a 1Kohm-1/2W resistor from the 3<sup>rd</sup> terminal of the turret board to pin 5 of the 8-pin socket. Repeat for the other turret board and 8-pin socket.
15. Refer to Figure 57 & 58. Solder a length of yellow wire from the 5<sup>th</sup> terminal of the turret board to pin 8 & 1 of the 8-pin socket. Repeat for the other turret board and 8-pin socket.



Figure 57



Figure 58

16. Refer to Figure 59. Form the leads of the (2) 220Kohm resistors so that the leads will fit into the turret holes and solder in place in the next set of turret holes.



Figure 59



Figure 60

17. Refer to Figure 60, 61, & 62
  - 17.1. Form the leads of the (2) 220uf-100V capacitors and the (2) 560 ohm-10W resistors as shown so that they will fit into the turret holes.
  - 17.2. Insert the capacitors, in the next remaining set of terminals, negative side toward the toggle switch, and solder in place.
  - 17.3. Insert the resistors in last set of terminals and solder in place.

SECTION 3 – WIRING – continued

NOTE: It is recommended to stabilize the 220uF capacitor on the turret board by using a glob of silicone sealant or hot glue under the capacitor. Press the capacitor down slightly to embed it in the sealant or glue.



Figure 61



Figure 62

18. Refer to Figure 62. Route a length of orange wire under the turret board and solder one end to one center terminal of the toggle switch. Solder the other end to pin 4 of the 8-pin socket. Repeat for the other center terminal of the switch and 8-pin socket.
19. Refer to Figure 63 & 64. Cut (2) 3" lengths of blue wire. Strip one end, tin, and form a hook as shown. Prepare (2) 100 ohm-1W resistors as shown, squeeze hooks together and solder. Shrink a length of heat-shrink tubing over the connections.



Figure 63



Figure 64

## SECTION 4 – FINAL ASSEMBLY & TESTING – continued

1. Mount the power transformer, the filter choke, and the two output transformers to the chassis. Refer to Figure 71 & 72 for proper transformer exit-wiring orientation.

NOTE: If you have purchased the Master kit the mounting hardware for these is included.  
If you are providing your own transformers the mounting hardware is not included.

- 1.1. For the Master kit transformers:
  - 1.1.1. Four nylon insulators go between the transformer and the chassis.
  - 1.1.2. Place the appropriate end-bell and then insert four nylon insulators.
  - 1.1.3. Insert bolts through the assembled transformer and chassis, then #8 lockwasher and nut.
  - 1.1.4. It helps to have another person hold the chassis vertical, on it's end, while you are attaching the transformers. The transformers are heavy and you DON'T want to scratch your chassis.
2. Wire the output transformers. Refer to Figure 71. If providing your own transformers, the wire colors specified in the following steps could be different.
  - 2.1. Cut the RED ultra-linear tap wires to length, solder/heat-shrink a 1.5K ohm resistor to the wire and solder the other end of the resistor to the toggle switch terminals.
  - 2.2. Cut the BLUE plate wires to length and solder to pin 3 of the 8-pin power tube sockets along with the 100 ohm resistor from SECTION 3- WIRING, step 34.
  - 2.3. Cut the YELLOW & BLACK output wires to length and solder to the speaker terminals.

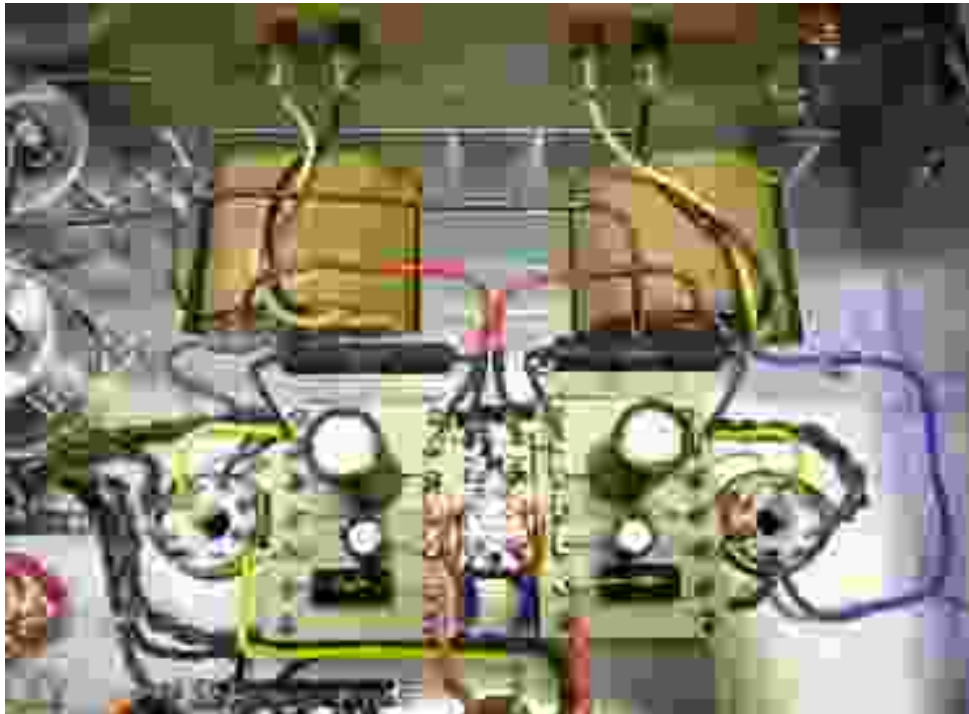


Figure 71

SECTION 4 – FINAL ASSEMBLY & TESTING – continued

- 2.4. Refer to Figure 71 & 72. Cut the BROWN B+ wires to length and solder them to a terminal lug of each 50uF power supply capacitor. The top-left lug of each as shown in Figure 72.



Figure 72

3. Wire the power transformer. Refer to Figure 72.
  - 3.1. One terminal lug of the 30uF power supply capacitor has been drilled out larger than the other three. This should be the upper left terminal lug as shown in Figure 72. Solder the RED/YELLOW STRIPE 750VAC center tap & BROWN/WHITE STRIPE 6.3VAC center-tap wires to this terminal. This is the power supply ground.
  - 3.2. Solder the 10 inch black wire from SECTION 3 – WIRING, step 21.2, to the other lug of the same terminal.
  - 3.3. Solder the GREEN/YELLOW STRIPE 5VAC center-tap wire to one lug of the remaining 30uF capacitor terminal. This is the unfiltered B+.
  - 3.4. Twist together the GREEN 5VAC supply wires and solder to pins 2 & 8 of the rectifier tube socket.
  - 3.5. Twist together the RED 750VAC supply wires and solder to pins 4 & 6 of the rectifier tube socket.
  - 3.6. Twist together the BROWN 6.3VAC filament wires and solder together with the filament wires from the power tubes & preamp tube to the terminal strip lugs. This is shown as the last two lugs on the right of the terminal strip in Figure 72.
  - 3.7. We will come back to the power transformer primary wiring later.



TESTING - continued

4. Leave one test lead connected to pin 4 of the rectifier tube socket and move the other test lead to the 750V center-tap terminal of the 30uF capacitor. This is the terminal on the left shown in Figure 77.
5. With the multimeter still set for 1000V AC range, turn on the amplifier.
6. The reading should be approximately 390V. Turn off the amplifier.
7. Leave one test lead connected to the center-tap terminal and move the other test lead from pin 4 to pin 6 of the rectifier tube.
8. Turn on the amplifier and the reading should again be approximately 390V.
9. Turn off the amplifier.
10. Using the test leads as in the previous steps:
  - 10.1. Be sure to turn off the amplifier between each of these readings.
  - 10.2. Connect to pin 2 and pin 8 of the rectifier tube socket, turn on the amplifier and check for approximately 5.5 to 5.7V. This is the rectifier heater voltage.
  - 10.3. Connect the test leads to the heater supply wires on the terminal strip, turn on the amplifier and check for approximately 6.6 to 6.7V.
11. If all these readings are correct we will now move on to check the DC supply with the rectifier tube in the circuit.

**ATTENTION:** Under normal operating conditions, with all tubes in place, the power supply capacitors will discharge rather rapidly. For the next test we are only going to install the rectifier tube to check the B+ supply. The power supply capacitors WILL remain charged for an extended period of time after the power switch is turned off unless discharged. This is discussed in step 24.



Figure 77

TESTING - continued

12. Turn on the amplifier and after about 30 seconds carefully take the following voltage readings using the positive meter test probe:
  - 12.1. The center terminals of the Triode/UL switch, power tube screen grid, should be approximately 10V less than the B+ voltage.
  - 12.2. Pin 3 of the power tube, power tube plate, should be approximately 4V less than the B+ voltage.
13. Turn off the amplifier. If all of the above readings check out OK, you are now ready to test the amplifier with an audio source.
14. Set down the amplifier in the normal position.
15. If using dummy speaker loads, disconnect them and connect a set of speakers, observing correct polarity.
16. Connect an input source such as CD player, MP3 player, PC audio, etc.
17. Switch the Triode/UL switch back to the triode position.
18. Make sure that the volume control knob on the amplifier is turned completely counterclockwise.
19. Turn on the amplifier, wait about 30 seconds, start your audio source, and slowly turn up the volume.

This amplifier is a simple design and there is very little chance that you have not been successful. At this point you can turn off the amplifier, wait 10 seconds and switch to the ultra-linear mode. When listening in the ultra-linear mode, you will notice that the amplifier has a little more power.

It is recommended to run the amp for a few hours and then check the operating voltages again that start at step 29. There is no need to reconnect the dummy-loads, just leave your speakers connected. If you have access to an oscilloscope, function generator, etc. you may want to perform additional measurements and testing that is beyond the scope of this manual.

The only thing left to do now is turn off the amplifier, unplug it, complete the assembly. If you have purchased the Master Kit this involves installing the walnut side panels, and the bottom plate, as well as the volume control knob. Then just crank it up, sit back and enjoy.

One important note concerning the volume control knob. It is not easy to find an inexpensive control knob for a 6mm shaft like the Alps volume control has. The control knob included with the kit is for a 1/4" shaft that is slightly larger. If you wrap about 4 turns of common cellophane tape around the shaft and trim flush with the end of the shaft, it will hold the knob in place so that when tightened it won't appear out of alignment when turned. An Allen wrench is included to tighten the control knob set screw.

I certainly hope that you have had fun building this amplifier and that it has been a positive learning experience.

If you have any questions or comments, please contact me at <http://www.diyaudio.com> under the user name "scitizen17".