

This document describes the start-up procedure of the Vanderveen-Trans-PP80. 2023-01-09

Start with the low voltage sections of the power-PCB and the driver-PCB:

1. Place the power tubes.
2. Remove the high voltage fuse-1 and fuse-2 from the power-PCB.
3. Switch on mains and check the voltages +8 Vdc and -8 Vdc with reference to audio-ground.
4. Do the same for Vn+ to read 120 Vdc with reference to audio-ground
5. Check on the driver-PCB on each opamp at their opamp-output pins (pin-1 and pin-7) to read less than 5 mVdc with reference to ground.
6. Check the filament glowing of the power tubes.
7. Switch off mains.

The following checks 8-17 control the high voltages sections $\frac{1}{2}B+$ and B+. Please take all safety precautions, like only one hand inside the amp if you must, no hands at all is better, stand-sit stable on an isolated surface-chair, wear none metal objects on hand and arms, arms are protected by clothes, a next person being present to switch-off the mains in case of hazard (never touch a person under high voltage stress), and so on.

8. Remove the power tubes.
9. Place fuse-2 and connect your voltmeter between B- and $\frac{1}{2}B+$.
10. Switch-on mains and trim with R10 the $\frac{1}{2}B+$ to 355 Vdc. This will take about one minute.
11. Switch-off mains and wait several minutes for the supply to discharge to below 25 Vdc.
12. Connect your voltmeter between $\frac{1}{2}B+$ and B+, place fuse-1.
13. Switch-on mains and trim with R4 the $\frac{1}{2}B+$ to B+ voltage to 355 Vdc. Take about one minute for stabilizing of this voltage.
14. Switch-off mains and wait several minutes for the supply to discharge to below 25 Vdc
15. Connect your voltage meter between audio-ground and B+.
16. Switch-on mains and read $120 + 355 + 355 = 830$ Vdc after about 1 minute.
17. Switch-off mains and wait several minutes for the B-supplies to discharge to below 25 Vdc.

Next the trimming of the quiescent current per tube ($I_o = 60$ mA) is described.

18. Place the power tubes
19. Place the two fuses -1 and -2
20. Place a DC-voltmeter over R31 and also one over R33. Set their scale at mV range
21. Make sure that the I_o -trim-pots are turned completely left (counter clockwise)
22. Set the volume-pot to zero
23. Load the output with an 8-Ohm resistor and connect the output to your oscilloscope (to check for possible oscillations)
24. Switch-on mains, wait a minute and slowly turn R10 clockwise until you read 60 mVdc over R31. Next do the same for R11 with reading of 60 mVdc over R33.
25. Check the trimming after 10 minutes and again after half an hour, to correct for minimal drift.
26. If this all does not function or is unstable: check your scope for oscillations. If so, your internal wires are too long. Short and direct wiring is essential for stability.
27. Switch-off mains.

Trimming of the AC-balance

28. Load the amp-output with an 4 Ohm resistor which can handle several watts.
29. Connect an oscilloscope or distortion meter or spectrum analyzer to this output
30. Deliver a clean 1 kHz sine voltage to the amplifiers input
31. Switch on the amp and crank up the volume till 2 Vrms at the loaded output
32. Trim R9 for minimal 2-nd harmonic distortion (minimum 2 kHz distortion)
33. If you don't have a spectrum analyzer or distortion meter, please set R9 to its mid-position. Then you are close to the optimum.
34. Without advanced equipment, you can crank up the volume of the 1 kHz sine, almost to maximum power. (Make sure that the resistor loading the output can handle 100 Watt at least). Then trim R9 until you hear minimal singing of the output transformer.
If you still have your voltage meters over the cathode resistors R31 and R33, you will notice that minimal singing means equal cathode currents (about 120 mA, rms reading) at maximum output power.

The next description is about advanced fine-tuning of Io and AC-balance. You need a quality function generator and spectrum analyzer (like Arta⁽⁷⁾).

35. Again trim R9 for minimal 2 kHz distortion of the 2 Vrms 1 kHz sine signal.
36. Next deliver 40 Hz sine to the input and set the output level at 2 Vrms
37. Fine-tune Io of ONE tube, until the 80 Hz distortion component is minimal.
38. Background: When you trim Io as described to 60 mA, you might encounter that $I_a = I_o - I_{g2}$ is slightly different between the two push-pull tubes caused by differences in I_{g2} . Because I_a drives the OPT, this slight difference in I_a partly magnetizes the OPT-core, creating extra second harmonic distortion. With slightly adapting of Io of one tube, the difference can be brought to zero, meaning equal I_a in both tubes.
39. You are done.