

Testing and initial power up.

These are the testing steps I went through when powering up the boards the very first time. If any test failed, I went back, documented the issue, produced a workaround or a fix and updated the design to make the next release better.

Low voltage DC power up.

Transformer checks

Primary connection

Measure the primary winding. There may be many connections.

Find the pair of connections that have the largest resistance.

Connect these, in a safe way, to the mains voltage. You should hear a very soft hum from the transformer. If it makes more noise than a soft hum, you might have connected to the wrong winding or a pair of connections to the primary winding that was not designed for your mains voltage.

Now let the transformer run on mains voltage without connecting anything to the secondary winding(s).

Observe it for 10 minutes, then disconnect it from mains, and feel it with your hands. It should not feel warm anywhere.

If it gets noisy, or warm, or if you see smoke or you feel any smell from it, disconnect immediately. The primary test has failed.

Secondary winding check.

Now turn to the secondary winding. It should deliver at least 2x16V with a mid tap.

Identify the mid tap by measuring the voltage between the different connections. Find one pair that gives 32-48 Volts. These are the outer connections. The mid tap is the third one. Check that the voltage between the mid tap and the outer connections is between 16 and 19 V and absolutely no more than 24V. When done, disconnect the transformer from the mains.

G1-ALC Low voltage check

Connect the secondary winding connections to J101 of the G1-ALC board with the mid tap to the middle pole of J101. Turn the transformer on.

Check that the DC voltage between ground and the pole of J107 closest to the corner is 22-27V

Check that the DC voltage between ground and the pole of J107 next closest to the corner is 11.8-12.3V

Check that the DC voltage between ground and the anode of D118 is about -12V.

Let the voltage be on for a few minutes and check that nothing is getting warm.

G2-Control low voltage check

Turn off the transformer.

Make connections between J108 on the G1-ALC board to J104.

The pin order is the same on both boards so you could use a flat band of wires.

Verify the connection between J108 on the G1-ALC board to J104 by measuring the resistance from, JP101, pin closest to the corner, to J108, the pin closest to J107, i.e. the middle of the board edge. It should be 0-0.2 ohms.

Unplug any jumper on JP101

Turn the transformer on again.

Check that the DC voltage on the pin closest to the corner of J104 is 22-27V

Check that the DC voltage on the 4:th pin from the corner of J104 is 11.8-12.3V

Check that the DC voltage on pin 1 of U4 is 5V.

Turn the transformer off

Re-plug any unplugged jumper on JP101

G2-Control G2 rectifier low voltage check

Connect the low voltage transformer secondary to J102 on the G1-ALC board instead of J101.

Turn the transformer on

Check the DC voltage between CATHODE and G2-unreg pins of J108.

(These are the two pins of J108 closest to J104) You should see about 44-52 Volts, depending on the transformer.

Note that this is just a check using low voltages, in the final setup the voltage should be considerably higher.

Turn the transformer off

G1 voltage power up

Transformer check

Apply mains power to the primary winding. Measure the voltages on the secondary windings,

Find out which winding gives about 100 VAC, and which gives more than 300VAC.

Disconnect the transformer from mains.

Check voltages of the G1 section

Connect the low voltage transformer secondary to J101 on the G1-ALC board. J102 should be unconnected.

Connect the secondary 100 VAC winding to J104. Leave the 300VAC winding unconnected and isolated.

Smoke test. If something smells warm or smoke erupts, turn off both transformers immediately

Configure for G1 switching

If R107 is a resistor and not a link:

Connect a link between J102 pin 5 and J103 pin 5 on the G2-control board.

Connect a wire between J103 pin 4 and J3 pin 4 on the G2-control board. (CATHODE)

Connect a wire between J102 pin 4 on the G2-control and J103 pin 1 (G1 Switch) on the G1-ALC board.

Apply mains power to the low voltage transformer

Check with an ohmmeter that there is no connection between 102 pin 1 (G1 Switch) on the G1-ALC board and J3 pin 4 on the G2-control board. When pushing the PTT switch, the relays should click and the ohmmeter should read near 0 ohms. Release the button and the connection should disappear.

Disconnect mains power from the low voltage transformer

Wire up for PTT and Class select

Connect a PTT button between J1 pin2 (PTT_L) and J3 pin 7 (GNDPWR) On the G2-control board

Connect a SPST switch between J107 pin 1 and 4 on the G1-ALC board. (CLASS AB1_L). Set the switch to open.

Test G1 output voltages

Apply power to the low voltage transformer.

Connect both transformers to mains voltage.

Beware, there is now lethal voltages available at the cards.

Check that the DC voltage on the 4:th pin from the corner of J104 to ground is 11.8-12.3V

Check the G1 out voltage against the CATHODE rail (J108 pin 2), should be less than -100V.

Press the PTT button. The voltage should rise to about -93 to -92 Volts depending on the position of RV102.

Release the button.

Flip the SPST switch to the ON (Class AB1) position.

The voltage should be between -84 to -81V depending on the position of RV102

With the PTT button pressed, the voltage should rise to about between -50 to -56V V

Check that there is about 12V on J107 pin 1 against ground.

Disconnect mains power from the transformers

G2 voltage check and adjustment

Check 30V Rail

Now, with the transformers off, connect the 100 VAC winding (NO, not the 330V yet) to J102 on the G1-ALC board.

Connect the voltmeter between pin 4 and 7 of yet empty socket of U2. Positive on pin 7.

Turn on the transformers. The voltmeter should show +30V approximately. If not, fix before continuing. The 748 is precious!!

Turn the transformers off again.

Install the 748

Now it's time to put in the 748 in its socket. **IMPORTANT!** Do not continue without it or you will burn R13 due to VDR1 clamping the overvoltage produced without the 748 regulating it down below 400V. Observe the polarity of the 748.

Connect the 330 volt winding

WARNING EVEN MORE LETHAL VOLTAGES WILL BE PRESENT DURING THESE TESTS

Disconnect the 100V Winding from J102 and put it back into J101.

Connect the 330V winding to J102 instead.

Test and measure the unregulated G2 voltage

Connect the voltmeter negative end to the CATHODE rail (J108-2 on G1 board)

Connect the voltmeter positive end to the G2-UNREG output (J108-1 on the G1 board)

Turn the transformer on briefly, the voltmeter should show between 350 to 400V.

If voltages seems OK, turn on for 10 seconds and then off.

Look and smell for smoke and heat building up. DO NOT TOUCH ANYTHING until the voltmeter goes below 30V.

Measure and adjust the G2 regulated voltage output

Now move the positive probe to the G2 Reg output (J3 pin 3)

Adjust RV102 to its middle position.

Turn the transformers on again.

Voltmeter should show 0 V because the relay connects to the CATHODE rail.

Push the PTT Button, the relays should click and the voltmeter should show over 300V.

Adjust RV101 while pushing the PTT switch until the voltmeter shows 350V.

Release the PTT switch and turn the transformers off.