C22 Vacuum Tube Preamplifier Complete User Manual

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INTRODUCTION

The circuit design is with referenced to the classical McIntosh C22 pre-amplifier. It uses three 12AX7 vacuum tubes for amplification and uses one pentode-triode vacuum tube 6F3P (6BM8) as voltage regulation. Vishay 1N5062 forming a bridge provides for full-wave rectification. The resulted ~300V DC. A low dropout regulator LM1084 is used to supply the filament. As all resistors and capacitors are low-noise with good channel matching, the sound quality should have low distortion.

FEATURES

- Three vacuum tubes 12AX7 and one 6F3P (6BM8/ECL82)
- Two single-ended inputs and two single-end outputs for stereo
- Voltage gain: 22dB
- Dynamic range: output voltage max. 20Vrms
- S/N ration: >90dB
- Built-in voltage regulation circuit.
- Optional mounting holes for delay protection module.
- Power requirements one 260V AC(200mA), one 15V AC(1A), and one 6.3V AC(1A)
- PCB dimension: 110mm (W) x 250mm (L)
- PCB thickness: 2.5mm, double layer, 2oz copper.
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PRECAUTIONS

- Do not use finger or any body parts to touch the components or board! It is hazardous, since the high voltage capacitors may not be fully discharges after switched off the power supply.
- Turn off the power supply if the transformer is getting hot or some smoke is observed or strange buzz sound is heard.
- Fuse should be used either in power transformer or main socket to avoid accidentally large current drawing.
- Always contact technicians or experts to seek help.

PROCEDURES

1. Solder all the components according to the schematic, part list, and photos. Notice to the polarity of the high voltage capacitors and the direction of the Zener diodes.

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2. Either connect delay output protection module (optional) to the jumper J6 and J7 or short it.

3. Connect the power transformer 280-300V AC, 12-15V AC, and 6.3V AC to the board, without plugging the vacuum tubes.

4. Measure the AC voltages at the connectors to see whether the voltages are maintained that are 280V AC, 15V AC and 6.3V AC.

5. If the voltages are correct, plug in the tubes and turn on the main power.

C22 Preamplifier with Tube Voltage Regulator

1. Connect an IEC power socket and a power transformer T120 as shown in Figure 1. Two secondary windings (115V) of the transformer T120 are connected either serially or parallel for main power supply of 220V or 110V, respectively.



Figure 1: Connection diagram between IEC power socket and the power transformer.

2. Connect the secondary windings (two 360V, 5V, and 6.3V) of the power transformer to the connectors (J1, J2, and J3) of the tube voltage regulator respectively as

illustrated in Figure 2. Then, use a metal wire to short the connector L1 (displayed as yellow line)

3. Plug in the vacuum tube EL84 and 6J8 (EF86), and turn on the power supply. Measure the output DC voltage at J4. Adjust the resistor trimmer VR1 of tube regulator board so that the output voltage reaches 290V DC. This 290V is the B+ voltage for C22 preamplifier.



Figure 2: Connection diagram between the power transformer T120 and the tube power voltage regulator.

4. Connect the B+: 290V DC and ground (J4) of tube voltage regulator board to positive and negative terminals of C15 of C22 preamplifier board respectively, as shown in Figure 3. Also, connect the secondary winding (15V AC) of T120 to the J3 of C22 preamplifier board for tube filament supply.



Figure 3: Connection of power supply by the tube voltage regulator to the C22 preamp.

- 5. To power up the input selector board and the delay protection board, the power supply ~12V DC can be obtained from the positive terminal of C13 or from the low voltage part of the tube voltage regulator, either J6 or J7 of tube voltage regulator board.
- 6. Connect the output (marked with Ro+ and Lo+) of input selector to 23 step attenuator and the output of 23 step attenuator to C22 preamplifier as in Figure 5.



7. Finally, wiring all the connections according to Figure 5

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Figure 5: Full C22 preamplifier connection diagram.

- 8. Plug in all the tubes (EL84 and 6J8 to power regulator board, and three 12AX7B to C22 preamplifier board)
- 9. Switch on the power supply without applying any input signals and check again the B+ voltage (~290V) and filament voltages (~12.6V). Also, a 'click' sound from a delay protection board will be noticed after a few minutes. This means the delay protection module is functioning.
- 10. If the B+ voltage and tube filament voltage are correct, then apply audio signal to the input of input selector and selector the channel by the rotary.
- 11. Enjoy it.

If you have any problem in assembly, please contact us by email to tech@analogmetric.com

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