

MLA-2500B

Tube Conversion

8874/3CX400A7, 3CX800A7, 3CPX800A7



The MLA-2500B is a nice, compact amplifier! Don't let it stay there and only collect dust due to bad 8875 tubes! You can easily convert it as described here, and you will have a nice desktop amplifier!

As the 8875 tubes used in the MLA-2500 series are not produced anymore, these tubes are getting more and more hard to get. Therefore I decided to convert the amplifier to a tube which are more easily available. The 8874/3CX400A7, 3CX800A7, 3CPX800A7 triodes are all very good candidates, as they are very similar to the original 8875. All uses the same socket. The 8874/3CX400A7 is electrically identical to the 8875, as the 3CX800A7 and 3CPX800A7 uses a 13.5 Volts filament voltage. Converting to these triodes requires less additional circuitry than converting to tetrodes.

Shown below is the maximum power dissipation for the tubes.

Tube	Plate Dissipation (Max)
8875	300 Watts
8874/3CX400A7	400 Watts
3CX800A7, 3CPX800A7	800 Watts

The 3CPX800A7 differs from the 3CX800A7 primarily by added length of the insulating ceramic, and will fit in the exact same socket, but is capable of holding off higher plate voltage.

On the 8875, the cooling air is applied horizontally through the horizontal anode cooling fins. On the 8874/3CX400A7, 3CX800A7 and 3CPX800A7, the cooling air must be applied axially (vertically) through the vertical anode cooling fins.

Tubes of this kind, uses mostly a pressurized chamber below the tube socket. However, the very compact MLA-2500B and its limited space below the tube sockets does not easily permit that method.

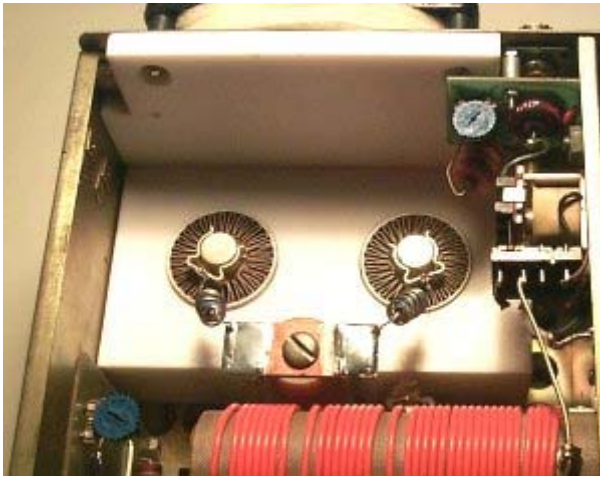
Instead a **pressurized anode compartment** will be used, so that the direction of the air flow will change from horizontal to a vertical direction through the cooling fins of the tubes.

A small amount of air flow going down through the tube socket to cool the tubes pins and socket itself could be an advantage. (See the ARRL Handbook). There are a small gap around the sockets, which will bleed some air. If the sockets are not centered in their holes, loosen the three mounting screws and position the sockets so they are centered in the holes. Tighten the screws. If you want more air flow, put a washer on each of the three mounting screws, between the chassis and the socket mounting tabs, so that the sockets are positioned a bit higher than the chassis, which cause a larger air gap between the socket and chassis. (The socket holes in the Teflon bottom plate are larger than the socket itself.)

The anode clips used is the Svetlana AC-1.

A **pressurized anode compartment**, using **Teflon PTFE** material, was designed and produced, using a milling machine. The goal was to make a stable, infinite lifetime compartment. The 8874/3CX400A7, 3CX800A7 and 3CPX800A7 will all fit in this anode compartment. The only difference is the diameter of the two holes for the anode cooler.

The anode compartment consists of three parts: chamber, bottom plate and deflector plate.



8874/3CX400A7



3CPX800A7 w/ FAN thermal switch installed



8874/3CX400A7 3CX800A7, 3CPX800A7

The compartment is fixed to chassis by two screws going through the chassis, the bottom plate and into threaded holes in the chamber, (see two holes in bottom plate). The deflector is fastened by two screws through the rear panel into threaded holes in the deflector. The deflector is also holding the chamber in place / down. The four metal screws used, is M4, 12mm length.

Prior installation of the anode compartment, it's recommended that the **Relay** and **ALC** RCA jacks are replaced (due to wear and tear). Position the ground lug on the Relay jack down, so it will not interfere with the anode compartment installation.

The RF Choke, RFC2 have to be moved about 3mm towards the front panel.

When installing the anode chamber, apply a thin film of silicone adhesive sealant between the teflon surfaces, and teflon to rear panel surfaces, so that any small gaps will be filled up. I used the DOW CORNING 732. (Note that adhesive will not adhere to teflon ptf material).

8874/3CX400A7 conversion.

This tube is electrically identical to the 8875, so no electrical modifications are required. For Fan thermal switch installation, see picture above.

3CX800A7, 3CPX800A7 conversion.

Using these tubes require some electrical modifications as they use a 13.5 Volts filament voltage.

You could use a separate filament transformer, but there are no space inside this amp to mount a transformer. A possibility is to mount it outside on the rear panel.

However, the 12.6V, 4 A winding on the transformer T1 will be used. The 6.3V, 8 A winding will be used for the lamps and relays.

This amplifier should use a step start in any case, due to the high transformer T1 inrush current, and also to have a soft start of the filter capacitors in the high voltage supply. With a properly designed step start, also the filament inrush current will be reduced to an acceptable level. Therefore, it is no need to use a small, separate filament transformer to reduce the filament inrush current.

The 3CX800A7 and 3CPX800A7 specified filament voltage is $13.5V \pm 0.6V$, 1.5A / tube. The output of the T1 12.6V winding is too low that it can be used. However, the output voltage can easily be increased by adding a 1/3 winding to the 12.6V winding. After doing so, the

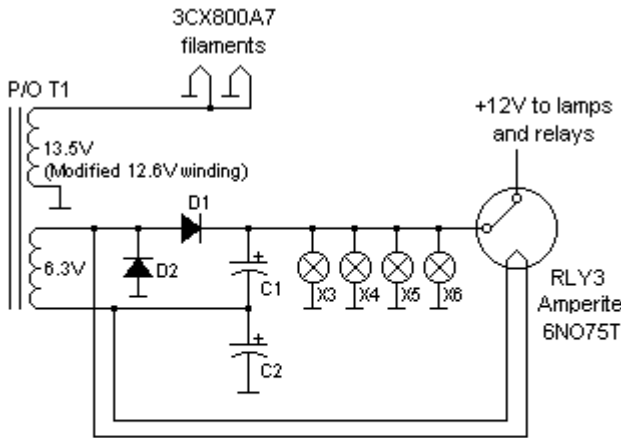


filament voltage was measured to 13.4V at 230V line voltage, which is good, as the line voltage here sometimes are a couple of volts lower. Keeping the filament voltage on the low side, will increase the life time expectancy of the tubes.

Adding a 1/3 winding to the 12.6V winding:

On the 12.6V winding, leave one end as it is to chassis ground. At the other end of the winding, connect a 22 AWG teflon covered wire. Carefully make a hole in the transformer plastic sheet insulation, see lower white circle. Push the new teflon wire through this hole, and it will exit the transformer on the opposite side, see upper white circle. From there the wire is going to the filaments.

Where the wire enter and exit of the iron core, I put a piece of insulating sleeve to protect the wire.



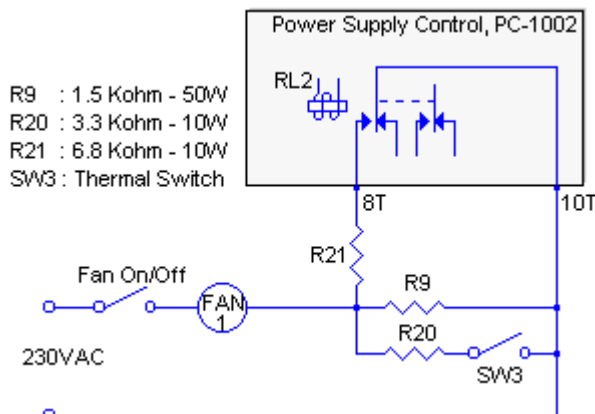
The 6.3V winding is now connected to a full-wave voltage-doubler which is supplying +12V to the four lamps in the panel meters (X3 - X6), ready / transmit lamps and relays. This voltage is varying from 12.6V to 9.5V, depending on the load (all lamps and relays on or not). A more stable voltage is not necessary for the operation of the lamps and relays.

I mounted the full-wave voltage-doubler underneath the chassis / PC1003 Switch Assembly area.

The 6.3V winding is also connected to the heater in the thermal time-delay relay RLY3. This relay has a 75 second time-delay. The recommended warm-up time for these tubes are 3 minutes. The time-delay can be increased to 3 minutes, by connecting a 1W, 6 to 7 Ohms resistor in series with the heater.

- C1, C2 : 1000uF - 35V
- D1, D2 : 1N5408 - 3A
- X3 - X6: 386

DENTRON MLA-2500B 3CX800A7 conversion



- R9 : 1.5 Kohm - 50W
- R20 : 3.3 Kohm - 10W
- R21 : 6.8 Kohm - 10W
- SW3 : Thermal Switch

The cooling of the tubes is excellent! The fan installed, is a **EBM / PAPST 4650N**, mounted on four noise & vibration isolators, as explained on my MLA-2500B page. On the same page you will also find more about the fan.

When keying the amp, the fan will increase in speed during transmit. If the thermal switch activates, the fan speed will increase even more.

The thermal switch SW3, (PCI CLR115), closes at a temperature of 46° C, (115° F). I mounted it on the left metal sidewall, see picture above. Note that the value of R21 is 6.8 Kohm which is different than when I used the 8875 tubes.

To cool the tubes after switching off the amp, a separate Fan On/Off switch is mounted on the front panel.

I went for the 3CPX800A7 tubes for my MLA-2500B. I bought them in the U.S., as so called "Pulls", and therefore cheaper as new ones.

You should also replace the grid meter shunt SH2 to 0.462 ohm, so that the grid current meter full scale will be 100mA, as explained on my MLA-2500B page.

TUNE-UP: Keep grid current below 100mA, and plate current below 1A.

If any questions about this conversion, please send me an email.

Copyright© 2001 - 2003. KRISTRONIC.com All Rights Reserved.

www.kristronic.com/lx2kl
