Time lasting amplifiers ?

By Leo Polisois.

When a solid state amplifier ceases to work, it is not really a tragedy. We are used to it and it does not take a fortune to find a suitable replacement. Not surprising, they are built by the millions

This is not the case of a valve amplifier. This product fills a tiny niche of the whole reproduction devices world, how tiny, it's hard to tell. Anyway, if the failure concernes a solid state amplifier, you can get a new one for just few hundred dollars. It's not the case of a valve amplifier of good standing.

Newcomers that decide a valve amplifier are usually reluctant to spend a large amount of money to make their first or second a prototype units, and this is quite understandable. Reputed valve amplifiers manufacturing companies would not take any risk manufacturing and selling cheap ones and their price is quite consistent.

Considering that the an acceptable quality output transformer, alone, is sold at no less than 100 $ (and you need two of them), by adding th cost of valves, cabinets, chassis, power transformers, other components, labour, etc. you quickly reach a relatively high level.

Scale economies don't help much, here.

Another striking point is the power output. Forget immediately to compete with solid state amplifiers, that claim easily 100W per channel, even with a 20W push-pull valve amplifier, highlighting its sound qualities. Its cost would exceed that of the former by four times at least.

Is the war lost ?

Not at all.

Solid state amplifiers of commercial quality (there are, of course, some exceptions with excellent quality but they cost much more) are bought by the millions because of their lower price, the only other performances checked by the customers being, in general, the power and the bass range claims.

It requires one or more listening opportunities to convince a potential buyer to make up his mind at the advantage of valve sets. With few exceptions, the impression is positive and lasting, the difference in sound being obvious. When you become a valve amplifier fan, you accept to hear "solid state music", now and then, just because you have no other choice.

No doubt transistors, Ics and other solid state devices are wonderful in many application fields and totally responsible for the immense progress achieved since they have been invented. But when it comes the audio reproduction, the valves keep their deserved superiority.

From the diy community's point of view, valve amplifiers "look" simpler, as they have all connections quite visible and easy to follow, whereas a solid state amplifier is much more complicated and generally comprises a lot more of components. The old generation, of course, is practically 100% for valve amplifiers and a lot of younger audiophiles (like myself) join them every day, contributing to keep the field active and efficient for a longer time.

How long ? It surely depends on keeping high the tube amps reputation, as our grandfathers did so well. Some pitfalls must be avoided, such as choosing critical circuits that result in a questionable sound or jeopardise the performance and life. That's why you must be very careful.

If you agree and you want to contribute, make an amplifier with a long life in mind (for grand-children – collection or just for your own satisfaction and pleasure, as long as you live and are able to enjoy it) and stick to the following advices:-

1. Use easy to find valves and not only the ones available at present, but also in many years to come. Many old types are still reproduced in industrial quantities, in different countries. These types should be preferred because the valves age and need to be replaced sooner or later, depending on the time spent and listening conditions.

2. How often a valve needs to be replaced ? It depends on the pressure you put on it. The manufacturers' data sheets state the maximum power dissipation, that ranges from 10W to 150W. Use your valve well below this extreme figure and it will last longer. At 75% of max.power, chances are its life will be more or less the one claimed by the manufacturer, but at 50% it will be much longer. Should you decide, for some reason, to use new-old-stock valves (NOS), preference should be given to the "military" types that were designed and built to withstand increased stress.
3. Be careful to follow the recommended voltages for the heaters, as well as anodes.
4. Give the valve enough time to warm up, before drawing the full anodic current.
5. Do not exceed 80% of the maximum admitted anode current at idle condition. Some more will be drawn by the alternating current.
6. Make sure that the contact, between pins and socket, is tight. Bad contacts generate heat and heat can damage the valve pin.
7. Make sure the valve is well fixed in the socket and does not move.
8. Coming to resistors : calculate generously the power dissipation that takes place in them. If you find 1W (for instance 10V at 100mA) use a resistor rated 2W and so on. Remember that a hot resistor generates noise.
9. The resistors can withstand a certain voltage at their terminals, irrespective of the power dissipated; if you exceed this value you can destroy them. This applies particularly to ¼ and ½ W resistors.
10. As to capacitors, use the proper quality, according to the schematics recommendations. They must have a generous tolerance with respect to the nominal working voltage, because it is liable to be be exceeded, in some cases, by high amplitude peaks. Remember that the electrolytic capacitors "die" with time. Sometimes their capacity falls to zero (this happened regularly with the old times capacitors, because their liquid dried), or they become short circuited, in which case it would not be useless to insert, from the start, a fuse in the line. Being the weakest point of an amp in consideration to life (after the valves), put the capacitors in an accessible position, where they can be easily removed and replaced. Let them stay away from heat sources. Most of them are in danger if they are located next to the power valves or to a heating component (bleeders, filtering resistors, etc.).
11. Special care should be taken in choosing the potentiometers or variable resistors. Check that they can handle the current flowing in them. Also, if they are frequently adjusted, use high quality components of suitable material. Price and brand names, here, are a good indication, if you are not familiar with the materials' characteristics.
12. Valve sockets should be of good quality. If the valves's temperature is high, ceramic or similar materials are compulsory. Make sure the heat around them is easily dissipated. Drilling holes around them creates an air flow, cooler, coming from below.
13. Output transformers should have a solid winding to winding and winding to metal insulation. The internal resistance of the windings should not be subject to currents exceeding the wire's rated density in Amperes/sq.mm.
14. Connecting wires should have a suitable insulation factor and they should not be too long. Avoid protruding and bare wires that could cause sparks or corona effects.
15. Fuses should be carefully sized and placed where they can easily be replaced. Connecting a neon bulb (with a series resistor) to the fuse holder terminals has the advantage of calling the user's attention, in case the fuse burned.
16. Switches should be of the right rating both in amperes and volts.
17. Heating components should be in a ventilated place. The air flow path should be wide and easy.

18. Soldered points must be perfect, otherwise, sooner or later, they will cause awful problems.
19. Make a copy of the full schematics, possibly with the normal voltages measured in good working condition, and save it inside the chassis, folded and sealed. It will help the future service man to restore the original quality, quickly and easily.
20. Finally, a word on security: **all dangerous parts and connections must be protected against any danger of getting shocks**. Put some warnings next to them.

Leo (Jan.2009)