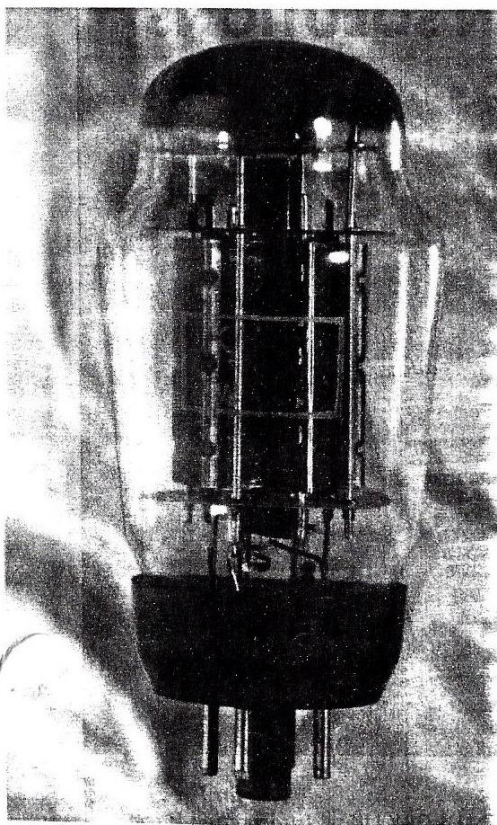


**Having designed a 32W power amplifier with a full power bandwidth of 5Hz to 55kHz and 0.07% distortion at 20W, Jeff Macaulay has found that combining valves and semiconductors can produce unexpectedly good performance.**

# Hot audio power



**D**espite rapid advances in semiconductor technology that have occurred over the past few decades, there are many audiophiles who believe that valves are best. Although at first sight this idea may seem ludicrous, it may not be quite as fanciful as some of the dubious products that the high fidelity industry has come up with of late.

Despite disadvantages of separate heater supplies and the need for high voltage supply lines, valves do have some advantages over their semiconductor rivals.

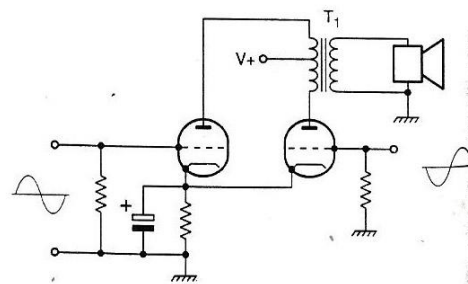
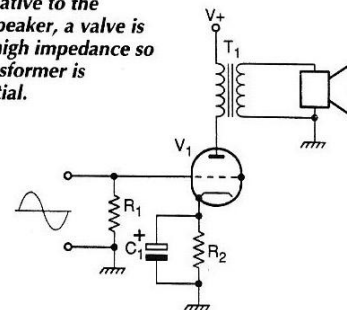
## Why use valves?

Firstly, valves are easy to drive. At low frequencies the grid of a valve has an impedance approaching  $100\text{M}\Omega$ , but without the large parallel capacitance of a v-fet. Similarly, being mechanical devices, the characteristics are far better matched between samples than, say, transistors from the same batch. Consequently, a class-AB amplifier output stage built with valves can be far more linear than a solid state equivalent. Most surprisingly of all, for those of us weaned on silicon, is the amazing amount of abuse that valves can take without disappearing in a puff of smoke.

It was in the spirit of curiosity that the design described here was developed. It uses a pair of formerly widely used EL34s driven by a solid state circuit.

There are several reasons why the EL34 is a good choice of output valve. Primarily, it has

**Fig. 1a. Simplest form of valve amplifier is Class-A. Relative to the loudspeaker, a valve is very high impedance so a transformer is essential.**



**Fig. 1b. In the conventional valve output stage, equal and anti-phase signals are applied to the grids to generate push-pull output.**