51 class A B amplifier

a class A amplifier with class B efficiency

Class A amplifiers are well-known in the audio world for their low distortion figures and big heat radiation. Manufacturers have always tried to design an amplifier having the advantages of class A without the drawback (heat). During the last few years they came up with several solutions. One of them was found by the Japanese manufacturer Matsushita, who developed an ingenious method that makes a 350 W class A amplifier possible without the 'heat problems'. The amplifier described here follows the same principle, but with one major modification: The output power is reduced considerably, in order to simplify the construction. After all this is a 'summer circuit' not an 'annual circuit'.

The circuit diagram shows a normal power amplifier at the left-hand side with an output stage consisting of a TDA 1034. The final stage (T1 . . . T4) is set in class A mode. The dissipation remains low, because the final stage is fed by ± 5 V. However, this supply voltage is much too low for the amplifier to deliver enough power. For this reason, the zero of the symmetrical 5 V supply is connected to the output of a second, straightforward power amplifier consisting of IC2 and T5 . . . T8. This amplifier is in class B mode and is fed with the same input signal as the first amplifier. The main difference is the fact that it operates with a higher supply voltage: ± 18 V. The amplification factor of the second amplifier equals that of the first. The loudspeaker is connected between the output of the first amplifier and the zero of the 18 V supply. The zero of the 5 V supply is connected to the output of the second amplifier.

Any input signal will now drive both amplifiers simultaneously. This means that a voltage is 'added' to the zero of the 5 V supply by the output of the second amplifier, which has the correct value and polarity for the first output stage to deliver the desired power to the loudspeaker. During the positive swing of the signal waveform, the collector of T3 is at the necessary output voltage plus 5 V. When it swings negative, the collector of T4 is at the required negative output voltage minus 5 V. In this way the amplifier operates in class A mode, but the dissipation remains nearly the same as that of a class B amplifier, as the supply voltage 'runs along' with the input signal.

When using this method it is a must that the input amplifier (IC1) can be driven to the high supply voltage. Therefore IC1 is supplied with ± 18 V. Furthermore, the 5 V supply must deliver a current that at least equals the peak current flowing through the loudspeaker. The power supplied by this amplifier is approximately 15 W into 8 Ω (this is class A).

When constructing the circuit, make sure that the 5 V supply is completely separated from the 18 V supply. Use a mains transformer with two completely separated secondary windings with a centre tap, or even better, use two transformers. Only the zero of the 18 V supply serves as ground for the circuit and the loudspeaker.