

15/20W AUDIO AMPLIFIER

A high-quality 15/20W audio amplifier circuit is shown in Fig. 79. This amplifier is designed to operate in class A into an 8Ω load, giving an output of 15W. With a 4Ω load, however, the circuit will operate in class AB to give 20W output power. The total harmonic distortion is less than 0.1% at full output.

The amplifier will withstand normal overdrive conditions and does not require additional protection against short-circuit conditions.

Circuit Description

The output transistors, a matched pair of BD181 devices, are driven by two BC338 transistors. These transistors are preceded by a phase-splitting stage using two BC147 transistors, and a pre-amplifier stage, a BC158.

A BC158 transistor is used in the pre-amplifier stage. A.C. and d.c. feedback is applied, giving an input impedance of $150k\Omega$. This stage also provides stabilisation of the mid-point voltage, which is set by adjustment of the preset resistor R_1 .

Phase splitting is achieved by transistors TR_2 and TR_3 connected in a long-tail-pair configuration, and local feedback is applied by resistor R_{11} . A supply voltage higher than that applied to the output stage is necessary to increase the voltage swing available.

The driver transistors TR_4 and TR_5 are bootstrapped by capacitors C_{11} and C_{12} to reduce the dissipation, especially under overdrive and short-circuit conditions. The output transistors TR_6 and TR_7 are matched BD181 transistors designed for high power dissipation at high supply voltage. Resistors R_{20} and R_{21} ensure that these transistors can operate up to their V_{CEB} rating.

Performance

Input impedance	150k Ω
Input sensitivity	
for 15W output into an 8Ω load	360mV
for 20W output into a 4Ω load	295mV
Total harmonic distortion	see Fig. 80
Frequency response	
-1dB points at $\frac{1}{4}\times$ full-power output	40Hz to 16kHz
-3dB points at $\frac{1}{4}\times$ full-power output	20Hz to 30kHz
Signal-to-noise ratio, at 50mW output power and source impedance 1k Ω	> 80dB