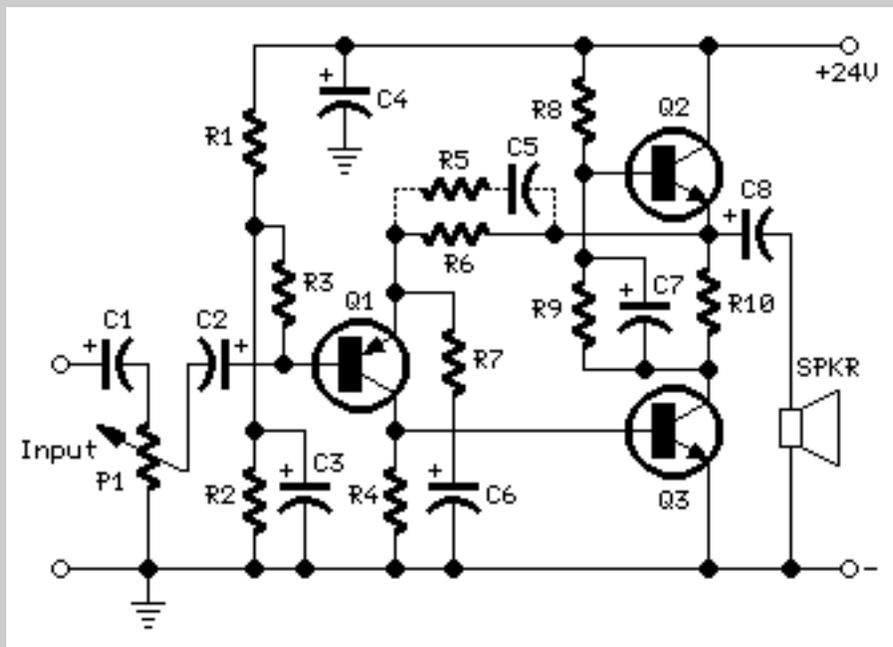


3 - 5 Watt Class-A Audio Amplifier

Behaves like a one-valve operated amplifier
Simple circuitry - No cross-over distortion

Circuit diagram:



Parts:

P1_____	47K	Log. Potentiometer (Dual-gang for stereo)
R1_____	100K	1/4W Resistor
R2_____	12K	1/4W Resistor (See Notes)
R3_____	47K	1/4W Resistor
R4_____	8K2	1/4W Resistor
R5_____	1K5	1/4W Resistor (See Notes)
R6_____	2K7	1/4W Resistor
R7,R9_____	100R	1/4W Resistors
R8_____	560R	1/2W Resistor (See Notes)
R10_____	1R	1/2W Resistor
C1,C2_____	10 μ F	63V Electrolytic Capacitors
C3_____	47 μ F	25V Electrolytic Capacitor
C4_____	100 μ F	35V Electrolytic Capacitor
C5_____	150nF	63V Polyester Capacitor (See Notes)
C6,C7_____	220 μ F	25V Electrolytic Capacitors
C8_____	1000 μ F	25V Electrolytic Capacitor
Q1_____	BC560C	45V 100mA Low noise High gain PNP Transistor
Q2,Q3_____	BD439	60V 4A NPN Transistors
SPKR_____	One or more speakers wired in series or in parallel Total resulting impedance: 8 Ohm Minimum power handling: 5W	

Comments:

In the old valve days, most commercial audio amplifiers suited for compact integrated mono or stereo record players used a one-valve amplifier topology. The circuit was usually implemented by means of a multiple type valve, e.g. a triode pentode ECL86.

Common features for those amplifiers were: Class A operation, output power in the 3 - 5W range, input sensitivity of about 600mV for full output power, THD of about 3% @ 3W and 1KHz.

Best types showed THD figures of 1.8% @ 3W and 0.8% @ 2W.

This solid-state push-pull single-ended Class A circuit is capable of providing a sound comparable to those valve amplifiers, delivering more output power (6.9W measured across a 8 Ohm loudspeaker cabinet load), less THD, higher input sensitivity and better linearity.

Voltage and current required for this circuit are 24V and 700mA respectively, compared to 250V HT rail and 1A @ 6.3V filament heating for valve-operated amplifiers.

The only penalty for the transistor operated circuit is the necessity of using a rather large heatsink for Q2 and Q3 (compared to the maximum power delivered).

In any case, the amount of heat generated by this circuit can be comparable to that of a one-valve amplifier.

An optional bass-boost facility can be obtained by adding R5 and C5.

Technical data (measured on 8 Ohm resistive load unless otherwise specified):

Sensitivity:

230mV input for 1.5W output

380mV input for 3.5W output

560mV input for 5.6W output

Sensitivity with bass-boost:

400mV input for 1.5W output

630mV input for 3.5W output

850mV input for 5.6W output

Sensitivity with 8 Ohm nominal, loudspeaker cabinet load:

210mV input for 1.5W output

325mV input for 3.5W output

477mV input for 6.9W output

Frequency response:

100Hz to 20KHz 0dB; -3dB @ 40Hz

Frequency response with bass-boost:

+5dB @ 100Hz; +3.9dB @ 200Hz; +2.5dB @ 400Hz; -1dB @ 10KHz and 20KHz

Total harmonic distortion @ 1KHz:

0.3% @ 0.5W; 0.45% @ 1W; 1% @ 5.6W

Unconditionally stable on capacitive loads

Notes:

- If necessary, R2 should be adjusted to obtain 13V at C8 positive lead.
- Total current drawing of the circuit, best measured by inserting the probes of an Avo-meter across the positive output of the power supply and the positive input of the amplifier, must be 700mA. Adjust R8 to obtain this value if necessary.
- Q2 and Q3 must be mounted on a finned heatsink of 120x50x25 mm. minimum dimensions.
- Add R5 and C5 if the bass-boost facility is required.

Having Questions?

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