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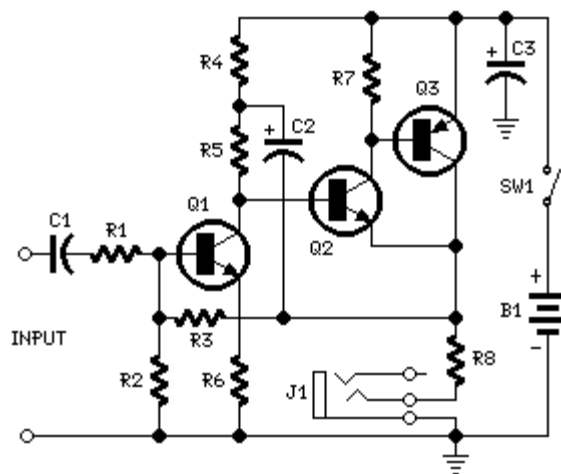
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# Portable Headphone Amplifier

## 3V Battery powered High Performance unit

### Circuit diagram:



### Parts:

R1	_____	10K	1/4W Resistor
R2	_____	100K	1/4W Resistor
R3	_____	68K	1/4W Resistor (see notes)
R4	_____	1K5	1/4W Resistor
R5	_____	3K3	1/4W Resistor
R6	_____	330R	1/4W Resistor
R7	_____	4K7	1/4W Resistor
R8	_____	2R2	1/4W Resistor
C1	_____	1µF	63V Polyester Capacitor
C2	_____	100µF	25V Electrolytic Capacitor
C3	_____	470µF	25V Electrolytic Capacitor
Q1	_____	BC239C	25V 100mA NPN High-gain Low-noise Transistor
Q2	_____	BC337	45V 800mA NPN Transistor
Q3	_____	BC327	45V 800mA PNP Transistor
J1	_____	Stereo 3mm.	Jack socket
SW1	_____	SPST	Switch
B1	_____	3V Battery	(two 1.5V AA or C cells in series, but see Notes)

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## Notes:

- Can be directly connected to CD players, tuners and tape recorders.
  - Tested with several headphone models of different impedance: 32, 100, 245, 300, 600 & 2000 Ohm.
  - Schematic shows left channel only.
  - B1, SW1, J1 & C3 are common to both channels.
  - R3 value was calculated for headphone impedance up to 300 Ohm. Using 600 Ohm loads or higher, change R3 value to 100K.
  - An interesting upgrade for this circuit was suggested by Mike Baum, NY USA. This involves the use of a Lithium-Ion Prismatic Rechargeable 340948 Battery, featuring a nominal voltage of 3.7V and a current rating of 1200mAH. These weight 38 grams and are 34.2mm x 8.5mm x 48mm. Correct value of R3 when using a 3.7V supply and 32 Ohm impedance headphones will be 100K: under these conditions, the amplifier will deliver about 3V peak-to-peak undistorted output. This means that the output power on 32 Ohm load will be almost doubled in respect to 3V supply. Current drawing will raise to 40mA. When powering a stereo version of this amplifier, the battery will last about 15 hours.
- 

## Technical data:

### Current drain:

35mA per channel with 32 Ohm impedance headphones.  
Much less with higher impedance loads

**Output voltage:** Above 2V peak-to-peak on all loads

**Sensitivity:** 90mV RMS input for 2V peak-to-peak output

**Frequency response:** Flat from 30Hz to 20KHz

### Total harmonic distortion @ 1KHz & 10KHz:

Below 0.05% into 32 to 600 Ohm loads and up to 1.5V peak-to-peak output.  
Below 0.1% at maximum output

**Unconditionally stable on capacitive loads**

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