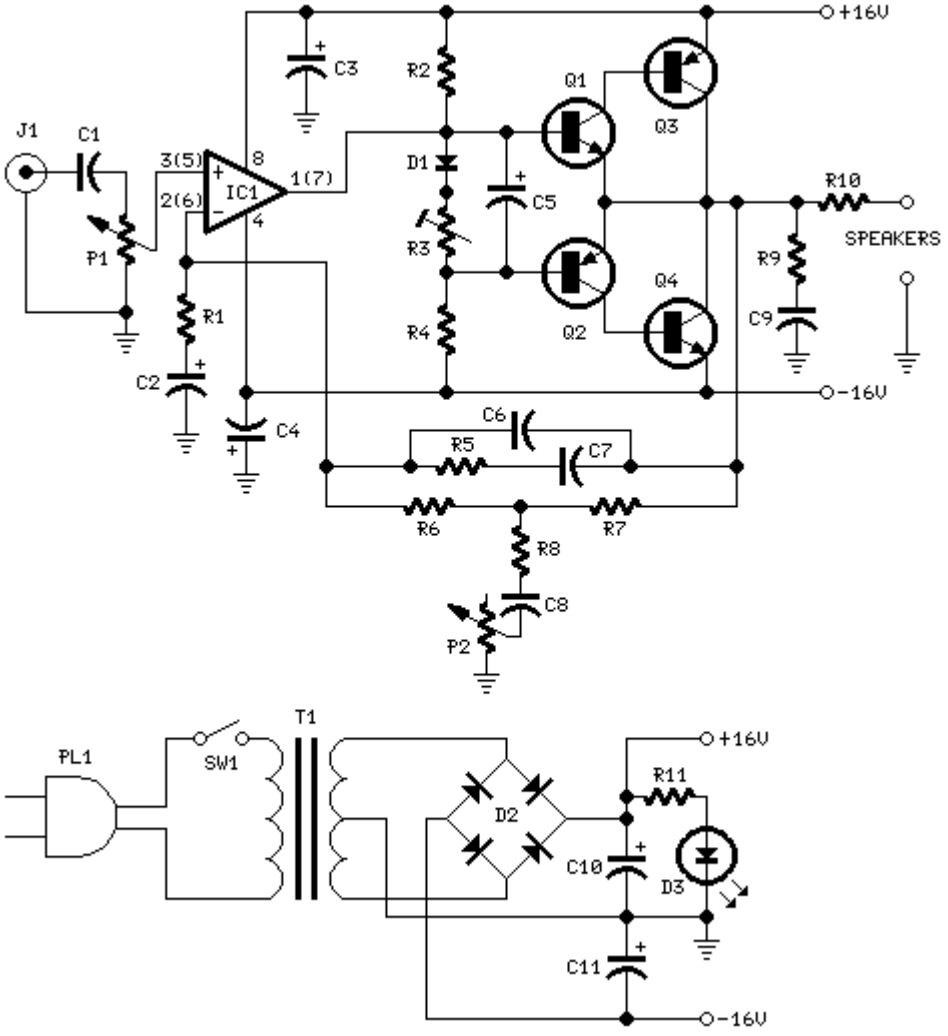
10W Audio Amplifier with Bass-boost

High Quality, very simple design.No need for a preamplifier

Circuit diagram:



Parts:

P1_____22K Log.Potentiometer (Dual-gang for stereo)
P2_____100K Log.Potentiometer (Dual-gang for stereo)
R1_____820R 1/4W Resistor
R2,R4,R8_____4K7 1/4W Resistors
R3_____500R 1/2W Trimmer Cermet
R5_____82K 1/4W Resistor
R6,R7_____47K 1/4W Resistors
R9_____10R 1/2W Resistor
R10_____R22 4W Resistor (wirewound)

C1,C8_____470nF 63V Polyester Capacitor
C2,C5_____100µF 25V Electrolytic Capacitors
C3,C4_____470µF 25V Electrolytic Capacitors
C6_____47pF 63V Ceramic or Polystyrene Capacitor
C7_____10nF 63V Polyester Capacitor
C9_____100nF 63V Polyester Capacitor

D1_____1N4148 75V 150mA Diode

IC1_____NE5532 Low noise Dual Op-amp

Q1_____BC547B 45V 100mA NPN Transistor
Q2_____BC557B 45V 100mA PNP Transistor
Q3_____TIP42A 60V 6A PNP Transistor
Q4_____TIP41A 60V 6A NPN Transistor

J1_____RCA audio input socket

Power supply parts:

R11_____1K5 1/4W Resistor

C10,C11_____4700µF 25V Electrolytic Capacitors

D2_____100V 4A Diode bridge
D3_____5mm. Red LED

T1_____220V Primary, 12 + 12V Secondary 24-30VA Mains transformer

PL1_____Male Mains plug

SW1_____SPST Mains switch

Comments:

This design is based on the 18 Watt Audio Amplifier, and was developed mainly to satisfy the requests of correspondents unable to locate the TLE2141C chip. It uses the widespread NE5532 Dual IC but, obviously, its power output will be comprised in the 9.5 - 11.5W range, as the supply rails cannot exceed ±18V.
As amplifiers of this kind are frequently used to drive small loudspeaker cabinets, the bass frequency range is rather sacrificed. Therefore a bass-boost control was inserted in the feedback loop of the amplifier, in order to overcome this problem without quality losses. The bass lift curve can reach a maximum of +16.4dB @ 50Hz. In any case, even when the bass control is rotated fully counterclockwise, the amplifier frequency response shows a gentle raising curve: +0.8dB @ 400Hz, +4.7dB @ 100Hz and +6dB @ 50Hz (referred to 1KHz).

Notes:

- Can be directly connected to CD players, tuners and tape recorders.
- Schematic shows left channel only, but C3, C4, IC1 and the power supply are common to both channels.
- Numbers in parentheses show IC1 right channel pin connections.
- A log type for P2 ensures a more linear regulation of bass-boost.
- Don't exceed 18 + 18V supply.
- Q3 and Q4 must be mounted on heatsink.
- D1 must be in thermal contact with Q1.
- Quiescent current (best measured with an Avo-meter in series with Q3 Emitter) is not critical.
- Set the volume control to the minimum and R3 to its minimum resistance.
- Power-on the circuit and adjust R3 to read a current drawing of about 20 to 25mA.
- Wait about 15 minutes, watch if the current is varying and readjust if necessary.
- A correct grounding is very important to eliminate hum and ground loops. Connect in the same point the ground sides of J1, P1, C2, C3 &C4. Connect C9 at the output ground.
- Then connect separately the input and output grounds at the power supply ground.

Technical data:

Output power: 10 Watt RMS @ 8 Ohm (1KHz sinewave)

Sensitivity: 115 to 180mV input for 10W output (depending on P2 control position)

Frequency response: See Comments above

Total harmonic distortion @ 1KHz: 0.1W 0.009% 1W 0.004% 10W 0.005%
Total harmonic distortion @ 100Hz: 0.1W 0.009% 1W 0.007% 10W 0.012%
Total harmonic distortion @10KHz: 0.1W 0.056% 1W 0.01% 10W 0.018%

Total harmonic distortion @ 100Hz and full boost: 1W 0.015% 10W 0.03%

Max. bass-boost referred to 1KHz: 400Hz = +5dB; 200Hz = +7.3dB; 100Hz = +12dB; 50Hz = +16.4dB; 30Hz = +13.3dB

Unconditionally stable on capacitive loads