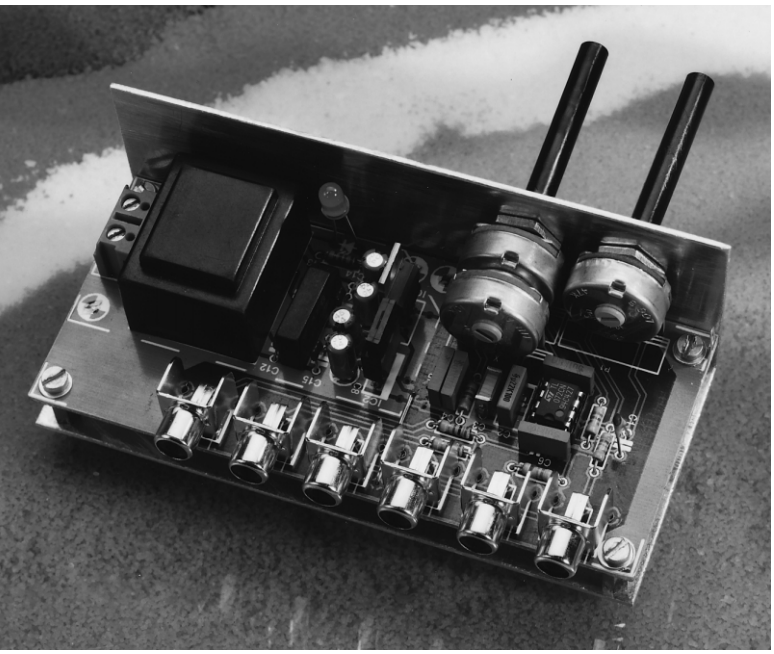
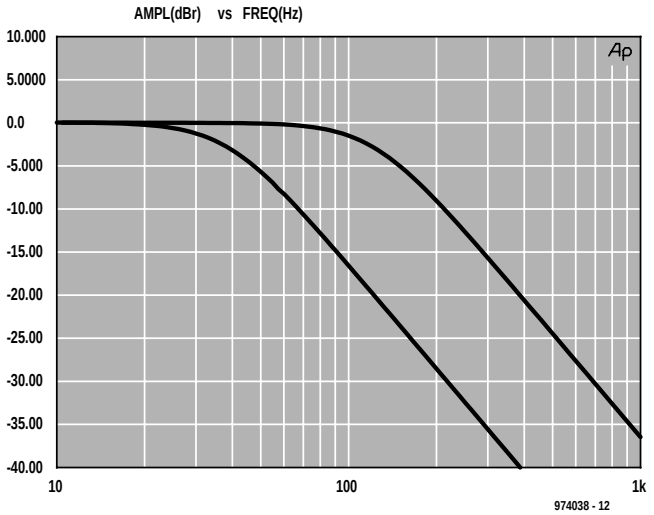
bass extension for surround sound





The extension is intended primarily for surround-sound installations that need some boosting of the bass frequencies but where an additional subwoofer cannot be afforded. It is based on a disused mono a.f. amplifier and loudspeaker. If these provide reasonable bass performance, they can be converted into a fairly good subwoofer with the aid of an active low-pass filter—see Figure 1.

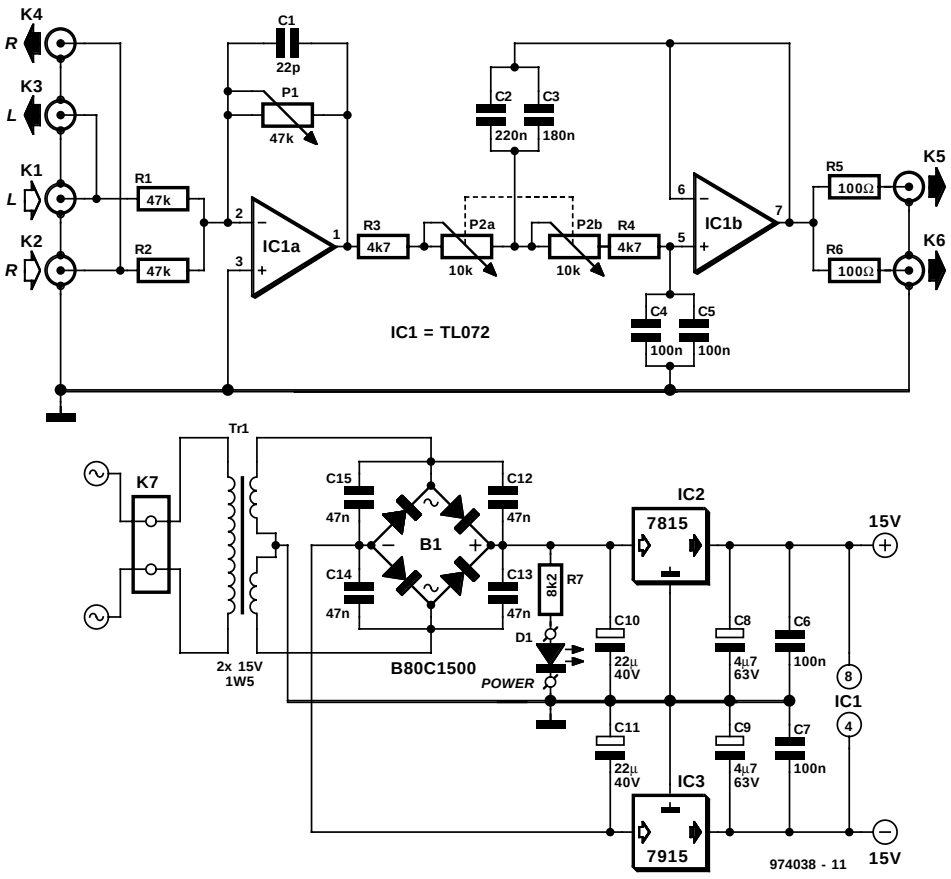
The input signals for the left-hand and right-hand channels are applied to audio sockets K_1 and K_2 respectively. They are output via audio sockets K_3 and K_4 to which the surround-sound decoder is connected.

The signals of the two channels are summed in IC_{1a}, which also functions as input amplifier. The amplification, and therefore the sensitivity of the 'subwoofer', can be adjusted with P_1.

The output of IC_{1a} is applied to a 2nd-order Butterworth low-pass filter. The cut-off frequency of this active filter can be set between 40 Hz and 120 Hz with stereo potentiometer P_2. The response characteristic of the filter at both these frequencies is shown in Figure 2. The actual cut-off point depends on individual taste.

The said mono amplifier is connected to audio output sockets K_5 and K_6.

The power supply for the circuit is simple and consists of a small mains transformer, Tr_1, a



Parts list

Resistors:
R_1, R_2 = 47 kΩ
R_3, R_4 = 4.7 kΩ
R_5, R_6 = 100 Ω
R_7 = 8.2 kΩ
P_1 = 47 kΩ logarithmic potentiometer
P_2 = 10 kΩ, linear stereo potentiometer

Capacitors:
C_1 = 22 pF
C_2 = 220 nF
C_3 = 180 nF
C_4–C_7 = 100 nF
C_8, C_9 = 4.7 µF, 63 V, radial
C_{10}, C_{11} = 22 µF, 40 V, radial
C_{12}–C_{15} = 47 nF ceramic

Semiconductors:
D_1 = LED, high efficiency

Integrated circuits:
IC_1 = TL072CP
IC_2 = 7815
IC_3 = 7915

Miscellaneous:
K_1–K_6, K_8–K_9 = audio socket for board mounting
K_7 = 2-way terminal block, pitch 7.5 mm
B_1 = B80C1500
Tr_1 = mains transformer, 2 × 15 V secondaries, 1.5 VA

bridge rectifier, B_1, antihunt capacitors C_{12}–C_{15}, a number of smoothing and decoupling capacitors, and two integrated voltage regulators, IC_2 and IC_3.

The filter circuit is best built on the printed-circuit board shown in Figure 3, which is, however, not available ready made.

The filter should be housed in a metal case. Moreover, P_1 and P_2 should preferably be types with a metal enclosure. Hum is prevented by earthing the case and the enclosures.

The harmonic distortion, with two input signals of 200 mV and a bandwidth of 22 kHz, is 0.0016% at 30 Hz.

Although not of prime importance at low frequencies, the polarity of the 'subwoofer' should be the reverse of that of the remainder of the system since the present circuit inverts the signals.

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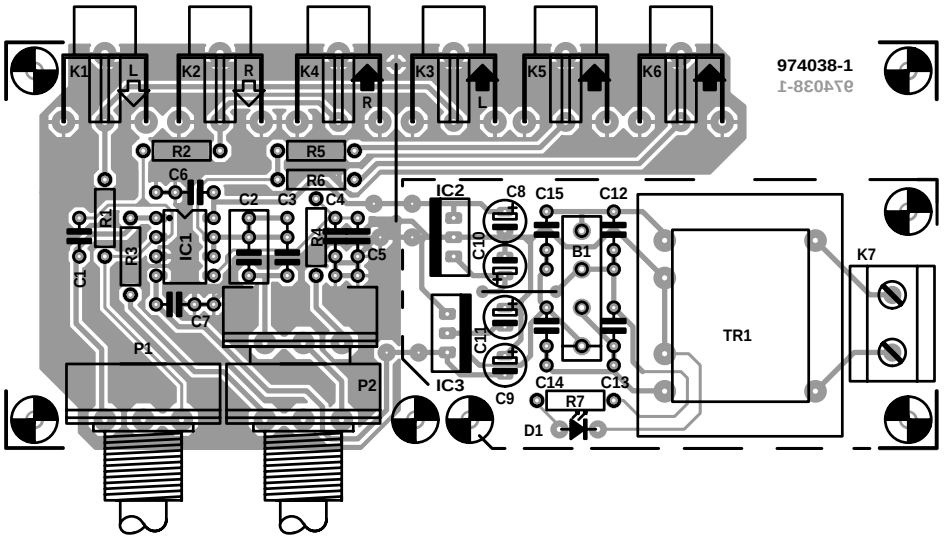

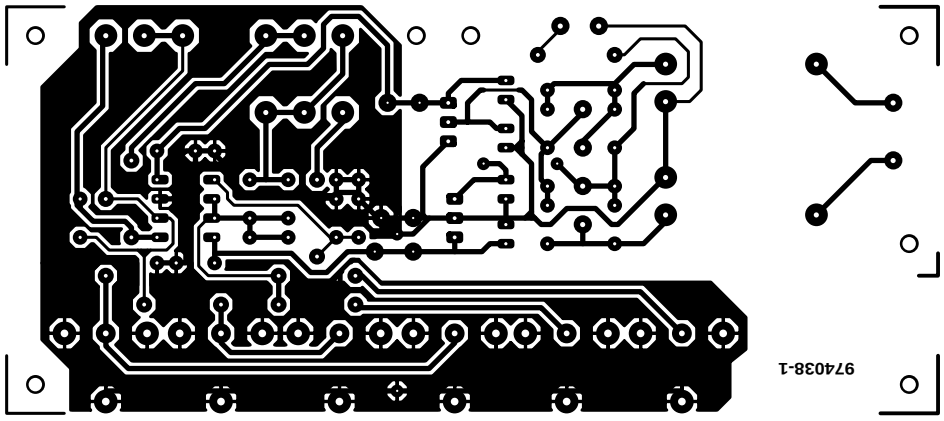

ELEKTOR	
240V~	50Hz
No. 974038	
P = 1VA5	