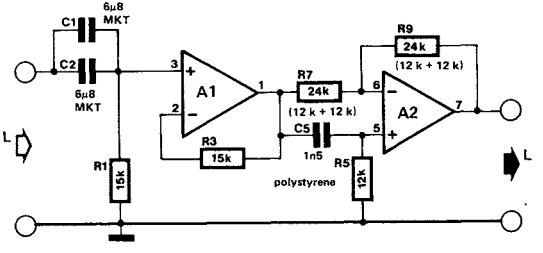
003 AUDIO TRANSFER EQUALIZER

Limiting the bandwidth of an audio system to 20 kHz affects the behaviour of the system in the pass band. The steeper the filter characteristic, the greater the phase shift in the pass band. That phase shift stands in non-linear relation to the frequency, and this causes a frequency-dependent delay of the signals (increasing with frequency from about 4...6 kHz). This effect is audible.

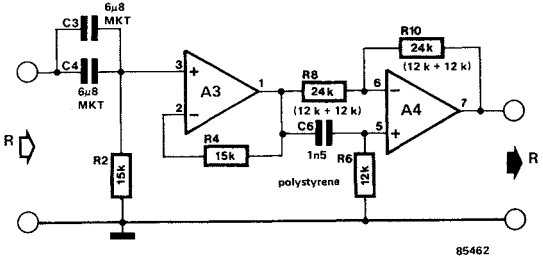
The CD (compact disc) player is an example of a system in which the bandwidth has been so limited. Particularly the Sony CD player and its clones suffer from a frequency-dependent transfer time. The Philips (and Philips-derived) system does not suffer from this effect.

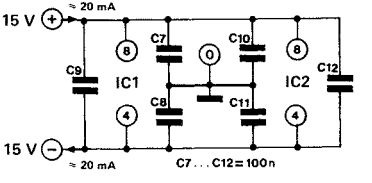
The effect can be negated by introducing a delay in the transfer time of the frequencies below 4...6 kHz, which equalizes the delay over virtually the entire audio range. In other words, transfer of all audio frequencies is carried out at the same speed as it should.

Such a delay is realized by phase shifter A_2 (left-hand channel) and A_4 (right-hand channel) in the accompanying figure. The maximum delay for the lowest frequencies is



A1,A2 = IC1 = NE5532N
A3,A4 = IC2 = NE5532N





$2R_5C_5 = 2R_6C_6 = 36\ \mu s$.
The circuit is connected between the output of the CD player and the AUX or CD input of the main amplifier.