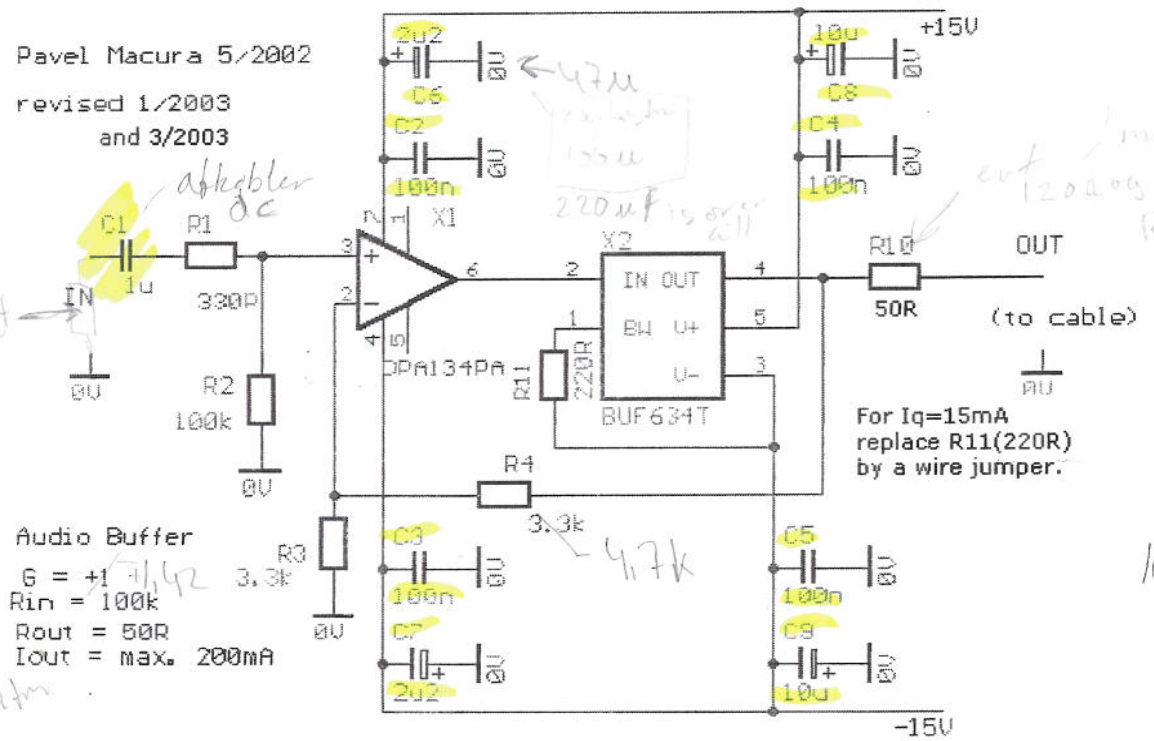
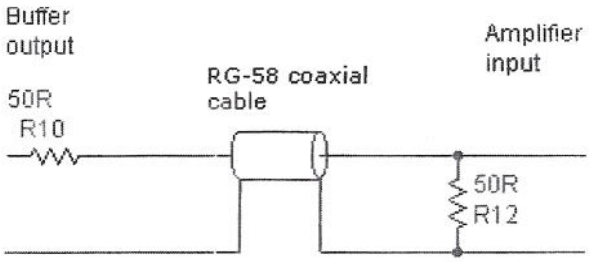
Audio Buffer

Output circuits of standard signal sources as CD players suffer from limited capability to drive capacitive load and low impedance load. Depending on signal cable length (capacitance) and amplifier input resistance/capacitance there is an interaction between output circuits of CD player and the cable. This leads to a loss of resolution of high frequencies, harsh (grain) sound and soft undefined bass. The following circuit solves the problem and can be also used as a high quality headphone amplifier. It has high input resistance and low capacitance and low output resistance. It is able to deliver output current of some 250mA. The frequency range is far beyond audio needs. The distortion is very very low, about 0.0001%. This circuit should be installed into the CD player or connected to the CD output by cable no longer than some 10 - 15cm.



First op amp X1 is Burr-Brown OPA134PA type. **The best results were obtained with OPA627AP** on X1 position, but this op amp is 10x more expensive than OPA134PA. **The second amp X2 is Burr-Brown fast buffer BUF634T**. The whole circuit has a voltage gain of +1. acts as a buffer amp and the influence of output cable is eliminated. The current load (R10 and R12) of the output is a must. For proper location of R10 and R12 resistors please see following image:



The R12 resistor should be placed as a terminating resistor at the end of buffer output cable.

Higher Iq

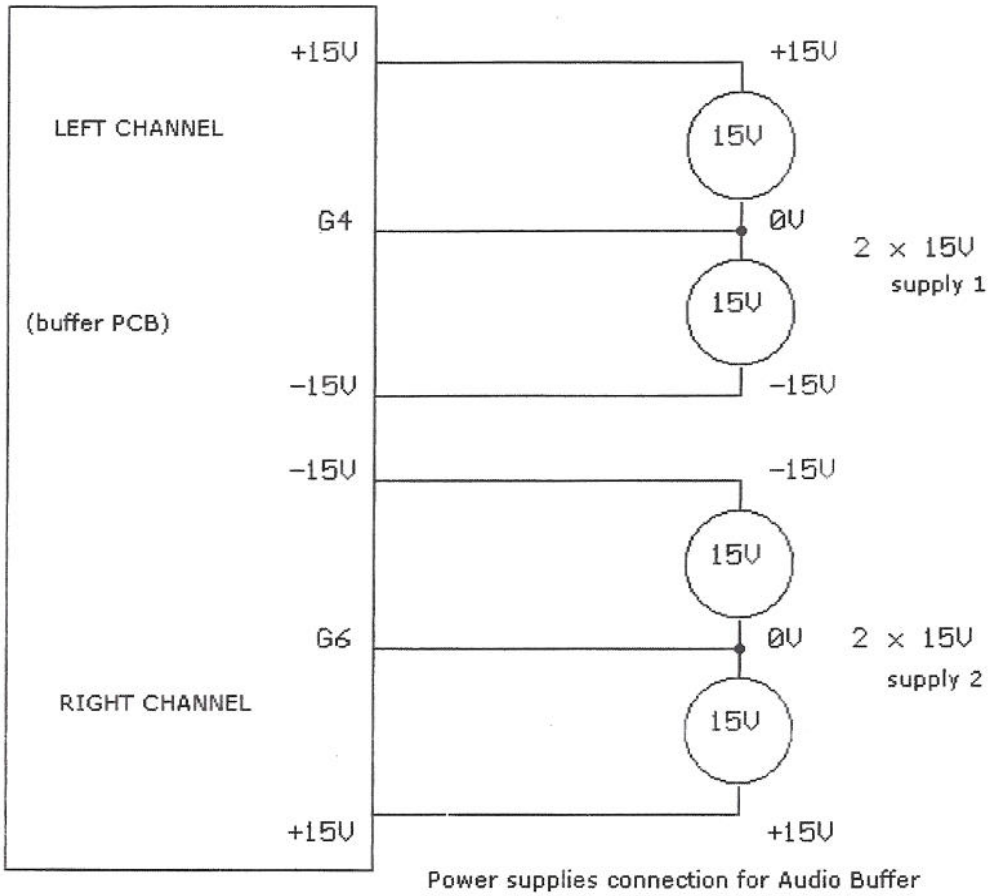
The circuit as shown operates at quiescent current of 8mA. This current can be increased by reducing R11 to 0R (wire jumper), then Iq=15mA and buffer mostly operates in class A.

Headphone Amplifier

The same circuit can be used as a headphone amp. R12 is to be omitted. Change R4 to 4.7k and R3 to 1k. You should use a potentiometer of 10k before C1. You will also not use the signal cable RG-58.

Power supplies connection for Audio Buffer

PCB of the Audio Buffer is supplied from two double voltage supplies 2 x 15V. Interconnection of the supplies and Audio Buffer PCB can be seen in the following image:



Power supplies connection for Audio Buffer

Pins G4, G6 (signal ground, 0V) are connected on the PCB. Power supply from two double voltage supplies 2 x 15V is assumed. It is also possible to supply the board from one double voltage supply 2 x 15V. In this case connect +15V pins of left and right channel together and do the same for -15V pins. For PCB pin numbers, see printed denotation on the PCB.

Construction notes

The PCB is for 2-channel (stereo) Audio Buffer module. Components layout can be seen as a printed denotation on the upper side of the PCB. Do not insert R12, R112 resistors directly to the board, but place it at the end of output cable (see buffer text description).

Pins G1, G2, G3, G4, G5, G6, G7 are inteconnected as signal ground (0V).
Shield of input cables should be connected to pins G1 / G2, shield of output cables to G3 / G5, 0V from power supply to G4 /G6.

The inner (signal) wire of input cable of left channel is connected to pin INL, for right channel to pin INP.

Output from left channel is on pin OUTL, output from right channel on pin OUTP.

As a power supply you can use two independent double power supplies +/-15V (2 x 15V) or one common double power supply +/-15V (2 x 15V).
+15V for **left channel** is connected to +15V pin in the upper half of the PCB, 0V to G4 and -15V to -15V pin in the upper half of the PCB.
+15V for **right channel** is connected to +15V pin in the lower half of the PCB, 0V to G6 and -15V to -15V pin in the lower half of the PCB.
In case that one 2 x 15V power supply is used, just interconnect +15V pin in the upper half of the PCB with +15V pin in the lower half of the PCB, and -15V pin in the upper half of the PCB with -15V pin in the lower half of the PCB.

Orientation of integrated circuits

Please take to the account that integrated circuits X101, X102 in the right channel are rotated on the PCB compared to X1, X2 orientation (left channel)!!

part No.	type	pcs
	list of material (2 channels)	
R1	330R resistor metal 1% 0.6W	2
R2	100k -"-	2
R3	3.3k -"-	2
R4	~~3.3k~~ -"- 4,7 K	2
R10	51R -"-	2
R11	~~220R~~ -"- (Jumper, evt!)	2
R12	~~51R~~ -"- udelades	2
C1	1uF foil capacitor, pin distance 7.5 mm	2
C2	100nF ceramic capacitor, pin distance 5 mm	2
C3	100nF ceramic capacitor, pin distance 5 mm	2
C4	100nF ceramic capacitor, pin distance 5 mm	2
C5	100nF ceramic capacitor, pin distance 5 mm	2
C6	2.2 uF/35V electrolyte, pin distance 2.5 mm	2
C7	2.2 uF/35V electrolyte, pin distance 2.5 mm	2
C8	10uF/35V electrolyte, pin distance 2.5 mm	2
C9	10uF/35V electrolyte, pin distance 2.5 mm	2
X1	OPA627AP or OPA134PA	2
X2	BUF634T	2
PCB	printed circuit board	1
	Add 100 for 2-nd channel component numbers	

Gain = R4 : R3 + 1 = V.

Gain = 4,7K : 3,3 + 1 = + 2,42 V

Hvis R11 = Jumper, (wide Bandwith!)
skal Bufferen have en clip on køleplade.

R12 udelades til forforstærker brug.