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Keeping the Hobby Alive

The author presents a design for a very cheap headphone amplifier that gives surprisingly good results.

You know what it's like; you cannot play music in the lounge anymore because it interferes with "family viewing," so the Magnepan SMGas (small-ish flat panel speakers) stand mute. I suppose there's always the portable CD player, but it does tend to get in the way, doesn't it?

MP3 SCENARIO

What about one of those nifty MP3 players that my teenage daughter has had grafted onto her for several years now? They can hold a gazillion hours of music tracks and are tiny, and the quality is supposed to be quite good. After a £10 investment to purchase the player, insert the battery and load up some tracks from the PC.

Brief chat with daughter ensues: what are those bits of black foam on the end of that skinny bit of wire? Headphones? Surely not. Oh, earbuds. You put them in your ears? Well, OK. Oops, it fell out. Try again.

Ah, what if I hold my head like this? No, the other one's fallen out now. What if I clench my ears (clench my ears?) and stand like this and grit my teeth. Oh, that's frightened the cats away. Brief pause to throw earbuds out of window.

Let's get the trusty old Sennheisers out, plug in (oops, need an adaptor), and let's listen to some music. Well that sure does sound surprisingly. . . dreadful! Clearly MP3 is rubbish. And it really doesn't go very loud, does it?

JUNK BOX SOLUTION

Well, I must be able to do something about this, at least just to get the volume levels up a bit to drown out the sounds of domestic harmony. Whatever I use, it must be portable with a little bit of gain and capable of driving a simple pair of headphones. This junk box project shouldn't take too long. Let's see, an AD712 and a 9V battery will do.

Need to generate a mid-point to give a $\pm 4.5V$ supply. Two resistors? Hmm, not keen on that. Or, I could use an op amp to generate the mid-point. Hmm, that might drain the battery too much.

What about two resistors and a simple emitter follower to generate the mid-point? That sounds like the best approach. Here we go, all done, now plug it in for a bit more volume and. . . Wow! Where did all that music come from?

Not only is it louder, but the sound is now three-dimensional and much, much bigger. I can certainly hear details that were hidden before. Perhaps the MP3 format is better than reported. This really is a revelation. What if I had used better quality components, a nifty aluminum case, and better connectors, as well as good coupling caps?

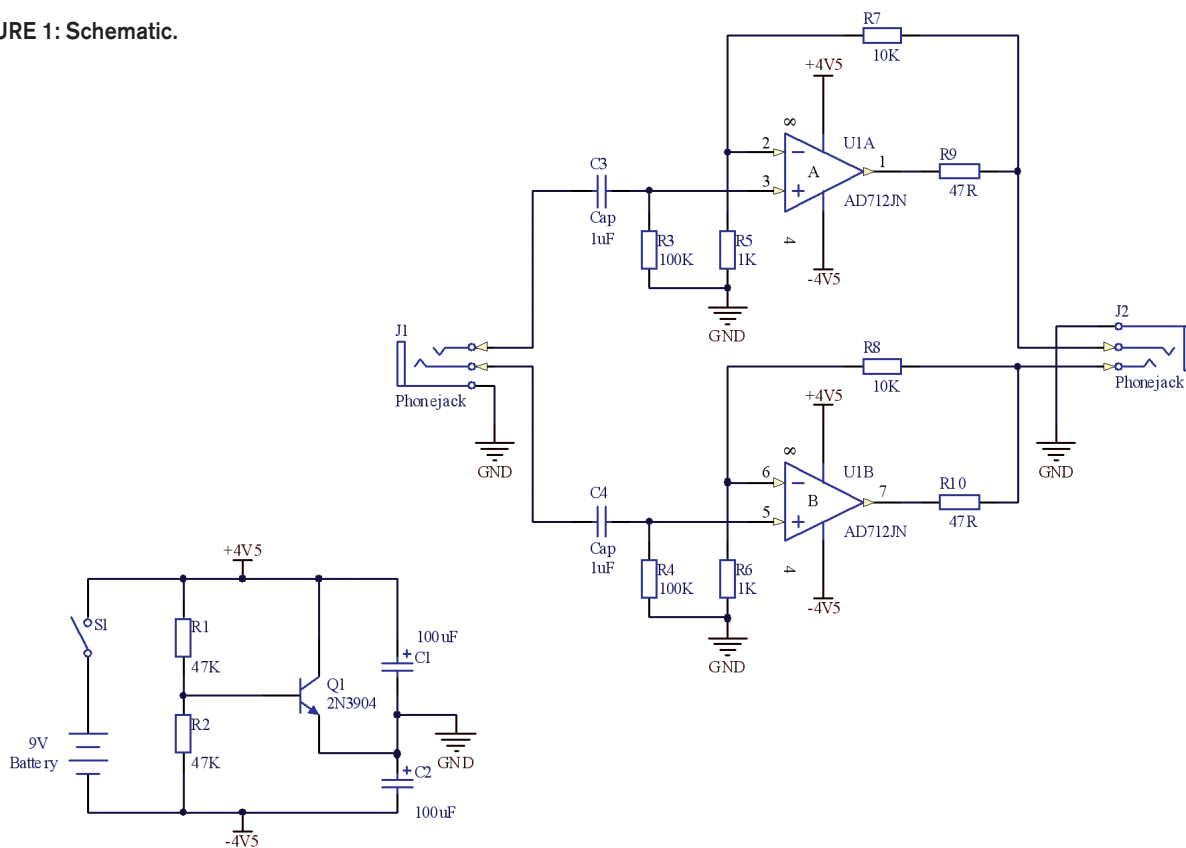
Figure 1 is the schematic for the minimalist—almost zero cost headphone amp. I claim no originality for it, because after I had built it I found loads of references to similar designs on the Internet. Maybe the emitter-follower biasing is a bit unusual, but it works fine. I did not include a volume control, because the unit works OK with the volume control on my MP3 player. I also use it to drive an FM transmitter from the MP3 player in the car. *ax*

TABLE 1

U1	AD712
R1, R2	47k
R3, R4	100k
R5, R6	1k
R7, R8	10k
R9, R10	47R
C1, C2	100 μ F 25V electrolytic
C3, C4	1 μ F film cap
Q1	2N3904
J1, J2	3.5mm jack socket
S1	SPDT
B1	9V battery
	battery clip
	case

All resistors 0.25W

FIGURE 1: Schematic.



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