
Subject: New Project IC phono preamp

Posted by [gofar99](#) on Fri, 01 Mar 2024 02:40:25 GMT

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Hi everyone. Contrary to common opinion I do mess around with SS stuff. A goodly while back I cooked up a design for a phono and nab preamp that used an IC. It was and still is a really nice sounding device and in the earliest form quite inexpensive. I am in progress to see how it can be bettered and so far results are promising. Super fit to the RIAA curve. Within +/- 0.5 dbv at 1 volt out from below 10HZ to past 70K (yes I know that is outside the formal values). S/N wide band unweighted is in the -92dbv range on MM and -90 on LOMC. Very clean and detailed sound. If I had to give up tubes I could live with it. (BTW a friend in Australia has built and sold a number of the earlier ones and folks are really happy with them) The present specs are bread board values and the built version ought to be a bit better on the S/N. Stay tuned for a schematic when I get it made up. One thing though you need to select the components for the EQ part to be under 1% in value. I just get a batch of each one needed and use a LCR meter to get what I need. Larger % will alter the fit to the RIAA curve.

Subject: Re: New Project IC phono preamp

Posted by [Wayne Parham](#) on Fri, 01 Mar 2024 17:17:16 GMT

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Dude, that's awesome! Do you have a kit or a PCB for sale for this phono stage?

Since you said, "Stay tuned for a schematic when I get it made up," that may be a bit of a premature request but do you have any estimates for timeframe, cost and types of products that might be available? Would you sell completed amps, assembled boards and/or kits or raw PCBs?

Subject: Re: New Project IC phono preamp

Posted by [gofar99](#) on Sun, 03 Mar 2024 02:33:39 GMT

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Hi Wayne, just diy at this point. I need to do up a decent schematic for it. Not a complicated build though you need to watch out for ground loops and grounding and shielding in general. I was listening to it this AM and the sound is quite nice. Very, very quiet as in no hum or noise when volume is at max in my system. MM and LOMC are equally quiet. It is below the noise floor of the system. Very clean sound and brings out whatever is on the disk within the limits of the cartridge. Top end is all there and some folks may not realize there is so much material there and actually not like it so I guess I would expect a lot of top energy from the specs as it is linear well past 20K. On the scope this AM it was essentially within the residual tolerance of the signal generator and at typical output levels (0.1 to 1.0 VRMS) nearly a perfect flat line from 20HZ to 20K (+/- under 0.2db) and only down 0.5db at 10HZ and 70KHZ. BTW I tried several ICs, the OPA 2134 was the quietest. Better than NE833, NE5552, TIL82, Burson V5, OPA2604. Most were at least 5 db noisier. Go figure that one.

Subject: Re: New Project IC phono preamp
Posted by [Wayne Parham](#) on Sun, 03 Mar 2024 14:41:46 GMT
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Sweet!

I can hardly wait to see this project unveiled!

Subject: Re: New Project IC phono preamp
Posted by [gofar99](#) on Mon, 04 Mar 2024 02:59:14 GMT
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Some notes on the preamplifier. The enclosure should be steel for best EMI rejection. Aluminum can be used but I found that it was not as good. Much of the circuitry is not sensitive to EMI, but the inputs can be. Unfortunately, I did not take photos during the build process. But layout is not critical. The preamplifier does not use input capacitors as I feel the any non-linear components should be kept to a minimum. The same goes for capacitors in the ground side of the inputs. They are often seen for prevention of very low frequency and DC gain. A consequence is that the input signal cannot contain any DC. Since cartridges don't generate any this is not a consequence. At the same time some individual ICs have internal DC offset and this will be amplified. If sufficient it will cause the IC to latch up. I find that when measuring the DC offset at the output some is unavoidable but up to about 2.5 volts is of no consequence. More than that I would use another IC. They are rather cheap so buying an extra or two is not a major expense. I tested several types of ICs and the OP2134 was the quietest. All others were at least 5 db noisier. One, the Burson V5 (a discrete version) didn't like the circuit and had a significant offset and noise level. This was unexpected, but true of two different samples. Others I tried were OPA2604, LM833, NE 5532, TIL82. The preamplifier was built on solder through pef board, but pretty much any PCB arrangement will work. I enclosed the power supply components in a metal sub box. It seemed like a good thing to do, but probably didn't matter as there is no AC inside the PS and the power supply modules don't seem to cause any EMI in the preamplifier. Whatever Meanwell does in the ones I chose works well. I also tried a battery powered version. It used 6 lithium cells. It was not quieter and the complexity and cost didn't seem to justify it. It did not require the power supply modules, but did need a way to recharge the batteries. Granted running the preamplifier for 1-2000 hours before recharging the batteries does have merit. Just not for me.

Performance. Test conditions were; the use of 2 different PC scopes, one external and one internal signal generator, a carefully calibrated passive inverse RIAA device, and a second known SS preamp for comparison. Bode plots were done on one of the PC Scopes. The output load used was 100K ohms. Gain is just under 40 db for MM and MI cartridges and just under 60 db for LOMC. The response was quite flat. Between 20HZ and 20K HZ it was at the limits of the test gear deviating less than +/- 0.1db. It was 2.5 db down at 10HZ and 70K HZ. Wideband S/N unweighted was -90 db for MM/MI and -88db for LOMC. It is possible that the actual S/N is a little better as it seems that the noise floor in my shop has been higher than in previous periods. The noise level without power on the unit, but attached to the test set up was only at -95db. Previously it has been between -102db and -105db.

Listening. Really, really quiet. No hum or noise audible at any output level. Very clean sounding. Great imaging and centering. Mono tracks were really mono, no wandering. The response was as expected full range. I figure this is a good project that will reward a builder with lots of enjoyment. Total cost less the case should be under \$200, if you have a lot of parts on hand even less. I highly recommend that you select the resistors and capacitors in the equalization circuit to as good a tolerance as you can get. I use a LCR meter to get mine to about 1%. Off the shelf resistors may be that good, but capacitors probably not. Inaccurate tolerances up to 5% will be fine, but will cause slight deviations from the RIAA curve.

File Attachments

1) [Insides.jpg](#), downloaded 138 times

2) [IC Phono PreampSchematic Feb 29 2024B.jpg](#), downloaded 113 times

Subject: Re: New Project IC phono preamp

Posted by [Wayne Parham](#) on Mon, 04 Mar 2024 15:13:14 GMT

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Nice! I love it!

Subject: Re: New Project IC phono preamp

Posted by [gofar99](#) on Wed, 06 Mar 2024 19:18:26 GMT

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Hi For folks that figure the posted version is too complicated or costly this version is for those of you who can stand slightly reduced specs in exchange for a greatly reduced cost. It is like the high-performance version but uses standard components and a less complicated power supply. Common capacitors were used in place of selected premium ones and the first stage of the power supply was omitted. Additionally, it eliminated the switching between MM and LOMC as well as the adjustable loading for LOMC. These features can be added if needed by changing a few resistors. The actual performance is really quite similar to the more costly version and the sound is quite similar as well. This version would be fine for nearly any system.

Measured performance. It worked better with OPA2604 than with OPA2134. The 2604 had a lower amount of noise below 30HZ. This is opposite to the costlier version. Signal to noise wideband is nearly identical to the other version at -88 to -90 dbv. The level below 30 HZ was however about 3 dbv higher. The frequency response was similar but had a few variations. In the high-performance version, the response was virtually a flat line from 20HZ to past 25K HZ with a

deviation of less than 0.1dbv. This version was down 0.2dbv at 20HZ, had a gentle rise of 0.2dbv centered at 200HZ and was flat at 20K HZ. Above that it rose about 0.5 dbv to about 75K HZ. Square wave performance was not as good as the other version. That one was clean from 50 HZ to 20K HZ with minor overshoot at 20K HZ. This version was clean at 50 and similar at 20K HZ but had rounding in the 2000 HZ range. This is probably due to some variation in phase shift in that portion of the equalization network. It is peculiar as this was not the case of the costlier version and the component values were the same. Regardless it is a really nice sounding phono preamplifier that is inexpensive and easy to build.

File Attachments

- 1) [IC Less Costly Phono Preamp.jpg](#), downloaded 99 times
 - 2) [IC Phono PreampSchematic March 6 2024.jpg](#), downloaded 96 times
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