Archimago's Musings

A 'more objective' take on audiophile topics among other thoughts... Twitter: @Archimago; E-Mail: archimagosmusings@outlook.com [Note that I have an Amazon Affiliates account. Some items may be linked to Amazon and I may receive some Amazon gift certs for qualifying purchases.]

Saturday, 4 January 2020

An Inexpensive Hi-Fi Class-D Stereo Amp for the 2020's: Hypex nCore NC252MP (DIY Assembly)

Happy 2020 everyone!

A few months ago, I saw this video on *YouTube* that got me thinking about just putting together an amplifier to start off the decade of the 2020's. That project in the video involved the use of Bang & Olufsen's ICEPower 200ASC and 200AC modules, good Class D amps which I agree should sound great and certainly a worthy project!

But I wanted something potentially even *better*. Let's put together an amplifier that should perform with even *less distortion*, somewhat *higher power*, and this can be done *even easier* because you don't even need to string two boards together! "Better" does come with a little higher cost, but not that much more.

These days, many amplifier makers are assembling OEM modules of readily made components like the ICEpower. For example Emotiva's PA-1 is basically an ICEpower 300ASC in their enclosure. Not a surprise since this trend eventually happens with almost all commodity hi-tech products from CPUs (no practical desktop options beyond AMD and Intel these days), or motherboards (think ASUS, Gigabyte, MSI, ASRock, ...), or DAC chip (ESS, AKM, TI/BB, Realtek, Cirrus, Analog Devices...) coming from a select group of major manufacturers controlling the majority market share. This makes sense as a reflection of the maturity of products with increasing levels of engineered performance. At some point, the quality of the devices hits a threshold such that there really is no point devoting each company's own R&D dollars into something that can be obtained at a lower price with economies of scale from companies specialized in advanced design. While a company might put a significant spin on their device (like say throw in a tube input stage), the "heart" of the machine is based on the OEM specs. There is no need for a cottage industry of boutique companies making consumer CPUs that would never be able to compete in performance for example!

I'm guessing that's what we're seeing with Class D amplifier designs with Hypex, B&O/ICEpower, and the new Purifi Audio competing in the higher end, and the inexpensive chip amplifiers (like the old Tripath "Class T" or the TI TPA3116 device previously measured) targeting the lower end of price with generally lower performance as well.

[Having said this, on a side note, the fact that there are a number of boutique audiophile companies making things like resistor ladder DACs and old NOS DACs that objectively perform poorly, says something about the fact that much of audiophilia is NOT about actual engineered performance ("high fidelity"). IMO most of the chatter in magazines and various places is about supposedly-trustworthy gurus, their preferences, opinions and hype that builds from there. This is also demonstrated in the "fashionable" and meaningless audio trends over the decades. In the 2010's, one obvious example is the digital filter options offered by DACs culminating in the most silly of "formats" called MQA that used various weak filters to "render" final output with ultrasonic artifacts as if this represented actual decoded high samplerate content.]

The Hypex nCore NC252MP is one of these OEM modules available for builders to incorporate into and sell their own products with:

The amplifier module was announced back in 2016 and I believe became available in quantity starting in 2017. This single module contains *everything* in one place for a 2-channel dual-mono amplifier (rated 250W into 4Ω, 180W into 8Ω, at 1% THD, 1kHz signal) including input buffer *and* power supply. All you need to add is an enclosure with the proper input and output connectors, power switch, and power LED for basic functioning. Already, this component is at the heart of devices like the IOM NCore Pro (€550), the Nord One MP NC252 (£579), March Audio P252 (US$895), and Rouge Audio Studio N-4B (€655.00). The best deal I've seen is for the Audiophonics MPA-S252NC (€440); not sure how much more it would cost to ship to Canada though if I were to buy it from France and had to pay for border duties.

As we'll see, it's very easy if you're interested to assemble a device with the same sound quality yourself. *The trick though is to find one of these OEM amplifier modules to buy!* At this time, they're not widely available to DIY builders, unlike the ICEpower devices in the video above available from Parts Express or Hypex's own NC400 modules meant for the DIY market.

As I was wandering around looking at online sales in late October, I was able to find a seller on eBay who had 15 of these modules available at <US$300 each; I happily snatched one up. Then I went to Ghent Audio and picked up one of these "DIY Stereo Case-kit for Hypex NC252MP" enclosures. I went with the easiest install option - Type C with solderless parts (US$150, even less expensive if you want to do a bit of soldering):

Ghent Audio's kit as you can see above is quite simple. It consists of 4 main metal pieces for the top, bottom, back, and the front plate which can be of different colors. Good quality materials, nice connectors, professional workmanship with smooth rounded edges, and precise lettering. All the screws and cables you need. The enclosure feels robust, slightly wider than deep - I like this box!

In total then, before applicable taxes, we're looking at less than US$450 (around €400, £330) for this DIY kit.

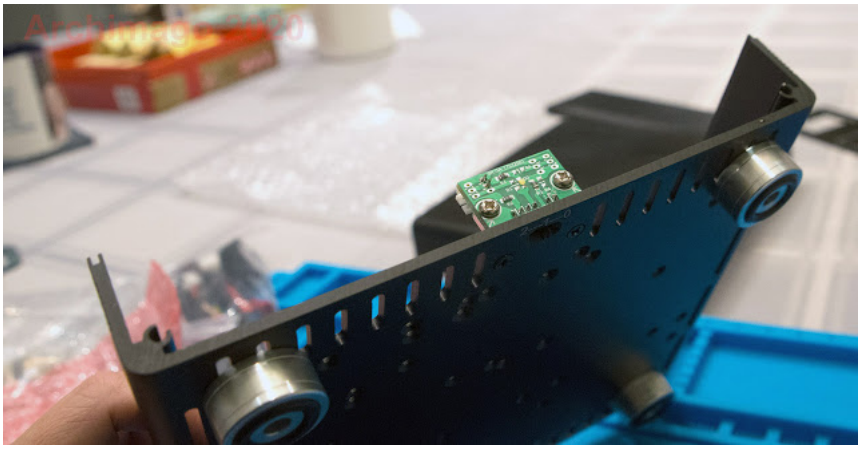
Let's Put This Together...

Note that Ghent Audio sells a number of enclosures for different amplifier modules. These instructions might be useful for similar enclosures even if you don't have the Hypex nCore NC252MP as I have here.

DISCLAIMER: ***Shock hazard warning.*** **We're assembling a device that plugs into your home wall outlet! Please make sure you understand what's going on, you're comfortable with doing this and use your own discretion. If you have any hesitation, just buy one of the pre-assembled units with service and warranty as well. I'm not responsible for any damage or injury that might occur in taking on the project...**

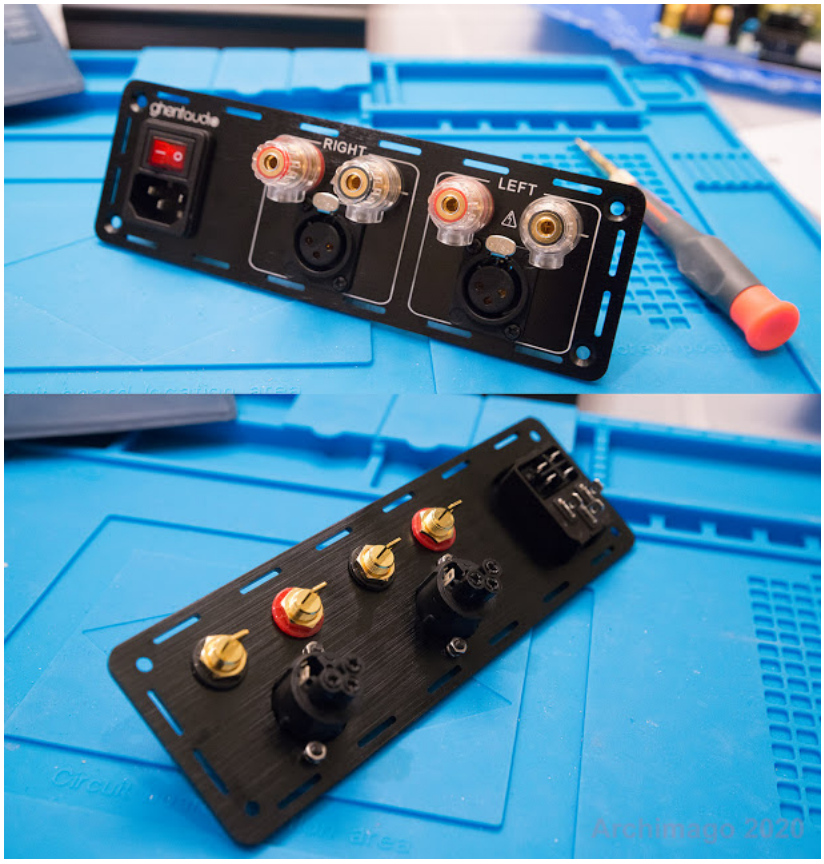
1. Get the bits and pieces ready. You'll need a screw driver set with Philips heads (I think there were a couple screws with Torx head used) for the screws in the case kit and of course a comfortable work space. It should not take more than a couple hours. I used my silicone repair mat for these things. You'll also need something to cut wire insulation with and wire stripping tools (not shown):

2. Install the LED indicator light circuit board with some Philips screws in the kit:

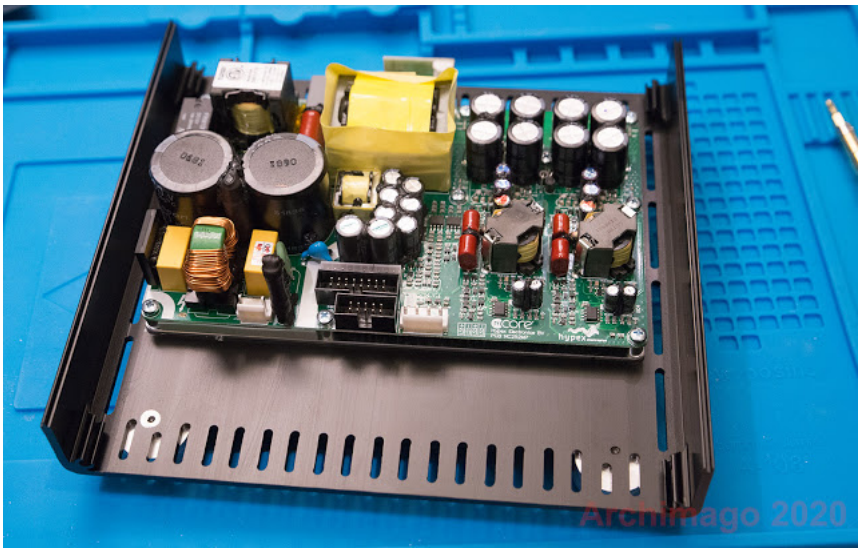


Although you'll notice in the picture above, I have the footers attached, it's smoother to do this later in Step 5.

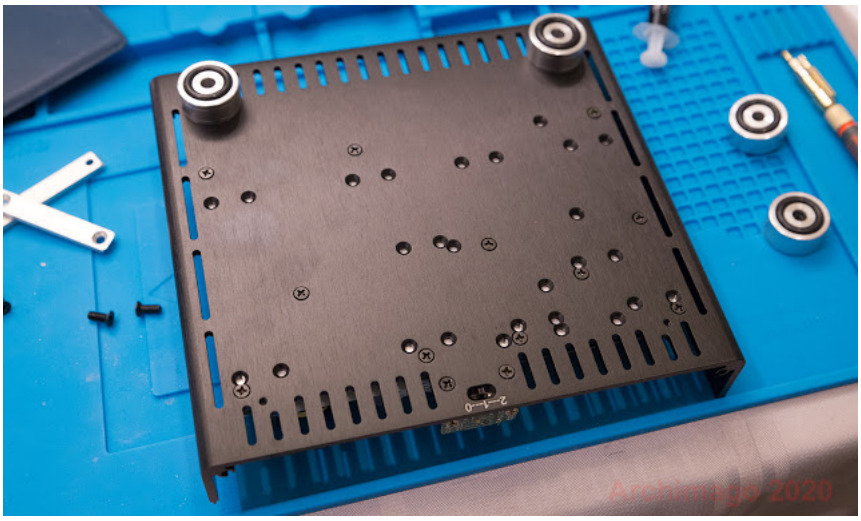
3. Stuff the rear panel with the 2 XLR connectors, IEC AC jack (basically pushed in and clicks into place), and speaker binding posts:



4. Secure the Hypex NC252MP amplifier module to the enclosure bottom plate:

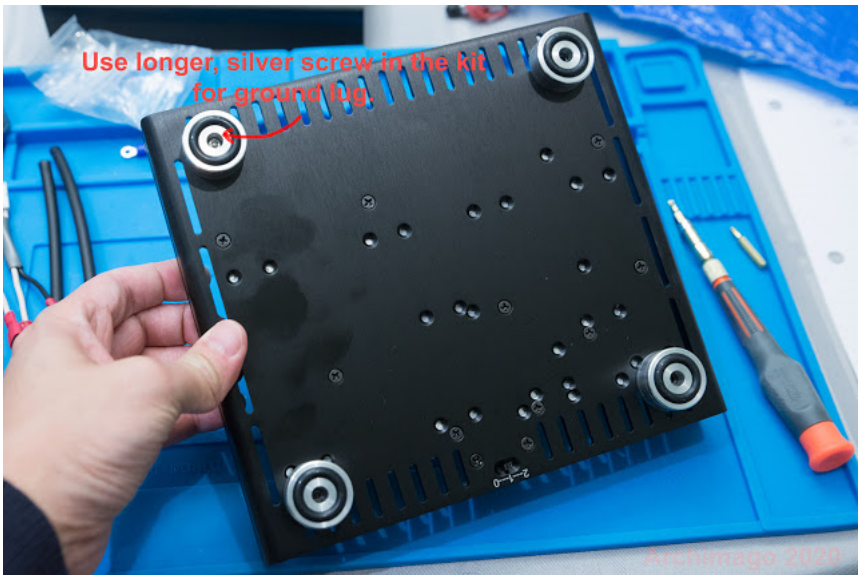


Note that there are 11 screws to secure. Also, optionally, you might want to apply a *thin* layer of thermal compound (something like the Arctic MX-4 typically used between CPU and cooler) as an interface between the bottom of the amplifier board and the case which serves as heatsink. Don't apply too much; I probably covered <50% bottom surface of mine. Also, make sure not to get the paste inside the screw holes:

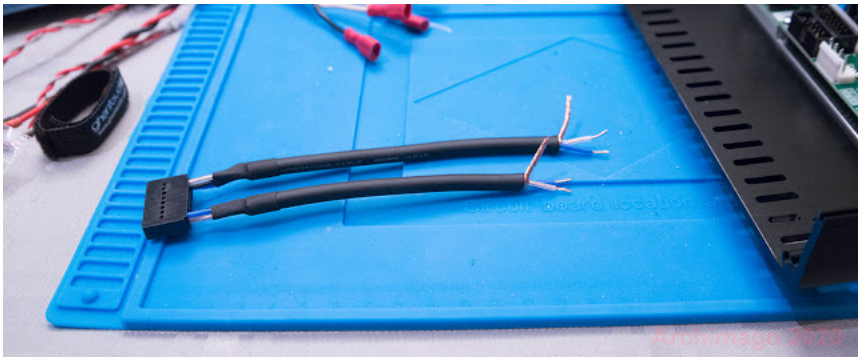


11 Philips screws to secure the amp to the enclosure. Again, I don't recommend putting the footers on yet unlike in this image until the next step!

5. Now it's time to put the footers on. Notice the longer silver screw included in the kit is used for the ground lug threaded through the right rear footer. Just use the nut to keep that footer loosely in place for now. We'll tighten that when we secure the ground connector cable in Step 9.



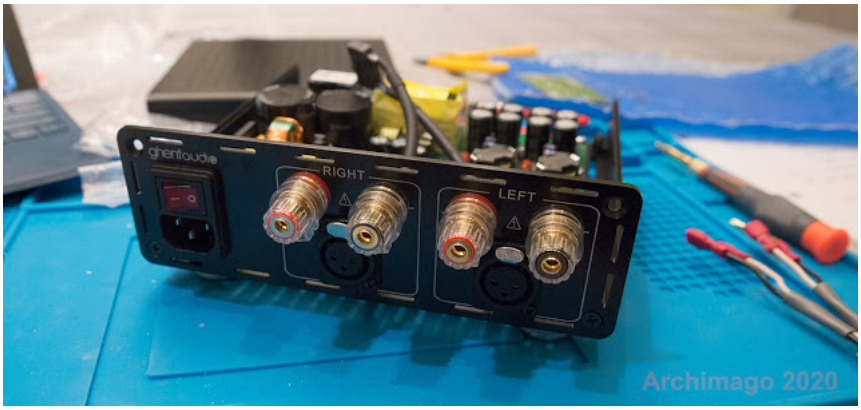
6. Strip back the XLR Input cable and connect the wires to the XLR connectors.



I removed back about 2cm of the thick insulator and about 5mm of exposed wire is enough for the connection. Also, there's quite a thick amount of ground copper strands; I cut off the excess and just inserted ~50% of those strands into the XLR connector.

Remember that this is the "non-solder" kit so it was easy to just tighten the screws to secure the conductors. Note the orientation of the wire colors; for my kit - **blue = positive pin 2**, **clear = negative pin 3**, and **ground pin 1** by modern convention (some devices invert +/-).

7. Screw on the backplate.



8. Now we can attach the loudspeaker connectors, XLR input connectors, and the front LED connector to the amplifier module with the kit harness cables for the NC252MP. Should be self explanatory with this picture:

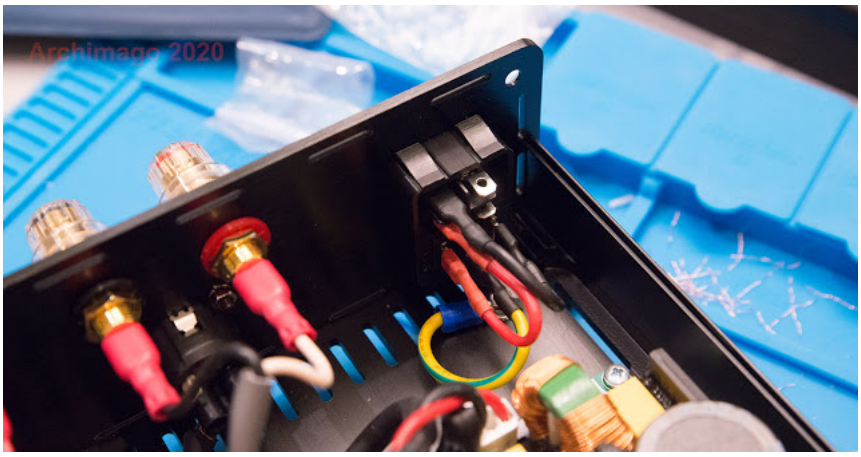
Have a peek at the PDF datasheet to look at the connector pinouts if you need to verify orientation.

9. Let's now connect up the power switch and safety ground. Remember, it's important to get this done *right* and especially make sure the ground lug is secure.

Let's start at the lowest connector and ensure that the ground is securely connected to the chassis:

Make sure the nut is tight! Remember, this is right over the longer silver screw used for that right rear footer in Step 5.

Now let's connect the IEC AC ***N***eutral and ***L***ive connectors to the power switch:

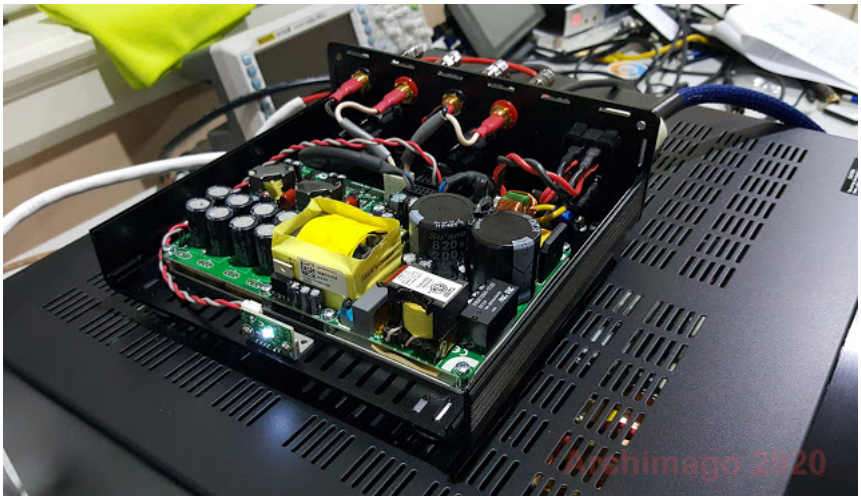


And finally, connect the power switch to the amplifier module:

Double check to make sure the power connections are pushed in fully and the ground cable is secure. (Might want to use a multimeter to ensure continuity.)

10. Yippie... The electrical stuff is all done. What I did now was a test to make sure it turned on before putting the top and front panels in place to save the hassle in case I had to open it up again. Since the enclosure is still open, remember to be careful if you're going to plug it in like I did.

Turned the rear power switch to ON position and plugged it in without touching the case to make sure the front power LED lights up as it should.

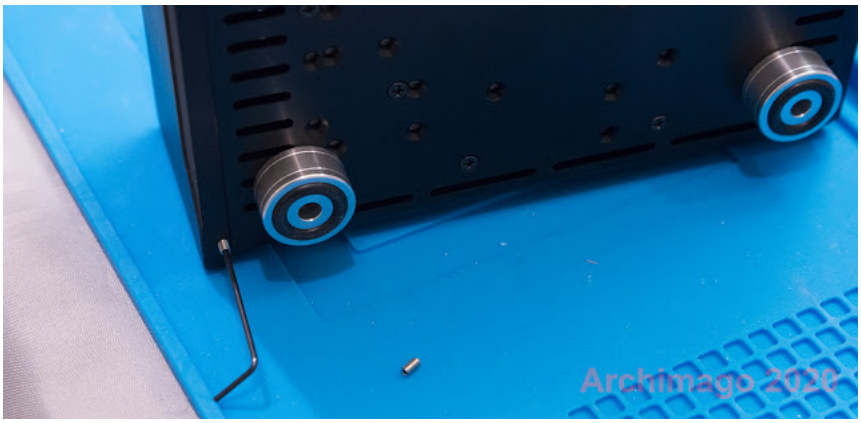


First time turned on... It's alive...

If it looks good, then unplug from the wall and let's finish the case assembly. Otherwise double check the wiring if the power light doesn't turn on!

11. Now with the box unplugged of course, slide on the top cover and we can connect what looks like little silver bars to the front; these hold the faceplate in place:

Attach the front plate. You'll find a couple little screws and a small Allen key provided in the Ghent kit to secure the front plate from the bottom:



12. Congrats... Now you're free to hook this up to your system, perhaps open up some alcoholic beverage of your choice and enjoy some music :-).

Connect up your speakers, XLR cables to preamp, favourite IEC power cable, and have a listen!

When I ordered the enclosure from Ghent, I actually asked for a gold/"champagne" faceplate to make the amp look a little more like some of the "classic" audio products of yesteryear as I wanted to change up the look of my system a bit. It has been the black motif for a few too many years ;-).

As you can see, Ghent Audio mistakenly sent me the all-black kit above, but quickly remedied the issue by sending me this front plate:

Cosmetic color change of course. Notice that with the "champagne" / gold faceplate, the "nCore" text shows up more distinctly.

And here she is with the gold faceplate on:

It looks pretty nice to me in real life, especially when the white LED is turned on. It's small compared to my much larger Emotiva XPA-1L monoblocks so the color will stand out in my system but not too "in your face". Dimensions: 21cm x 19cm x 8cm, only 5.8lbs.

Here's a size comparison with my Emotiva monoblocks stacked to the right:

So how does this thing sound???

The Hypex Class D amps have generally been well regarded for their sound quality. Likewise, for more objective folks, measurements are generally excellent and this specific amplifier module performed quite well on the *Audio Science Review* testbench. Of course I'll run my own tests to see what I get from this specific module and enclosure build.

Subjectively, let's be clear... This does *not* sound like the inexpensive Class D Yeeco TPA3116 "chip" amp. It's not "airy", the noise floor clearly is much better with essentially no hiss coming from the speakers with volume turned way up. It sounds more authoritative with more "oomph" behind the bass and clearer treble.

Does it sound much different than the Class AB Emotiva XPA-1L monoblocks? No. They seem to sound about the same and can both push the volume of my speakers beyond comfort. Without a proper switch, I would not be able to perform an instantaneous A/B comparison of the amps. Remember I have a powered sub so what differences I might hear would be mostly the quality of the upper bass, midrange and treble. The impression I have is that the Hypex achieves a "sweet" treble that's detailed but not harsh. I was listening to the *Wicked (2003 Broadway Cast)* (album DR9) recording the other day and really enjoyed the clarity of the beautifully done duet between Kristin Chenoweth and Idina Menzel in "For Good". Like what I find typical of low distortion amplifiers, I can pump up the volume without feeling dysphoric or fatigued. A track like Breakage / Jess Mill's "Fighting Fire" (Loadstar Remix) off *Getdarker Presents: This Is Dubstep 2011* with its deep, tight propulsive drive even with the subwoofer turned off is a nice demonstration of subjective "speed" and control the amp has over the speakers - no "flabby" bass. By the way, notice the excellent "surround" effect as well sitting in the sweet spot on this track (especially with the room correction DSP turned on in my system).

I have not noticed any amplifier "break in" period or change over the weeks (some people have expressed that Hypex amps improve over 50 hours). This is solid state technology after all and I expect any significant "break in" to be done within a few hours and changes after that might actually be "break down". If I did hear a change, it's much more likely to do with my own *psychological expectations* - the brain is certainly not solid state technology :-). [Would be nice if certain reviewers like this might consider this likelihood.]

Bruno Putzeys in his 2011 whitepaper on the nCore technology stated that: "*If you want to wax lyrically about all the different sonic colours and textures amplifiers can add to the listening experience, there's not much to say.*" Agreed. This is high-fidelity. There should not be much to speak of when a device is simply sounding "transparent" operating within technical limits; better to just spend time listening, enjoying the music than trying to poetically make up stuff about tonal textures and the like unless you're purposely seeking some form of coloration. Quality of textures, timbres, dynamics, "speed", sense of clarity these days should be the result of the artist's creativity, decisions made by the production team, and skills of the recording engineer rather than any additive effect from an otherwise good DAC or amplifier unless one chooses to do so (eg. EQ, DSP, non-linear possibly tube amp/preamp/DAC). Obviously speakers and rooms make a huge difference.

As you can imagine, at <$300 for the stereo module, this is not the top-of-the-line Hypex amplifier. If you're looking for more power out of 2 channels, consider building with the Hypex nCore NC502MP module rated as 2 x 500Wpc into 4Ω. Again, this is an OEM module so not easy to find but I've seen it on eBay for <US$375, Ghent Audio doesn't have a pre-built case for that module at this time so you'll have to look around.

For the "high end" which will provide more power and even lower levels of distortion, building an amplifier using a couple of Hypex NC400 DIY modules plus switching power supply and enclosure will generally run you ~US$1000+. There's also the Hypex NC500 module for OEM builds such as in the recent ATI AT54XNC amplifiers. In 2019, we also saw the release of Purifi Audio's "Eigentakt" 1ET400A amp module for consideration. These can be bought online for ~US$300 x 2 for stereo pair plus you'll need to add a power supply and case; similar price point to Hypex NC400's (check out Mitch's article on some Purifi goodies recently).

As someone who believes that there is such a thing as a "good enough" level of fidelity, it's quite possible that a ~US$450 amplifier like this that is fanless, power efficient idling at <15W (based on my Kill-A-Watt meter, compared to something like 50W idle for my Emotiva XPA-1L *single channel* monoblock), runs very cool, and in typical use only sucks up ~25W at the SPL I listen to, could very well be my "reference" amplifier for much of the 2020's! I think it's quite a good deal. Let's see what my measurements show, but I don't think this amplifier would be the weakest link in the sound system (speakers and room more than likely as usual).

At some point, as much as some audiophiles want to believe that they're *always* hearing better and better sound (ironic because as we get older past our prime, our ears get worse!), we need to contend with the idea that technology has already matured to the point where there really is no further audible fidelity to achieve. Beyond the point of transparency, we're simply left with subjective idiosyncratic preferences. Assuming the objective measurements are better than my Class AB Emotiva XPA-1L amps, this little amp is a nice reminder of what technological progress looks like. Smaller, lighter, more efficient, less expensive to purchase and run; and sounds just as good if not better.

One feature that I would have liked is a 12V trigger in the case kit to turn the amp on like I have with the Emotiva XPA-1L monoblocks. No worries, a simple substitute is this US$25 Iot Relay Power Switch which I'm using currently. Just connect up the trigger output from my preamp to the +/- green connector and plug the amp into one of the "Normally OFF" receptacles:

Iot Relay Power Switch - trigger connected to turn on amplifier when preamp activated with remote.

Ohhh... Look, an "audiophile" thick power cable for the amplifier - might be worth a measure with amplifiers ;-).

I think this is a nice start to the 2020's. We'll certainly talk more about this amplifier with measurements and such in the days ahead.

Have a great January everyone!

Posted by Archimago at 09:51:00

18 comments:

PhilFromTO 4 January 2020 at 13:54

Hi Arch, happy 2020!
I see the Audiophonics assembly is down to 391 Euros (no VAT)... very tempting.
Looking forward to your measurements (although Amir's are a pretty good selling point.)
I'm currently running 2 relatively dated (and hungry) power amps by Quad and Hafler for my MCH setup, and Class D looks like a very interesting alternative. Might even pay for itself.
Mitchco's project looked a bit daunting, and the Hypex 400s are a bit pricey, so I'll be watching this space as always for your measurements and observations.
All the best
Phil

Reply

Replies

Archimago 4 January 2020 at 15:06

Hey *PhilFromTO*,
Great deal on that Audiophonics at <400€! Obviously will need to look into shipping and applicable taxes (TO = Toronto?).

Yeah, I've done a little bit on the measurement side already and what I'm seeing correlates nicely with Amir's IOM unit (including the ~420kHz ultrasonic switching noise which I'll show). In fact, preliminary