# Transducer modification

# Cambridge Audio

# DacMagic 100


by nightrunner

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**1. Introduction**

Why I decided on this DAC. ?

For some time I have been thinking about the successor to my "worn" E-MU 0204, which, by the way, I consider a very good entry level DAC. At the beginning, my thoughts were directed towards much more expensive devices, which is quite natural, because if you want something more, you have to pay for it, and replacing it with a similar device does not make much sense. I decided to buy the Cambridge Audio DacMagic 100 because my intuition and experience told me that this DAC has potential and with appropriate modifications it can sound really interesting. In addition, positive reviews, affordable price and the sound we get for it made me decide to buy the DacMagic 100.

Knowing what elements the DacMagic 100 was built from, I did not expect a large qualitative leap in relation to the E-MU 0204 and I was not mistaken. Cambridge Audio has potential and its advantages, but I did not notice a change that would allow me to clearly state the superiority of the DacMagic 100 over the E-MU 0204. I must emphasize at this point that the E-MU is after minor modifications consisting in replacing the capacitors and output sockets. DacMagic 100 has been playing with me for over a month. He certainly worked well over 100 hours during this time. So he has already "won". During the first dozen or so hours of work, the sound changed significantly, but only after working 100-200 hours, I can hear that it has finally "settled" and I can assess what it has changed in my system.

My system is not high-flying, but I appreciate it for its musicality and diversity. He is able to correctly play and give the character of a rock song as well as calm and relax with reggae. Of course, this flexibility has its limits, but it is big enough to give at least a little joy from listening to each of such extremely different genres of music. Unfortunately, the DacMagic 100 clearly limited this flexibility. The sound of the CA is correct and basically reflects the reviews that can be found on the Internet, it is a really good converter, but I would argue whether it is worth almost PLN 700, and I can definitely say that it is not worth its previous price of PLN 1350. Its disadvantage is the clearly imposed uniform character. All the songs sound similar and predictable, there is no surprise or emotion. It reminds a little kindergarten teacher who tells preschoolers to recite a nursery rhyme in such a way and does not allow any deviations from the adopted template, because not a full stop. Personally, this aspect bothers me a lot and despite many advantages over the previous DAC (E-MU), I feel quite unsatisfied, which sometimes makes me go back to the E-MU to relax a bit and surprise me.

The E-MU 0204 is very musical and can play differentiation, it creates a pleasant scene, it is very open, the music flows freely and detaches from the speakers. The DacMagic 100 has clearly more dynamics and a very pleasant and fuller treble. The midrange protrudes a bit in front of the line, but it is not obtrusive, but only slightly emphasized (the extended midrange is clear for an unheated DacMagic 100). Unfortunately, this is where the pros and cons begin, such as lack of diversity and musicality.

Unfortunately, Cambridge Audio does not offer such tangibility and contact with music. The boundary between the listener and the system is clearly outlined and receives a lot of listening pleasure. The character of DacMagic 100 can be described as rock, with a hard, compact and uniform bottom,

emphasized midrange and correct treble, unfortunately all this clearly lacks freedom. The DacMagic 100 has a lot of potential and possibility, you can hear it, you just need to help it spread its wings a little.

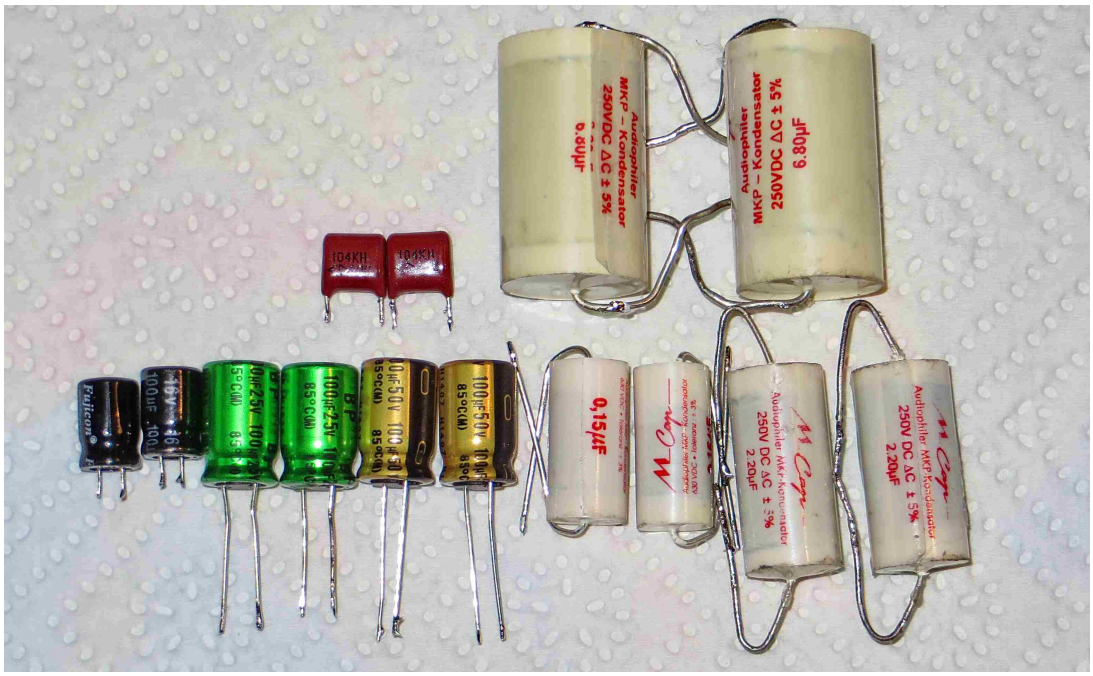
## 2. Replacement of output capacitors

In the DacMagic 100 output section, separating capacitors are used to protect the output from the appearance of a DC component. It is a classic pair of Cambridge Audio applications, a Fujicon electrolytic bipolar and a 100nF film capacitor bypassing it. I already had contact with Fujicon capacitors during the modification of the AZUR 651A amplifier. These capacitors are of poor quality and have a significant negative impact on the sound. They strongly limit the stage, close everything in a small area, they are grainy, they unpleasantly sharpen the treble and play quite dark. The situation is saved by some foil shunt capacitors, they increase the diameter and the top, but they also have their drawbacks. These are elements that should be replaced as soon as possible, because the cost of replacement is low and the change is immediately noticeable.

Below are some combinations that I decided to check to find the best solution for DacMagic 100 and to broaden my knowledge.

My proven solution is Nichicon ES + Mundorf Mcap. With this modification, I decided to test different variants of the Mundorf capacity. I was also interested in the solution of removing the electrolytic capacitor and leaving only the foil capacitor. This solution significantly reduces the capacity, but maybe you do not need it so much?

In the network I found a modification of the DacMagic 100, in which someone decided to replace the Fujicon capacitors with Nichicon Fine Gold capacitors that have polarity. I have seen such solutions before and it does not seem to be the best solution, but out of curiosity I decided to check it out.




*Picture 1: Tested capacitors*

### *2.1 Nichicon Muse ES + "factory" foil capacitor*

The first variant that I decided to check is a combination of Nichicon MUSE ES and a factory-made foil capacitor. I have had the pleasure to test Nichicon Muse ES capacitors and I consider them to be very good electrolytes for the audio path. In fact, these are just decent electrolytic capacitors for the audio path, which you can get without any problems. Muse ES made some big changes. There was more room on the stage, mainly in width. The depth also increased, but only in the area between the speakers and the listener. The midrange and treble gained more life and freedom, the location of virtual sources clearly improved. The lower registers gained differentiation and precision. They lost some weight, but in this case I consider it an advantage. Fujicon capacitors gave more weight to the pit, but at the same time they caused that it sounded the same for every genre of music. At the beginning I got the impression that Muse ES brightened the sound and gave it a bit of unpleasant sharpness in the upper registers, but after a dozen or so hours of playing, the unpleasant sharpness clearly decreased.

### *2.2 Nichicon Muse ES*

Out of curiosity, I decided to check how the Muse ES would do without factory foil shunt capacitors. As a rule, electrolytic capacitors sound worse than foil capacitors, therefore they are shunted with foil capacitors. To my surprise, it turned out that Muse ES are doing better without "factory foils". The sharpness mentioned in the point above decreased significantly, so it was caused by the factory foil capacitor. Muse ES still play a bit spicy, but without "factory foils" this sharpness has decreased to an acceptable level. It got quite nice and quiet. Muse ES has brought a new dimension to the energy served by the DAC. If someone likes the energy and attack served by this DAC, they should try Muse ES,

This example showed me the importance of choosing the right components. As you can see, the adopted rules do not always work and sometimes even less significant elements can be of great importance. The factory foil capacitors formed a matched pair with dark Fijicon, but with Muse ES the situation changed significantly.

### *2.3 Nichicon Muse ES + Mundorf Mcap*

For this connection I decided to check what changes will introduce different capacities of the Mundorf Mcap capacitor. I chose 0.15uF 630V, 2.2uF 250V, 6.8uF 250V capacitors for the test. The Mundorf Mcap is a very musical, a bit warming capacitor that gives a lot of air. Thanks to the Muse ES combination + Mcap, the scene clearly expanded, especially in depth. The tonal balance improved, it became more neutral. Mcap clearly calmed down the sound served by the DAC. The music finally began to flow freely. Such calming down in the case of the DacMagic 100 could be considered a disadvantage, but thanks to it the diversity increased and the songs finally began to sound as they should. Where it was supposed to be calm, it was quiet, where it was supposed to be, kick appeared there, everything started to be served without much effort. This is certainly a step in the right direction. The DAC still has a lot of energy, but this energy began to be served wisely and ceased to be forced wherever it falls.

Changes in the value of the capacitance of Mundorf Mcap capacitors were clearly heard and as the capacity increased, the stage, freedom of transmission and more and more details appeared.

With the factory capacitors, I still had the impression that music was fed under constant stress and under strict supervision, according to established rules. After applying a pair of Muse ES + Mcap all this unpleasant tension disappeared and the DAC gave the music a free hand and more freedom to express emotions.

### *2.4 Mundorf Mcap*

It turned out that the 100uF capacity is not needed at all to transfer the entire band. In fact, from a technical point of view it was obvious from the beginning, but as you know, what "on paper" does not always reflect what we are actually able to hear. I already had the opportunity to check the issue of high capacitance of the capacitors when modifying the AZUR 651A amplifier.

Mundorf Mcap visibly warmed the sound. This variant will definitely appeal to people who would like to calm the DAC a bit. The sound lost energy, but gained more space and naturalness, which is especially manifested in classical instruments. It is possible that people who liked the energetic playing of the DacMagic 100 will feel some confusion, but after prolonged listening, you can't get the impression that for this energy we got a considerable cost of natural sound. Mundorf Mcap sounded similar to the jumper (described in the next section), which speaks for this option for people who are looking for the most natural sound. The change in capacitor capacity had a clear impact on quality, which is why I recommend using the largest possible capacitor. During the tests I was able to fit a capacitor with a capacity of 3.9uF 250V in the DAC, and in tandem with Muse ES.

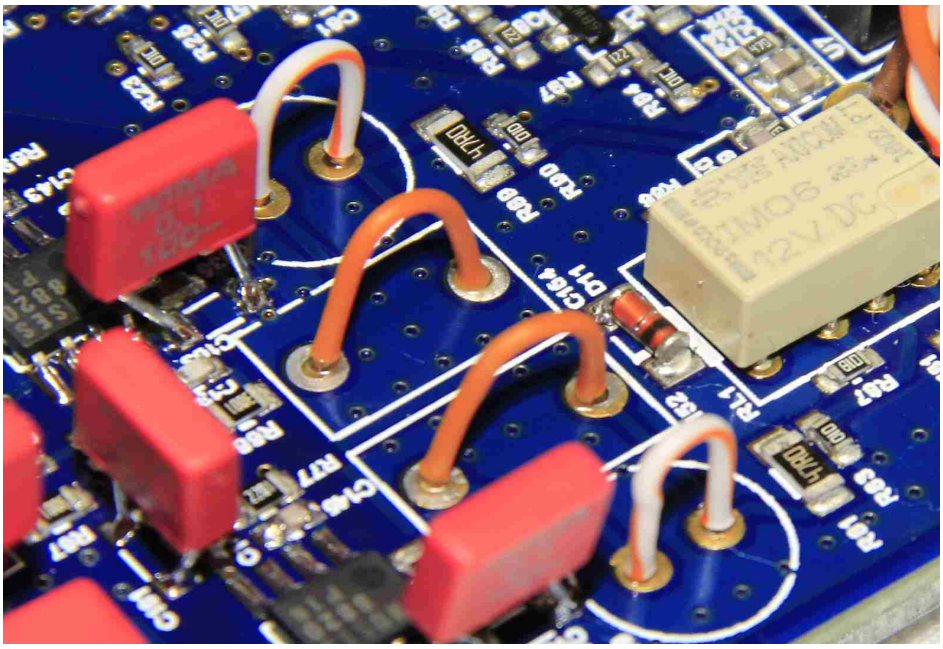
### *2.5 Jumper*

As you know, each of the electrical components introduces some distortion into the signal that passes through it. I decided to check what happens when I use the jumper in place of the output capacitor. The jumper practically costs nothing and can be considered a reference element in this case. For the best signal flow I decided to use all four connection points and made two jumpers for each channel.

Probably no one will be surprised that the jumper sounded the best of all variants. Sound has gained in virtually every aspect. The stage grew in each of the three dimensions, but the most interesting changes occurred in the width, where the music began to extend beyond the space between the speakers with incredible ease. The highs became fuller and softer. The vocals in some of the songs felt like I was listening to live music. The lower registers gained more warmth and depth, but compared to the Mundorf Mcap presented more dynamics. In the case of the jumper, the DAC lost energy, but gained significantly more dynamics. As in the case of Mundorf Mcap, people who liked the energy of DacMagic 100 can be a little confused by the obtained effect, but since the "piece of wire" introduced such changes, it can only mean that we received this energy at a considerable cost,

The use of a jumper, unfortunately, is associated with the risk of a constant voltage at the DAC output in the event of a failure. It can be 8V (OPAMP supply) or even 12V. However, it should be remembered that the amplifier to which we connect the DAC may also have capacitors in the audio path that will stop this voltage, so in some cases it is worth considering using a jumper, because thanks to it we will get the highest quality at the lowest

costs. The use of a jumper can be considered a step towards system optimization, if we are sure that the amplifier is able to stop unwanted direct voltage and prevent it from reaching the speakers, then the use of capacitors at the DAC output is unnecessary.



*Picture 2: Jumper in place of output capacitors*

### *2.6 Jantzen Audio CrossCap 6.8uF 400V*

To diversify the test, I decided to check what changes a decent foil capacitor at an affordable price, such as Jantzen Audio CrossCap, which I have in my collection, will introduce. The Jantzen Audio CrossCap sounded quite sharp and worse than the Nichicon Muse ES, which surprised me. I got the impression that it gave a larger stage than Muse ES, but the sharp top and hard tiles clearly masked its advantages, so much so that after a few songs I decided that this was a bad option.

In short, I can say that Jantzen Audio CrossCap does not work well with the DacMagic 100 and it is better to use the cheaper and better Nichicon Muse ES.

### *2.7 Nichicon FineGold vs Nichicon Muse ES*

The issue of using capacitors with specific polarization in the audio path has been intriguing me for some time and I decided that the modification of the DAC is a good opportunity to check if such a solution makes sense. I have come across such a solution many times, so I decided to spend some time on it.

It so happened that in my collection I have Nichicon FineGold 100uF 50V and Nichicon Muse ES 100uF 25V capacitors. Comparison of Muse ES and FineGold seems to be a good idea, because they are capacitors of the same class and the same company, so discrepancies resulting from technological differences can be rejected. Both compared types of capacitors have identical dimensions and with these dimensions FineGold is able to withstand twice as large

voltage from Muse ES, so there must be some physical differences in the construction of these capacitors, but can these differences be heard? Yes, it can be done very clearly. To tell the truth, the distortions introduced by a capacitor with a certain polarity are quite interesting. I am not surprised that some people decide to use such capacitors, because the effect is there, it may even be desirable in specific conditions, but it does not change the fact that it introduces large deformation at the same time. Personally, I consider such a compromise when modifying as unacceptable and senseless, because it significantly affects other introduced changes. Nichicon FineGold brightened the sound a lot. The highest registers came to the fore, the midrange was close behind them, and the bottom was far behind, although it gained differentiation compared to Fujicon capacitors. In FineGold you can listen to the character of Muse ES, which is why the changes can be perceived as a step forward, but it's not Muse ES. The frequency response is quite large and I do not think there is a dark enough system to match such a change, but there were people who liked this sound. Unfortunately, this is where the "advantages" of such a solution end. Distinct deformations in the whole frequency range, consisting in "cutting" the sounds, make everything sound very unnatural. The impact on the snare drum resembles a deafening blow to a plastic bucket, and the drum plate is a short burst, as if a moment after hitting the stick the cut-off took place and the plate stopped vibrating. I remember the piano sound most, as if it had been stripped of its soundboard. The arrangement of virtual sources seems to be correct, but there is a lack of air around them, as if they hung unnaturally in a vacuum, and the sound did not have a medium on which it could travel.

So I personally advise against using capacitors with a certain polarization in the audio path, because it brings more losses than benefits. In principle, there are no benefits, only a situation may arise where someone interprets the introduced deformations as a subjective benefit. Personally, I would rather stick with the factory Fujicons than replace them with capacitors with a specific polarity, no matter how high-quality they are.

### *2.8 Summary*

Of all the tested variants, the best solutions in my opinion are:

1. Jumper
2. Mundorf Mcap 3.9uF 250V
3. Mundorf Mcap 3.9uF 250V + Nichicon MUSE ES 100uF 25V
4. Nichicon MUSE ES 100uF 25V

The jumper is the best and cheapest solution for the conscious user. I personally decided to leave the jumper because I already have a "security" in the amplifier. Besides, after a few days of listening with the jumper, I decided that there is no return to the option with capacitors.

Unfortunately, for the other options it is difficult to indicate the best solution, because the changes are significant and a lot can depend on individual preferences. Each of the variants introduces big and positive changes. Mundorf Mcap offers more warmth and naturalness. Nichicon MUSE ES, however, allows you to still enjoy the great dynamics offered by the DacMagic 100, but unfortunately some blades. The MUSE ES pair costs PLN 3, the Mundorf Mcap pair costs PLN 40, so the price difference is big. I can recommend Nichicon MUSE ES as a base option with a clear conscience, because the ratio of their changes to the price is indisputable.

## 3. Replacement of power capacitors

The DacMagic 100 does not have many power capacitors (there are 9 of them in total) so you can afford a bit of madness and use top shelf capacitors. With this modification, I decided to test the ELNA SILMIC II capacitors (there was one Panasonic FC at the power input).

I was curious what changes ELNA SILMIC II capacitors will introduce, because I have never used them before. Capacitors such as Panasonic FC / FM or Nichicon FG have their own unique character, so you can influence the sound of the device to some extent. Panasonic capacitors slightly warm and calm down, Nichicon FG are more analytical and dynamic. ELNA SILMIC II surprised me with their neutrality. They will give the impression that they do not affect the character of the sound in any way. Of course, they improve quality. Clearly cleaned the stage, added air and precision. The range of higher frequencies has improved, it has become gentle. The dynamics in the whole frequency range also increased, but I did not find any frequencies underlined or colored. I feel a bit unsatisfied because I expected a clear effect, fountains and weirdness, and nothing here. SILMIC II capacitors are simply neutral. They do their part, clean up the power mess and do not even manifest their presence. These are very good capacitors and I can recommend them with a clear conscience. All in all, they are an interesting alternative to the mentioned Nichicon FG and Panasonic FC / FM capacitors.

Of course, it should be taken into account that a lot depends on the application itself and using ELNA SILMIC II in another device may have different effects, but so far in my opinion they will remain neutral.

**Capacitor list:**

1x Panasonic FC 1000uF 35V 5x ELNA

SILMIC II 100uF 35V 4x ELNA SILMIC

II 10uF 35V

You can use 25V capacitors. I used 35V capacitors, because such were available.

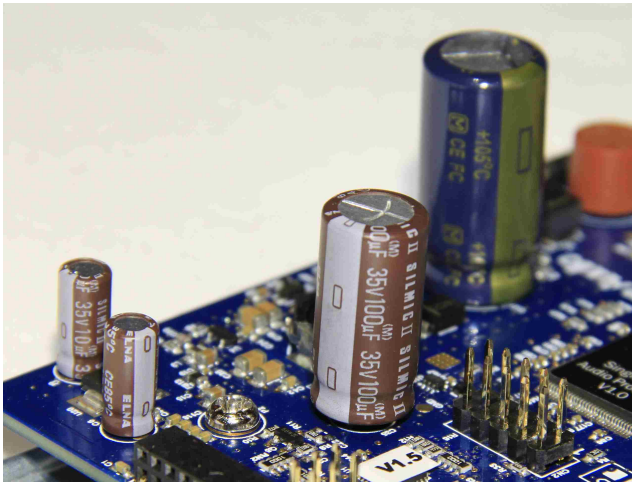



*Photo 3: Power capacitors*

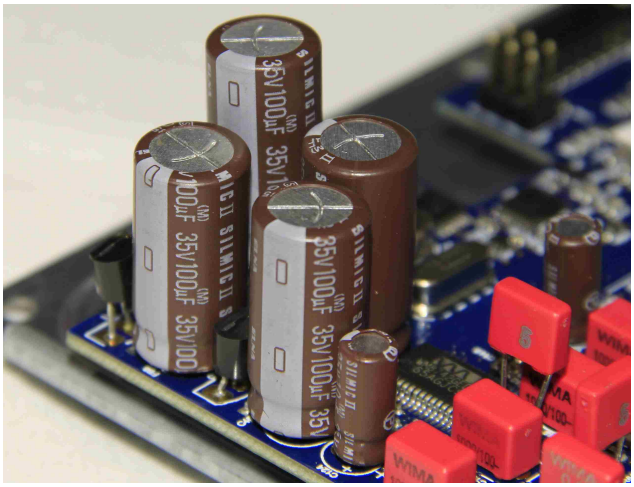



*Photo 4: Power capacitors*

## 4. Replacement of opamps

Probably no one will be surprised by the fact that in this design the Cambridge Audio company used NE_5532 opamps, these are two dice, one for each channel. It should be emphasized that this is a very good design for its price, so it can be found in devices up to 10 times more expensive than the DacMagic 100. The amplifiers are in the SO-8 housing, which makes it a bit difficult to juggle with opamps, so I chose two favorites for testing, they are MUSES_8820 and MUSES_8920. Intuition told me that MUSES_8820 should match the DAC character well, but sentiment was the first to install MUSES_8920. Unfortunately, I was not satisfied with the changes introduced by MUSES_8920, the DAC calmed down a lot (too much), it changed completely in relation to the factory configuration. He gained a lot of space and musicality, The DAC opened a lot and the sound finally broke away from the loudspeakers, but it lost energy and attack. I have to admit that MUSES_8920 suits calmer music very well, the songs sounded just beautiful, you could immerse yourself in the armchair and dream. Unfortunately, with faster and more aggressive songs, the DAC got lost and late, it wasn't necessary to listen to it for a long time to know that it wasn't his element. It was the complete opposite of the factory configuration. MUSES_8920 turned out to be a completely wrong idea for the DacMagic 100, because despite some advantages, it forces too big compromises. I had high hopes for MUSES_8820 and I was not disappointed. It is the perfect opamp for this DAC. All the advantages such as dynamics, attack, fleshy bottom remained and at the same time gained a new dimension. Same as MUSES_8920, The DAC opened up a lot, the sound broke away from the speakers, you could finally feel the contact with the music. The impressions are really amazing. You feel tremendous energy and contact with each instrument. The stage improved, the precision, the sources gained more space, they no longer had to nestle and push apart, as was the case with the factory configuration. The DAC finally started to play differently and reflect the atmosphere of a specific music genre. However, during the first listening sessions, all of this was relegated to the background, because the most interesting were the energy and dynamics introduced by MUSES_8820. It's been a long time since I came across a device that could give such a vivid message and so absorbed the listener. One feels enormous energy and contact with each instrument. The stage improved, precision, the sources gained more space, they no longer had to nest and push, as was the case with the factory configuration. The DAC finally began to play variously and reflect the atmosphere of a particular genre of music. However, during the first listening sessions, all of this was relegated to the background, because the most interesting were the energy and dynamics introduced by MUSES_8820. It's been a long time since I came across a device that would be able to give such a vivid message and absorb the listener so much. One feels enormous energy and contact with each instrument. The stage improved, precision, the sources gained more space, they no longer had to nest and push, as was the case with the factory configuration. The DAC finally began to play variously and reflect the atmosphere of a particular genre of music. However, during the first listening sessions it all went to the background, because the most interesting were the energy and dynamics introduced by MUSES_8820. It's been a long time since I came across a device that would be able to give such a vivid message and absorb the listener so much. However, during the first listening sessions, all of this was relegated to the background, because the most interesting were the energy and dynamics introduced by MUSE

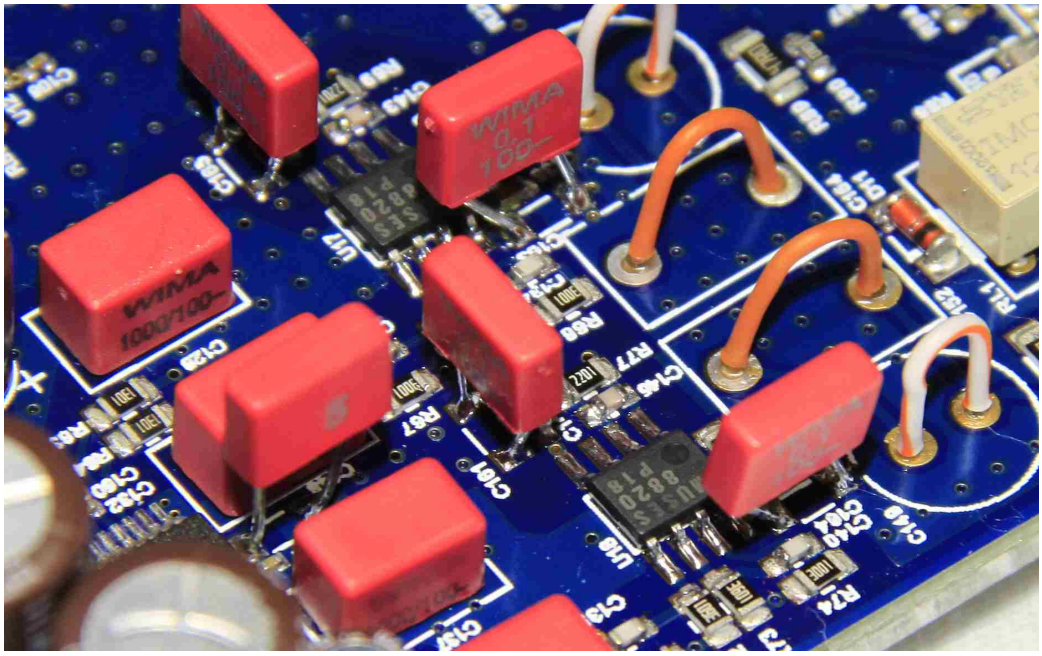



*Photo 5: New MUSES 8820 opamps*

## 5. Application of a stabilized power supply

Replacing the power supply is a procedure recommended by many people and at least in this matter there is no fierce war, as in the case of many other aspects in the audio world. I have decided that replacing the power supply will be one of the modifications introduced. I have never used a stabilized power supply and I was very curious what changes it will introduce and what will be their relation to the costs incurred. Because I have two DACs and I like challenges, I decided to design and assemble my own power supply. I estimated that at the price I would have to pay for a ready-made power supply, I should build two structures with similar parameters on my own, and the plan was successful. Creating my own design turned out to be not that simple and showed me that the commonly accepted rules for creating stabilized power supplies do not work well, when it comes to powering audio devices. Specialists from power supplies would probably point out a few design errors to me and decided that the power supply was "exaggerated", but my basic assumption was to create a device with a capacity of 12V 3A, which the DacMagic 100 will not use, but my second ASUS Xonar STU DAC already so, that's why I created two twin power supplies.

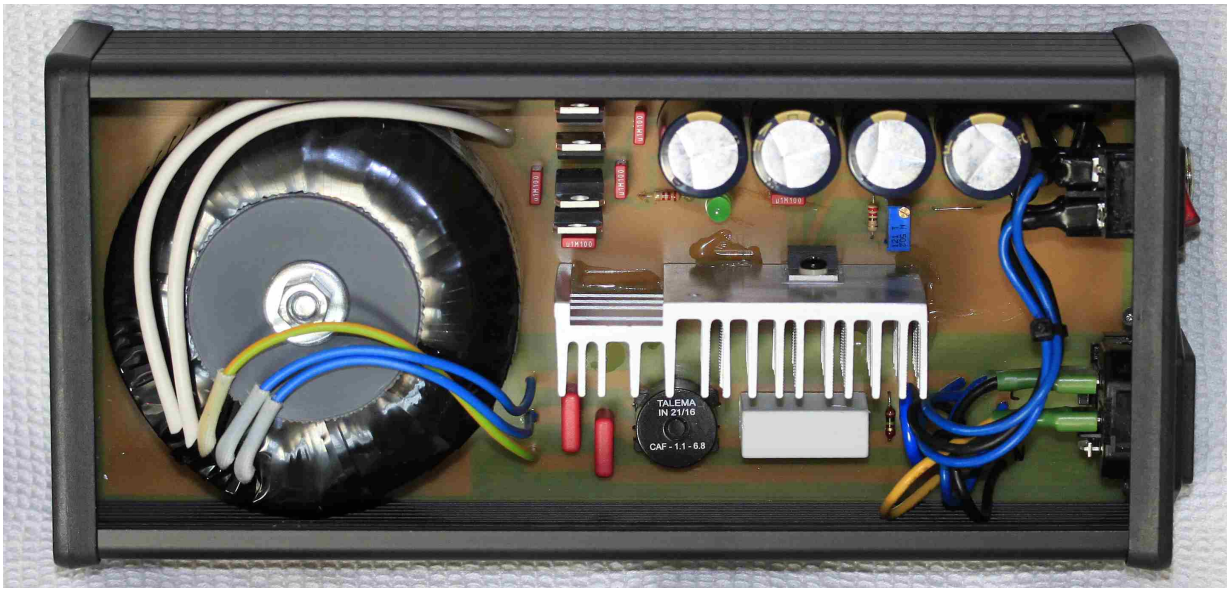



*Photo 6: 12v 3A stabilized power supply on the LM350 stabilizer*

To tell the truth, in order to fully and reliably describe the process of creating and testing this power supply, I would have to create a separate document. Therefore, in order not to elaborate on too much, I will focus only on the most important aspects and impressions after connecting the finished power supply to the DAC. The power supply is based on the LM350 stabilizing system. It is a popular circuit with short-circuit and thermal protection. LM350 is a very simple and easy implementation solution. According to the art, the output of the stabilizing circuit should be connected directly to the output of the power supply. You can put a small capacitor at the output, but it should not be too large because too large capacity can cause so-called ripple, or voltage surges resulting in changes in load values. Of course, I followed the art and used a 10uF capacitor. I noticed, that many designs, even from recognized manufacturers, based on stabilization systems are made in this way, so I also decided to stick to the rules. The power supply has undergone short-circuit and load tests, and I also checked for interference. Everything looked promising.

The first impression after connecting the new power supply was a little consternation. Based on other people's reports, I was expecting a significant jump in quality, but experienced a small disappointment. My first conclusion was that replacing the power supply from impulse to stabilized is not such a clear and unambiguous leap into a better world. Due to the fact that the power supply cost me a little, because about PLN 320 I was counting on a considerable and uncompromising quality leap. Unfortunately, it did not happen at all, and the compromise introduced by the new power supply meant that at the beginning I even considered going back to the switching power supply. In fact, the first impression is the best indicator of change, because if you immediately hear a clear improvement, it is a clear sign that you are going in the right direction.

Connecting the new power supply meant that the sound became more analytical, the stage gained a lot of space (mainly depth) and a clear height dimension appeared. Phantom sources gained even more space and finally we could feel the atmosphere and the "dimensions of the room". You can hear a clear increase in control and discipline, the recording has to be really bad for something to break out in front of the line or to irritate the ears unpleasantly. There are many advantages introduced by the new power supply, but ... well, there are some but ...

With the switching power supply the DAC sounds with incredible energy and panache. The effect is very interesting and engaging, but plugging in a stabilized power supply made me realize that together with the energy and momentum, the switching power supply introduced a lot of chaos and distortions, which was most reflected on the stage.

Regarding the disadvantages, the new power supply caused the DAC to retreat a little. It did not close like before the replacement of opamps, but the first listening showed that something is wrong. The biggest unwanted changes took place at the bottom of the band. From the technical side, the bass improved the same as the rest of the frequency range, but it lost energy and differentiation, it ceased to be so enjoyable and surprising. In a few classical pieces, I noticed that, for example, the double bass had suffered a lot from this change, it stopped decaying with such ease,

as if someone had laid out a soundboard for him

sound isolating. I went back to the switching power supply several times, because I missed a bit of the energy that the new power supply picked up, but the longer I listened to the new power supply, the more I liked the changes it introduced and I knew it was a good direction. However, the compromise I had to make was difficult to accept. The power supply played for several days. During this time, I tried to convince myself that this should be the case and I have to get used to the changes. Fortunately, I am too stubborn and inquisitive to leave this issue like that, so I decided to verify that the power supply is working properly. I decided to compare it to a battery. I had a 12.3V car battery at hand. I connected the battery and finally heard what I had hoped for from the beginning. There was openness and energy that was so lacking. This is how a new power supply should play. I started to wonder if the LM350 stabilizer is really that fast in terms of voltage stabilization? The DAC is a specific device and the changes in its load are small, and if they occur, they are certainly fast, maybe too fast for the LM350? I decided to conduct an experiment and added a 1000uF capacitor stabilizer to the output. This solution turned out to be a hit. The power supply started to sound much better. Then I added 2 more capacitors, which gave a total of 3000uF at the output of the power supply. The effect is very positive, the power supply "started to play" similarly to the battery power supply. I started to wonder if the LM350 stabilizer really is so fast in terms of voltage stabilization? The DAC is a specific device and the changes in its load are small, and if they occur, they are certainly fast, maybe too fast for the LM350? I decided to conduct an experiment and added a 1000uF capacitor stabilizer to the output. This solution turned out to be a hit. The power supply started to sound much better. Then I added 2 more capacitors, which gave a total of 3000uF at the power supply output. The effect is very positive, the power supply "began to play" just like when powered by a battery. I started to wonder if the LM350 stabilizer is really that fast in terms of voltage stabilization? The DAC is a specific device and the changes in its load are small, and if they occur, they are certainly fast, maybe too fast for the LM350? I decided to conduct an experiment and added a 1000uF capacitor stabilizer to the output. This solution turned out to be a bull's eye. The power supply started to sound much better. Then I added 2 more capacitors, which gave a total of 3000uF at the output of the p

This example shows that it is sometimes worthwhile to deviate from conventional thinking. Of course, adding such a large capacity at the stabilizer output would be a mistake if I were to design a universal power supply to power everything, because it certainly has a negative impact on the LM350's ability to respond to load changes. However, in this case, this is not the case

universal power supply, designed for a specific type of device, which reacts very positively to such unconventional changes. In fact, the DAC itself has one 1000uF capacitor (Panasonic FC) at its input, and the 3000uF output of the power supply is only an extension of this capacity, because both capacities are connected by a cable / path, they are only found in other housings.

In conclusion, I am very pleased with the results obtained. Stabilized power supply, despite the introduction of major changes, I consider the least profitable modification due to the price of PLN 320, although from this price PLN 120 is the cost of the housing itself, so the power supply could be made even cheaper, but compared to other modifications, its cost will still be high. However, I have to admit that this is a change that I could not give up anymore. Besides, the power supply is an investment for the future as it can be used with many devices.

## 6. Replacing the output relay

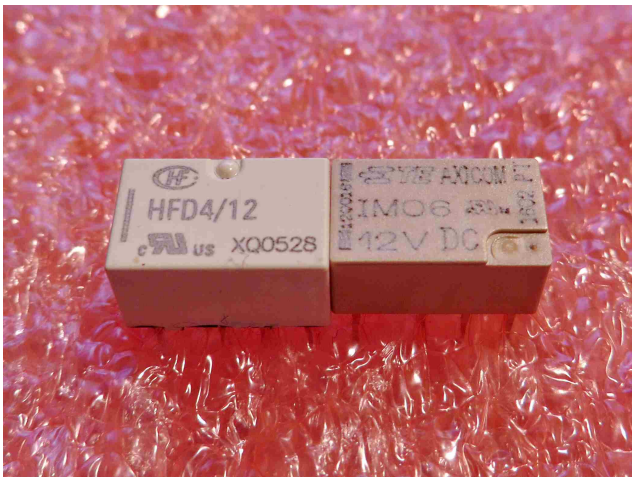
In the DacMagic 100, Cambridge Audio uses a HONGFA micro relay for the output. Unfortunately, my knowledge about the quality of the relays is small, so I used the information provided by the manufacturer of the relay, which showed that the relay is of decent quality (gold-plated contacts).

To be sure, I decided to check if the relay has no negative impact on the sound by bypassing it with a jumper. Of course, this shorting of the relay involves some risk and should be handled with care. Relays are not cheap and nobody uses them without a reason, especially in budget designs. Most often their task is to turn on the device output only when its operation is established, to prevent any transients (noise / noises) from appearing on the output. The short-circuit of the relay had a positive effect on the sound, the changes were immediately audible, it was a clear step towards more analog sound. The sound became softer and fuller. The conclusion was simple, the transmitter has a clear negative impact on the sound. The influence of the relay was so clear that

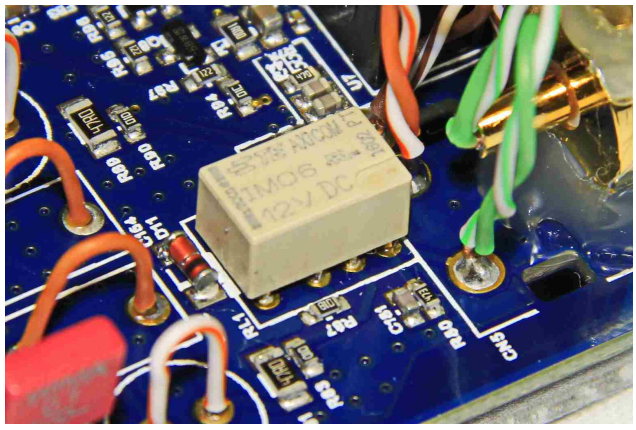
I decided to check if I could buy a better relay, unfortunately the matter of replacing it was not so simple. My analysis showed that the relay used practically does not differ in parameters from relays from other companies, but I know from experience that not all changes can be seen on paper. With the availability of micro relays it is not so easy and basically from those available in Poland and with a decent delivery time, I had only one relay to choose from. I decided to take the risk and purchase a TE Connectivity (AXICOM) relay model 2-1462037-7.

The purchased relay turned out to be better than the one used at the factory. After the initial listening, I decided to check if I could hear any changes with the jumper bypassing the relay. I have to admit that I didn't hear any differences. Maybe after a long listening session something could be detected, but the first impression is about no changes.

The most interesting fact is that these relays practically do not differ in parameters. As you can see, not all gold has gold contacts.



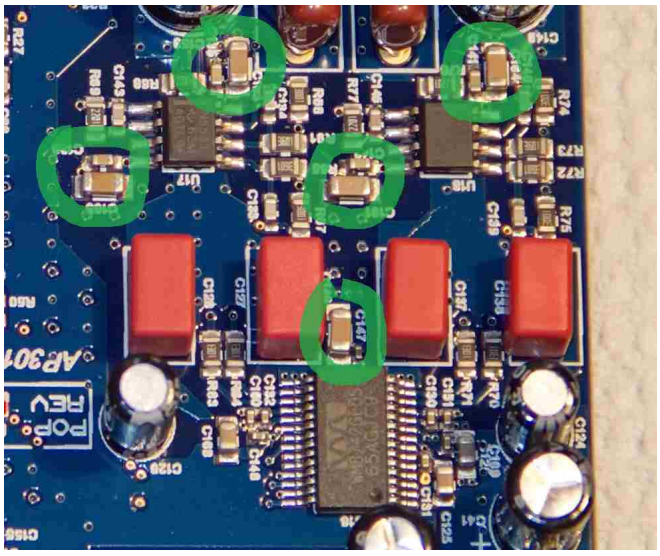

comparison



*Picture 8: AXICOM relay*

## 7. Replacement of decoupling capacitors

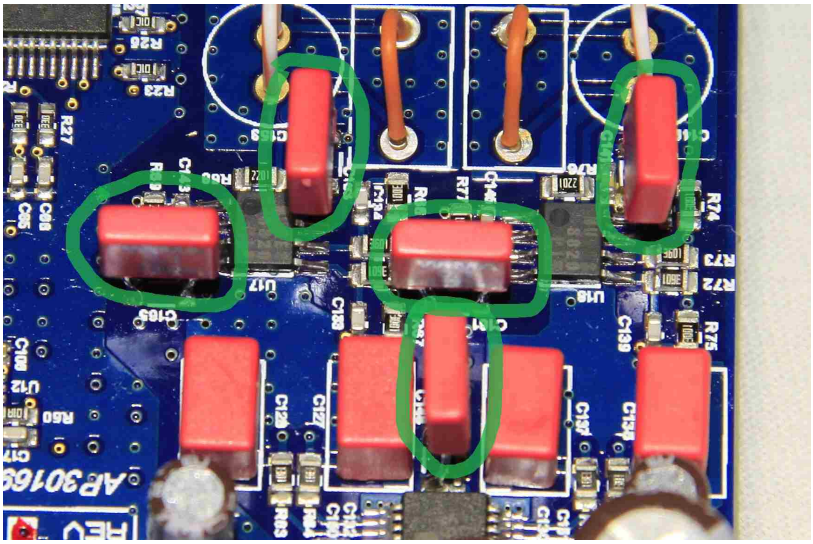
Decoupling capacitors are designed to remove the variable component from the supply voltage, i.e. all unwanted interference that may deteriorate the sound quality. It must be admitted that Cambridge Audio has made an effort in this matter and decoupling capacitors can be found in many places of the device. In order not to write too long, I will limit myself to describing the places where I decided to make changes, namely with operational amplifiers and the D / A converter circuit (WM8742). As you can see in the photo below, the manufacturer decided to use a pair of SMD capacitors (bigger and smaller) to improve the filtering efficiency. The larger capacitor has a capacity of 10nF, while the smaller capacitor I did not check, because I would have to solder it and I was afraid that it would not be soldered again, due to small dimensions. I decided to leave smaller capacitors and replace larger ones.



*Picture 9: OPAMP decoupling SMD capacitors and D / A converter Picture 7: Relay*

I decided to use 100nF WIMA MKS2 capacitors. I have already used these capacitors in many applications as decoupling capacitors and they are perfect for this role. Many people do not realize how huge a role decoupling capacitors play and how much can be gained at a low cost. It was no different with the DacMagic 100. The biggest change is the clear extension of the stage and its aeration. This is another step towards natural and full sound. The most memorable thing about this change was "Pink Floyd - One of My Turns", namely the woman's walk at the beginning of the song. It was the first time that I heard clearly the entire left-to-right transition, which is a really big achievement,

This example shows how much noise still penetrated the systems despite the use of two SMD capacitors to decouple the power supply. Of course, it will never be possible to completely get rid of the disturbances, but getting such a clearly audible change at a low cost (PLN 2 for 5 pieces used) is worth attention.



*Picture 10: New WIMA MKS2 decoupling capacitors*

**8. Replacement of RCA sockets**

Replacing RCA sockets is a very interesting issue. I have to admit that the sockets used in the DacMagic 100 are of decent quality and this type of sockets is also found in much more expensive constructions. Unfortunately, the factory-applied socket has a serious disadvantage, which is a very small contact area of the signal line. The matter is quite strange and I do not completely understand it myself, because from a technical point of view the contact surface at a negligible current should not matter much. It is possible that this is not about the surface, but rather about the quality of the contact. However, this does not change the fact that the replacement of factory RCA sockets brought audible changes. Interestingly, I only replaced the sockets on the DAC side, while the sockets on the amplifier side have not been replaced (yet), and yet you can hear an improvement.

The whole thing is a bit grotesque, because many of us have already got used to spending hundreds of zlotys on wires with gold-plated plugs, and hardly anyone is aware that they insert these plugs into maybe not the worst sockets, but certainly those that do not allow to use them " the possibilities of gold ". A bit of bitterness is added by the fact that to obtain a clear improvement in quality, you do not have to invest in gold-plated sockets for dozens of zlotys, because a brass socket for 8 PLN / piece is enough. The sockets used by me cost PLN 14 per piece, but I used them because I didn't have cheaper sockets on hand. It is important to pay attention to how the signal pin connection is made. In the sockets that I use, the signal pin enters a brass or copper sleeve, which certainly provides better connection quality than the "hook" shown in the picture, which I removed from the factory-fitted socket. Unfortunately, I do not have any socket that I could disassemble and show what makes a decent RCA socket different.

*Photo 11: "Forks" of the factory RCA socket*

Since I have sown another grain of voodoo audio, it remains for me to describe what changes the replacement of RCA sockets introduces. In short, this is a small step towards a more analog sound. The quality of the higher and middle registers is clearly improved, they are smoother and fuller. With this modification the song "Jan Garbarek - Gula Gula" was the most memorable for me. Before the modification, at its peak moments, the saxophone sometimes seemed to be losing control and irritating the ears unpleasantly. After changing the RCA sockets, this phenomenon has significantly decreased and even at higher volumes I no longer feel discomfort. The lower registers also gained and became warmer. The change can be compared to the difference in the lower registers between MP3 320 kbps and FLAC. The change at the bottom is most audible for classical instruments such as the double bass or the piano. So it's really worth thinking about replacing RCA jacks, especially when using three digital (or more) total wires. I believe that PLN 28 invested in this modification was a good step, although I could fit the price of PLN 15-20. When I compare the changes introduced by replacing the RCA sockets in the DAC to the changes that my current interconnect introduced (WireWorld Solstice 7), this PLN 30 was a very good investment. In other words, the socket finally got closer to the plug in class. This is not the first device in which I can hear changes, because in my previous DAC I also heard them, and there I replaced RCA sockets for such at PLN 8 per unit. it was a good step, although I could fit in the price of PLN 15-20. When I compare the changes introduced by replacing the RCA sockets in the DAC to the changes that my current interconnect introduced (WireWorld Solstice 7), this PLN 30 was a very good investment. In other words, the socket finally got closer to the plug in class. This is not the first device in which I hear changes, because in my previous DAC I also heard them, and there I replaced the RCA sockets for 8 PLN each. it was a good step, although I could fit in the price of PLN 15-20. When I compare the changes introduced by replacing the RCA sockets in the DAC with the changes made by my current interconnect (WireWorld Solstice 7), the PLN 30 was a very good investment. Writing differently, the socket has finally come close to the plug. This is not the first device in which I can hear changes, because in my previous DAC I also heard them, and there I replaced RCA sockets for suc

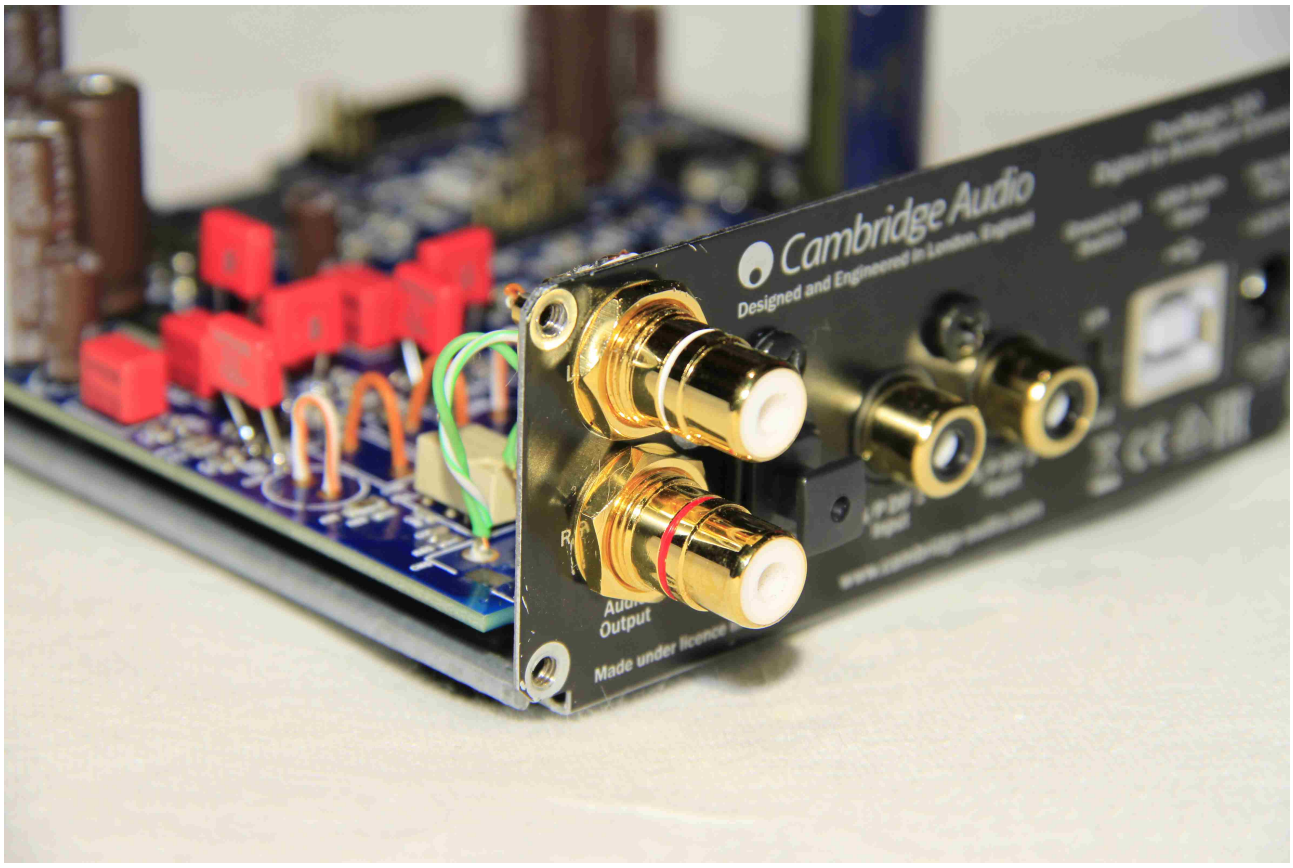



*Photo 12: View of the new RCA sockets*

## 9. Replacing the front panel diodes

Cambridge Audio shame on you !!!

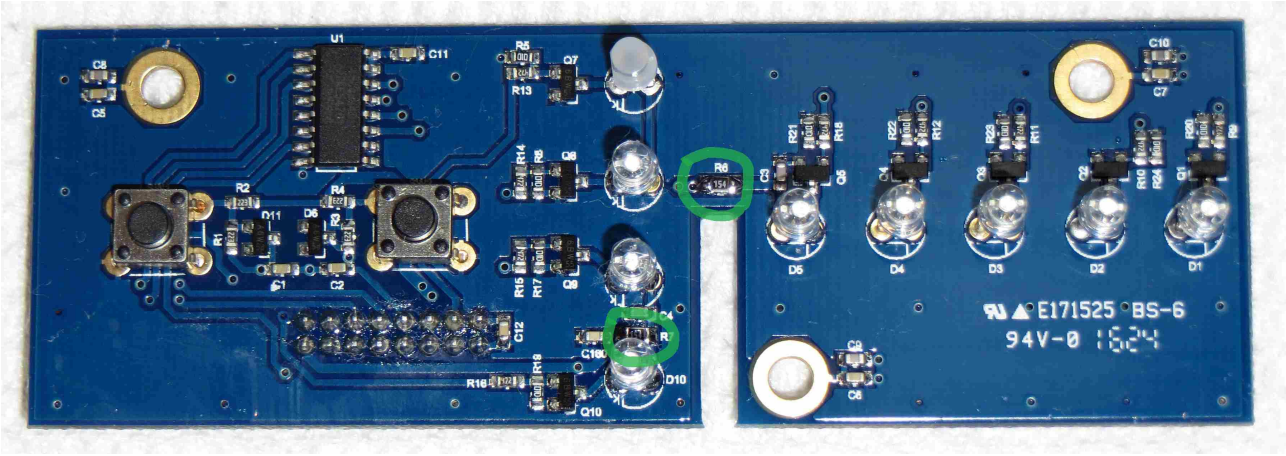
On the Internet you can find information about problems with the front panel in Cambridge Audio DACs, consisting in malfunctioning of the controls. The problem does not only concern the DacMagic 100, but also its older brother DacMagic PLUS. Unfortunately, this ailment also got my copy and after 3 weeks of purchase, the control started sampling the sample from 96kHz sampling. At first, it sometimes dimmed, then it winked briefly at the start of the song about sampling 96kHz and went out, and after a few days it went out forever. Due to the fact that this is a new device, I considered shipping to the service, but I did not want to give the DAC for such a long time (about 14 days). In addition, I was curious what causes such a problem and decided to explore the subject myself. It turned out that the faulty diode is responsible for the malfunction of the indicator. Speak colloquially and referring to the ancient times of filament bulbs, the diode has burned out. It turned out that the circuit in which the diode worked was good and it was enough to replace the diode with a new one.

It would seem that the problem has been solved, but the matter of replacing the LEDs on the front panel is not so simple. The front panel contains two circuits. The first circuit is covered by 5 diodes which indicate sampling, while the second is a circuit containing 4 diodes indicating the selected input. The circuits are managed by an integrated circuit which decides which diode is to light up.

An additional problem was the different brightness of individual LEDs, but this difference in brightness was not intended at all. For example, the 44.1 kHz sampling lamp glowed fainter than the USB source indicator, while both COAX input indicators glowed even less than the indicator.
44.1 kHz. Technically the branch of each diode was the same, so the problem had to be the diodes themselves. Unfortunately, it was not possible to purchase the same LEDs. The diodes used gave very little light, were milky and scattered light very much. The LEDs I was able to buy gave much more light, which in this case was not an advantage. In order to limit the amount of light for new LEDs, I had to replace the resistors on the power supply of the LEDs from 0.91 kohms to 150 khms. The difference is very large, but it was only at this value that the LEDs began to glow with adequate brightness. Due to the large discrepancy in brightness, I had to replace all the LEDs, but at least now all LEDs shine with the same brightness.

It seems to me that in this case the manufacturer went a bit too far in terms of savings, because as you can see on the internet, my problem is no exception. Unfortunately, the matter is not so simple, because it is not limited to replacing the diode and most people will have to send the device to the service, or accept the fact that some of the controls do not work, because their malfunction in no way affects the quality of the sound.

The photo below shows the front panel board with the LEDs listed. In the picture you can see one milk diode, which was also replaced, I left it only to show the difference in the picture. In green, I marked the resistors that I had to replace to get the right amount of light.




*Picture 13: Front panel PCB*

## 10. Summary

After reading the advantages that each of the modifications introduced, one would get the impression that after adding them, I obtained a reference device. Unfortunately, it is not so good, but the DAC has changed a lot. When I bought this device, I was a bit disappointed, because after good feedback from other people I expected something more for almost 700 PLN. In my opinion, this DAC was not worth PLN 700. After the modifications, I can write that the DacMagic 100 could rub the nose of more than one device for PLN 1200-1500 and that is how I value the level that this DAC currently presents. Although I would not be surprised at all, as if its value reached even higher in the mainstream of prices. With this calculation, I do not include the changes introduced by the power supply, because the power supply is not an investment in the device itself, but rather in the entire system, because once purchased it can power us not one DAC. List of elements and their cost:

| **Element** | **Price in PLN** |
|---|---|
| 2x OPAMP MUSES_8822 | 42 |
| AXICOM relay model 2-1462037-7 | 9.5 |
| 2x RCA socket | 16 |
| 4x ELNA SILMIC II RFS 10uF / 35V | 2 |
| 5x ELNA SILMIC II RFS 100uF / 35V | 6.5 |
| Panasonic FC 1000uF / 35V | 1 |
| 5x WIMA MKS2 100nF / 100V 5% | 2 |
| Output capacitors or jumper | 0 (jumper)<br>3.50 (NICHICON ES) 40<br>(MUNDORF M-Cap) |
| **The total cost of** | **from 89 to 119** |

The amount of PLN 89 for the final effect obtained is small, considering how much I managed to get out of this small device. This modification once again showed me that it is really worth looking inside the device and not treating it like a black box. The DAC has retained its character and tendency to lighten and emphasize the midrange, but this tendency has clearly diminished and you need to listen to a few songs before you hear it. The DAC ceased to impose its conditions, but only subtly emphasizes the higher ranges. This makes the DacMagic 100 sound more universal and natural. The factory DacMagic 100 was

slightly worse than my previous modified E-MU 0204 DAC, after modifications it is clearly better. In addition to the openness that I missed so much, I got a clear increase in dynamics, stage size and quality of the upper registers. DacMagic 100 caused another weak point of my system to appear, which is the integrated input selector in my CA AZUR 651A amplifier (modified amplifier). Until now, I considered the integrated selector to be "reliable" because bypassing it with the jumper did not introduce any clear changes. However, it turned out that for this test I missed a better quality source than the modified DacMagic

100.

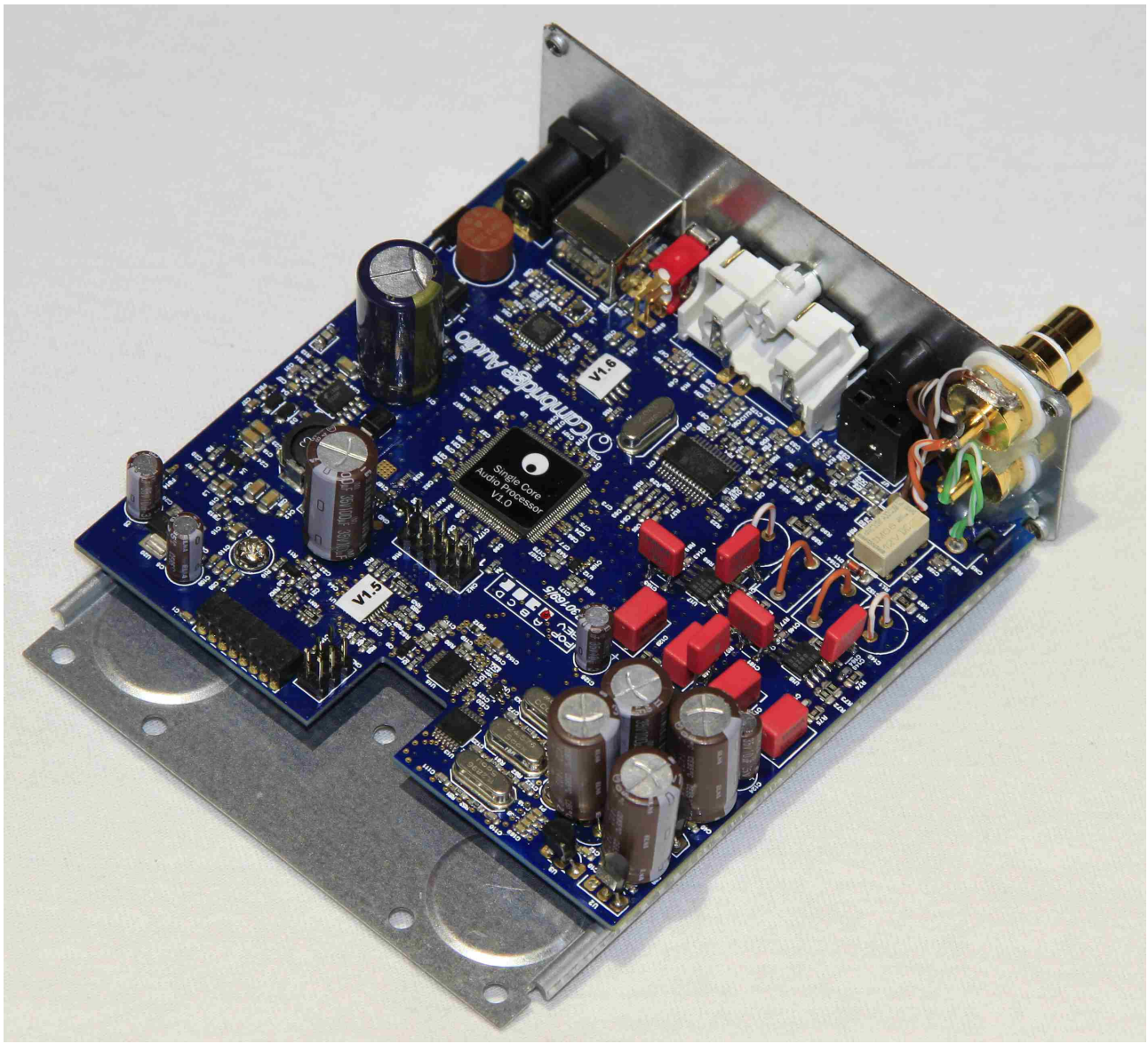



*Photo 14: DacMagic 100 after modifications*