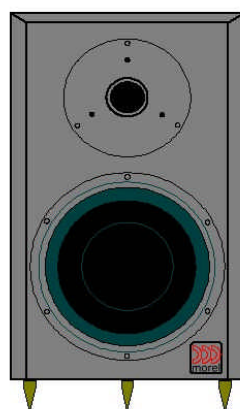
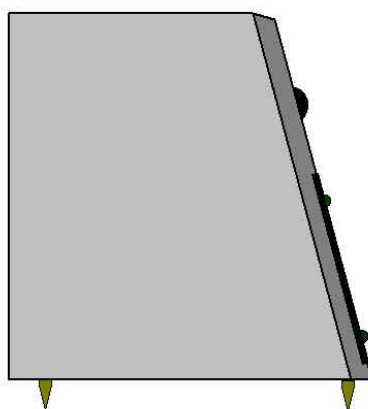
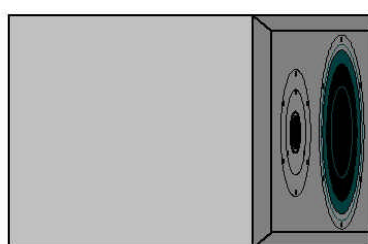


Two way bookshelf speaker

Since 2008 we are designing a range of new DIY models based on the new line of MOREL drive units. This CA 620 is the most cost effective 6" model we can think of. Despite the choice of the most common tweeter, basic quality crossover components and simple cabinet structure it appeared to possess a true "MOREL" behaviour.

The woofer is now equipped with a Aluminium diecast chassis. The tweeter became a slightly changed faceplate resulting in a better off-axis response.

With this model we surprise a lot of people, knowing that this one is only the beginning of a line of speakers only increasing in quality. Yet, don't be mistaken; this CA 620 will bring a lot of building and listening pleasure to a wide range of audiophile builders and listeners.



Tweeter: CAT 308
Woofer: CAW 638
Freq.range: 60-22.000 Hz
Efficiency: 87dB
Nominal load: 150Wrms
Impedance: 8 ohm
Crossover: 6/6dB serial
Crossoverpoint: 3000Hz

www.eltim.eu

Introduction

With the introduction at CES 2008 of a wide new range of MOREL drive units, it finally became possible to design a wide range of modern speakers. We took the challenge and this CA 621 is one of our most cost effective answer using a 6" woofer, being the construction of an easy to build, but high quality speaker. It should become a well known and often built DIY starters model, so price needed to be acceptable low compared to the given quality. Only time will tell if we succeeded.

We only use six panels and a rib inside to strengthen the 22mm MDFT panels. A new 16cm (6") woofer in an alu diecast open basket is assisted by the most cost effective 28mm softdome tweeter available. In order to keep the costs down, we also decided for most elementary crossover components in a simple 6/6dB serial crossover. Due to the few components this is not only quit cheap, but has also a very linear phase behaviour which is noticed at ones while listening to this model. We choose a crossing point at 3000Hz.. The enclosure is calculated at 7,5 liter, resulting in a Q of the ideal 0,707 when stuffed heavily. Using this crossing frequency together with the design and heavy damping, improving midrange behaviour, it becomes possible to add a real woofer cabinet, resulting in a true 3-way system.

A said: a nice model to start your DIY hobby.

The units



For the woofer we use the only available 6" model in the new "Classic Advanced" range, the **CAW 638**, being the successor of the well known MW-166 and MW-168. With the new diecast aluminium Uniflow basket the unit breaths a lot better as the former models with steel baskets did. These former models only left little room to breath after mounted in a baffle. The new unit shows even it's anatomy; actually you can see the voicecoil due to the External Voice Coil (EVC) principle, where the magnets are mounted inside the gigantic 75mm aluminium Hexatech coil with hexagonal wire. The produced heat is moving away from the inner magnet system, with the result that it hardly ever will compress the sound. Small holes in the former even cause an air flow through the open pole center to increase cooling.



All new MOREL woofers use parameters to meet today's demands and you can build modern slim designs with it. The CAW 638 is calculated for a sealed enclosure of 9,5 liter, using typical damping. We use a heavy damping here, so the cabinet can be 7,5 liters. The woofer parameters are chosen very smart, since you can also use it in a 22 liter vented cabinet, as we do in our CA 624 and CA 625.



The tweeter **CAT 308** is a modified MDT-30s, the most cost effective MOREL tweeter with a rear chamber. Times change and finally it is in the international used Ø 104mm. By the way, also the successors of the well known MDT-29 (CAT 298), MDT-33 (ET 338-104) and Supreme tweeter (ST 1048) are available in this size now.

Through the fine silk 28mm handcoated dome you can see the effective damping. And the cavity into the rear chamber. This model is equipped with a 28mm Hexatech voicecoil, resulting in a very fast transient response and high load capacity. It is running from 1800 Hz up, without any serious spikes and dips. Due to the new designed faceplate the off-axis response increased compared to the former model MDT-30s.

The cabinet

With a width of 19cm and a height of 26cm this design finds its place in any bookshelf or on a stand, even in smaller living rooms. Also in this design we use the “golden number”, in the width/height of the baffle, location of the units and shape of the inner rib.

Side and top/bottom 22mm MDFT panels are angled 45°, so they fit perfectly without visible sides of MDF. The 22mm MDFT baffle is milled on both sides. At the back we milled it 4/22mm all around. This way the side panels can be positioned quite easy without slipping while the glue is drying. At the frontside both units are sunk for a clean look. The edges can be rounded with a fraise or angled by 60° as in our prototype picture and the panels we supply. Be careful with that, because there will only be about 2-3 millimeters left on both sides of the woofer.

The backpanel holds Mundorf quality crossover components (BL140 coil and RxF/Tinfoil capacitor) for easy assembling.

We supply our kits with thermal and mechanical stressfree mounting materials.

Drawings are only available together with our kits.

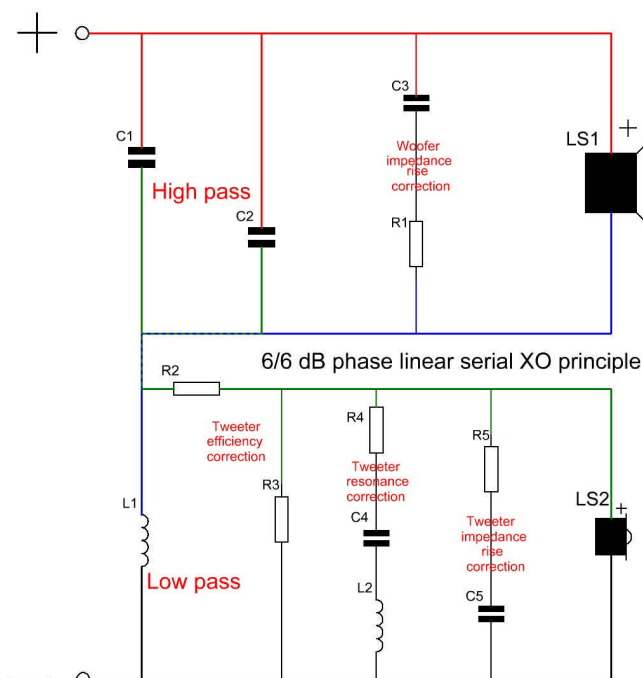
The crossover

Our designer has the opinion that in combination with MOREL units most simple crossovers bring the best musical results. We mostly just listen and listen and... while tweaking our designs.

Bringing perfect graphs too often the sound became dead, something we don't want.

He used a simple 6/6dB crossover and to increase phase linearity even more, it became a serial crossover. For a correct functioning this type of crossover must “see” a flat impedance load in the woofer and tweeter circuits. To gain this we added some circuits parallel to the woofer (C3/R1) and the tweeter (R5/C5), preventing rise of impedance with frequency. Besides that a circuit (R4/L2/C4) counteracts the tweeter behaviour around the resonance frequency of 780Hz. Resistors R2/R3 bring down tweeter efficiency to the level of the woofer, being 87dB. The 6/6dB (L1, resp. C1+C2) filter is crossed at 3000Hz.

For proper functioning the -3dB points must be exactly the same. This is the basic reason why this crossover is hardly used, since with just “tweaking” you will not get proper results or spend way too much time in designing. Therefore we made our own software, where we enter all driver parameters and all crossover parts values and try to find a crossing point bringing best results for the purpose. The value of L1 (BL140 type) is set first, since we need to use the E12 range, while we can add a small capacitor (C2, Tinfoil) to the basic HP capacitor C1 (RxF). Even then we cannot get it exactly right, so we alter the compensation networks a bit to get it exactly right. Practice showed that our software works right after some “bugs” were removed while comparing theory and practice in several of our models. Unlike many other designs impedance is nearly flat.



The damping

After listening for hours we believed we had to fill it with 25 grams of our TWARON Angel Hair.



Twaron Angel Hair is made of extremely thin synthetic wire, which is made “woollike” elastic due to a special process. In the picture it is compared with a human hair. As you can see it is a very open material, resulting in a very wideband and efficient damping material. 20 grams brings similar damping in the midrange as 120 grams of sheepwool, but the range of TWARON is much more effective in the lower ranges. While using it you will also find out that small signal response, like echo’s of a room or mechanical noises of instruments will be noticed much more. You are simply more “there”. It is permanent elastic and it stay’s in place forever.

Note:

We designed this system in a way, that you can add a real (sub)woofer cabinet later. We intend to cross this around 300Hz, so in that case you end up with a real 3-way floorstanding system. The woofer of the CA 621 is relieved from heavy movements and so it can concentrate on the midrange frequencies. Due to this the total load capacity will increase also.

ELTIM CA 621:

Units + screws + damping + complete building description	€193,-
Milled MDFT 22mm panels	€ 66,-
All needed MUNDORF crossover components + mounting material	€ 53,-

All prices are per speaker, 19% VAT included.

Kits and components can be ordered at our dealers or in our webshop.

Detailed drawings are not for sale separately. Publishing it in any way is prohibited.

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