



Callas

With this new model in the Callas Series, Opera's intention is to create at home the emotion and pleasure of listening to music: to provide a musical, focused, three-dimensional soundstage with the correct timbre, dynamics and detail - and to do this with no sense of listening fatigue.

To achieve this goal new technical solutions have been researched and applied and every single aspect of the design was subjected to intense musical listening tests at Opera.

The new Callas model use techniques and components which reflect the state-of-the-art in electro acoustic design, including not only cabinets, drive units and crossovers but also new devices as the frond doublet and the new Triplet rear radiating device. The sonic result is tonally correct, convincing, involving and most of all, enjoyable to listen to. The new Callas is elegant looking and beautifully finished and will discreetly enhance any room.

The System

The new Callas replaces the well-known previous model. It is very difficult to enhance such a fine product as the old Callas model with its small size, great bass response and superb sound. However, the new Callas goes further. It is a bookshelf loudspeaker design which includes two complementary sub systems:

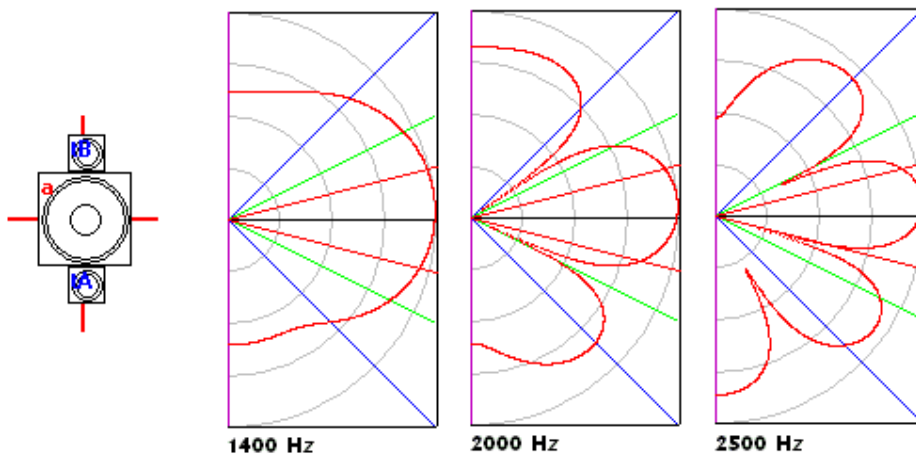
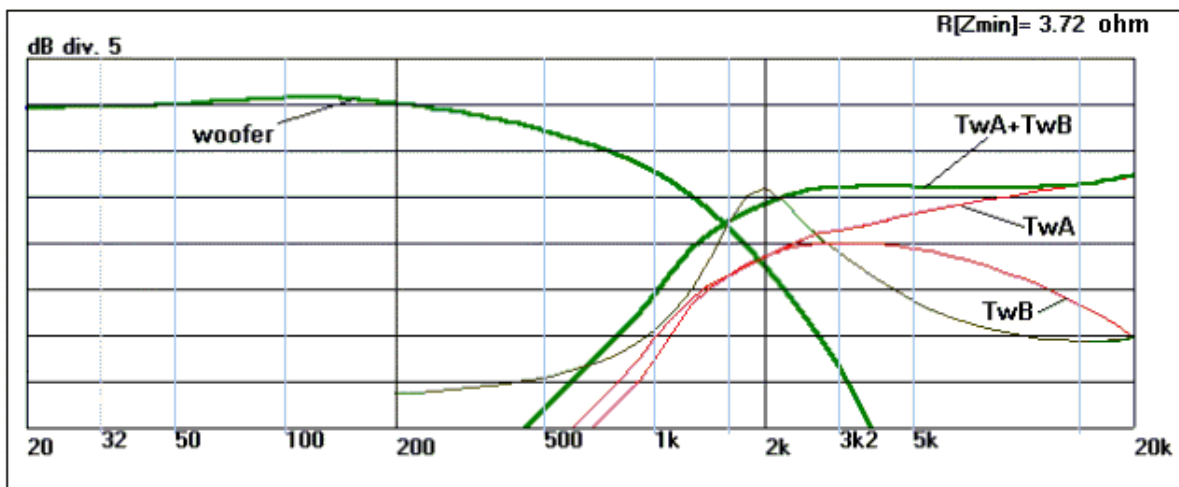
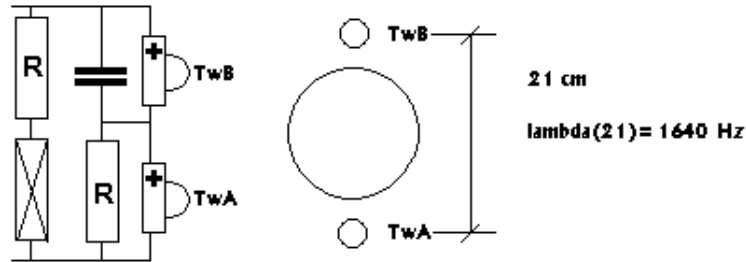
- the (main) front radiation system with one 5" woofer-midrange and a couple of state-of-the-art one inch fabric tweeter for the high range (the doublet).
- the rear radiation system with three tweeters forming the new device called Triplet located on the rear of the cabinet.

The rear tweeters differ from the front tweeter only because of the protection grid.

The rear system act as the CLD implemented for the Tebaldi and Caruso top models but is reduced in size to fit in the much smaller cabinet. The rear radiation from the Triplet feeds the reflected sound field without interfering with the direct sound and thus preserving the loudspeaker transient response (as the CLD). The rear radiation balances the power response of the system at higher frequency (where the front tweeter became directional) and increases the "Brilliance" which is a quality related to the perception of sound details. Details in the music are related to the acoustic properties of the environment where the original event was recorded. More detail enhances the sense of space in the reproduction which is not a just simple boost in the mid-high frequency range.

The main front system uses two tweeters (the doublet) placed above and below the woofer in a quasi-series configuration which, doubling the radiation surface, allows a lower cross-over frequency, reduces non linearity and, more importantly, moves the main beam of sound radiation upwards as the frequency increase. This solution gives a more realistic height to the sound stage. One may regard the doublet as an "inverse d'Appolito" configuration (the original d'Appolito configuration uses two woofers with a tweeter in the middle to produce a symmetrical vertical radiation pattern). The Triplet and the Doublet are devices developed by Opera Loudspeakers to improve the three-dimensional aspects of the reproduction.

Far from theory, the results are clearly audible: the new Callas produces a sound stage which expands the depth with an excellent transient response and with the power, dynamic and low frequency extension that usually only larger size diameter woofers can produce.



The front "dublet": loudspeakers assembly, cross-over frequency response.
 The Triplet is described in details in a separate technical note.
 Directivity pattern on the vertical plane

The cabinet

A great care has been taken in cabinet design and realization to obtain a compact, heavy, stiff but still elegant one. Many prototypes has been tested to find out the best solution.

The cabinet is made with a three different materials: MDF, multi layer plywood and solid wood. The cross section of the cabinet is like a teardrop similar to Diva and Divina models.

The front baffle is obtained from a thick MSF board (30 millimeters) which is shaped on both side: on the outer side to reduce the diffraction effects and on the inner side to eliminate "whirlwind" and air flow noise that may affect the woofer diaphragm motion at low frequencies. The shape of the inner side of the front baffle is very important and is a feature of all our model from many years. To reduce edge diffraction the front baffle has rounded edges.

The side of the cabinet are made with curved multi layer plywood, 30 millimeters thick. The curved multi layer is much stiffer than the regular one because of the stress between layers. The glue used to assemble the multi layer is extremely rigid and hard as glass. The result is much more stiff then solid wood, MDF or regular plywood of the same thickness. This make the structure more stiff and increase the quality of lower frequency range. The back of the cabinet is a block of MDF 60 millimeter thick. The top and bottom side are 40 millimeters thick. So the thickness of the cabinet range from 30 to 60 millimeters instead of the usual 20-25.

The lateral sides are veneered and the top side is solid wood, all them are finely lacquered in the best Italian tradition.

The front baffle is finished in leather that is elegant and fine to see but also works as an air washer for the loudspeakers.

Thanks to the chosen geometry, together with other design features, the Callas model obtains a substantial increase in low frequency radiation from the two reflex ducts which extends the bass response to the very lowest frequencies.

The reflex ducts are placed in the rear side of the cabinet so that duct noise, if any, is less audible. A good quantity of lining material is carefully placed inside the cabinet. On the rear side there are to big, solid, gold plated, brass connectors that accept a wide range of cable termination.

The Components

The Callas model uses two new drivers, woofer and tweeter, made by Seas (Norway) and customized for Opera applications.

The tweeter has a one inch soft precoated Sonotex dome loaded by a double decompression rear chamber, there is a low density magnetic fluid in the gap and a small but powerful neodimium magnet. The linear excursion of the dome is 0.9 mm. pick-to-pick (!). The overall external size is only 53 millimetres and this allows the tweeter to be positioned very close to the woofer and to keep the right distance between the triplet's sources. This tweeter sounds clear, linear and free from coloration. The woofer has extreme characteristics:

- magnesium cone
- solid copper phase plug for superior heat dispersion.
- "Excel motor" with copper rings above and below the T-shaped pole piece
- wide linear excursion of the moving coil (14 mm pk-pk)
- very stiff cast alloy basket with large windows also below the inner spider
- 38 mm aluminium voice coil former
- very low voice coil inductance (which reduce distortion due to impedance coil and flux variations)

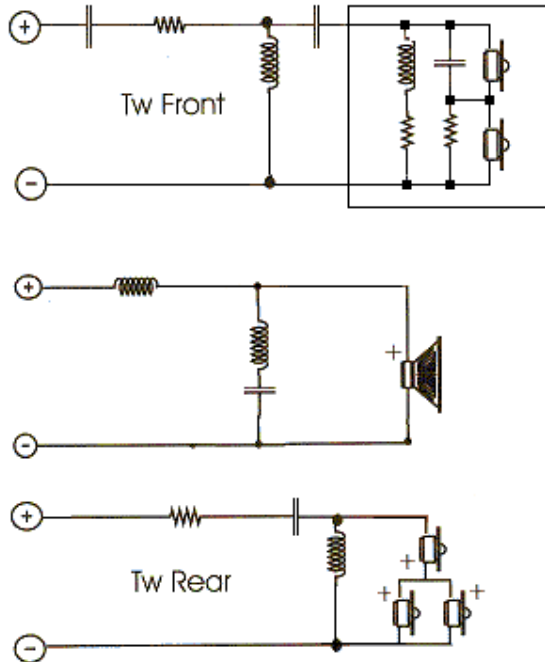
All this means low distortion, negligible compression and superior performance.

This woofer has an excellent frequency response up to 3000 Hz free from any breakdown. This is also due to the new rubber rim with special corrugation which better control the higher frequency resonances typical of metal cones. This woofer offers the midband reproduction of the best specialized midrange but with a powerful 38 mm diameter, long excursion, moving coil.

The Cross-Over Filter

The cross-over has three different sections: front tweeters, rear tweeters and woofer. While the woofer low pass and rear tweeter high pass filters have classical topology, the front tweeters high pass filter has two sections. The first is the quasi-series connection of the two tweeters with an RL impedance compensation network. If we regard this sections as a "single device" the filter itself reduce to a "normal" third order high pass. The cross-over frequency of the front system is 1500 Hz while the rear triplet is high passed at 2kHz.

The coils in the low pass section, in series with the signal, has a low permeability core while all other coils in the filter section have no core. Capacitors are low tolerance, high voltage, high quality MKT type.



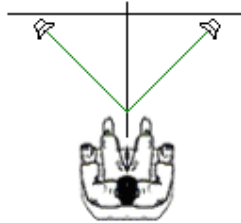
New Callas cross-over

The upper front tweeter is up-limited so that below 2 kHz all tweeters produce the same SPL while, as the frequency increase, only the lower tweeter is fully powered. Due to the quasi-series connection the emission coherence in mathematically preserved.

We believe that the cost of a diffuser has to be assessed together with the cost of the amplifier more suited to drive it. The minimum value of the real part of electrical impedance of the Callas is higher than 3.2 ohm. This makes Opera Callas a real nominal 4 ohm system that can be easily driven by a wide range of amplifiers, either with valves or solid state. Sensibility is not so high (86 dB SPL 1 metre/2,83 Volt) but considerable for the loudspeaker size.

Position in the listening room

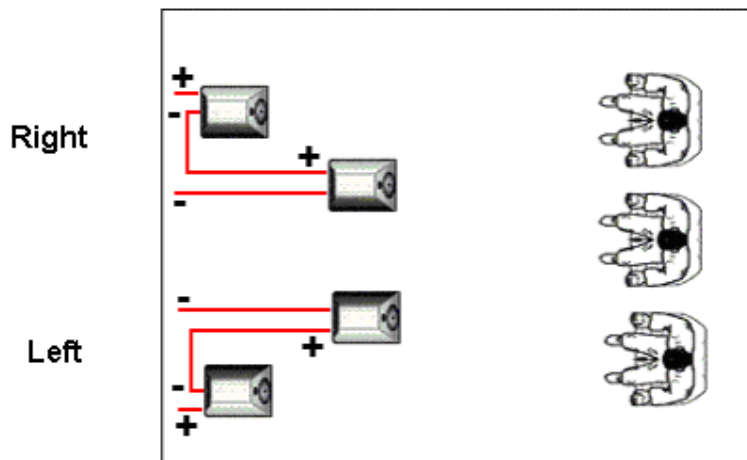
Opera Callas is a bookshelf design but better results occur with the cabinets placed on stands and this positioning is strongly suggested. It is also recommended to angle the loudspeakers in such a way to form an isosceles triangle with the listening point as the third vertex. To enhance the image focusing (enlarge the stereo-effect area) position the loudspeakers as shown below so that the third vertex of the ideal triangle falls in front of the listener:



Speakers and listener relative position to enhance image focusing

We advise against placing the loudspeaker in a corner. Keep a minimum distance of at least 50 cm from the side walls and choose the distance from the rear wall for the better bass reproduction (not less than 20 centimetres). The best position within the surroundings has to be found experimentally.

When two pairs of Opera Callas diffusers are used, they have to be connected in series as illustrated in the figure below.



Positioning and connection of two pairs of Opera Callas (suggested by Righini). This positioning is suggested in large rooms and with many listeners.

Technical Specifications: Opera Callas

System	Bookshelf and Stand – Bass Reflex , rear ducts Finishing: wood and hide
Front Sistem Loudspeakers	1 woofer 5" with magnesium cone, Excel Magnet, solid copper phase plug. Doublet: 2 tweeters with a 1" Sonotex dome, neodymium, ferrofluid, decompression chamber
Rear System	Triplet: 3 tweeters (the same as front system) with grid
Number of Way	Two ways with doublet + rear triplet
Frequency response	32 -25000 Hz
Cross-over	On Printed Circuit Board
	12 dB/octave for the woofers
	18 dB/octave for the il front tweeter
	12 dB/octave for the rear Triplet (2kHz high pass)
	Cross-over frequency around 1500 Hz
Maximum power (Long Term)	80 Watt RMS
Maximum power (Short Term)	250 Watt RMS (no clipping)
Suggested amplifier	Starting From 10 Watt RMS
Sensibility	86 dB/2.83 Volt/1 metre
Nominal impedance	4 ohm (Zmin >3.2 ohm)
Position within surroundings	At least 50 cm from walls
Dimensions	37.5 x 23 x 34 cm (h x l x d) 14.8 x 9 x 13.4 in (h x l x d)