



Malibran

Maria Malibran or Maria Felicia García was born in Paris on March the 24th, 1808 and died in Manchester on September the 23th, 1836. Her father was the great tenor Manuel Garcia, her sister Pauline Viardot-Garcia was a singer too. Maria Malibran's voice was exceptional for range, power and flexibility and she could sing as contralto and soprano. She was a great interpreter, actress and also a composer. Maria Malibran fell off her horse and died. She was only 28 years old and immediately became a legend.



The goal of the Malibran is to reproduce quality of our top models in smaller cabinet while increasing the bass dynamic and making easier the room placement.

The Malibran model is the first loudspeaker system designed by Opera and produced by Unison research. The Malibran model implement all the technical solutions developed by Opera including the bass section developed for the Grand Callas model: the "progressive" low pass filter, the CLD (Crossed Linked Dipole) and the TEB (sealed enclosure) for the three woofers.

Malibran model is a 146 litres, over 120 Kg., floor standing loudspeaker. We have reduced the size while increasing the low frequency response. The Malibran as a two-way system with a powerful passive sub-woofer and the CLD in the same cabinet. On the Malibran's front panel there are four mid-woofers and the tweeter which are responsible for the direct sound (and a lot of the reflected sound as well). The front system consist of four "state of the art" mid-woofers and tweeter. Three 10" woofers are placed on one side of the cabinet. On the rear side of the Malibran cabinet there is the CLS rear radiating system with 4 tweeters high-pass filtered at 2 kHz. For more information about CLD and progressive filter see the attached documentation. Many efforts have been spent to make the Malibran easy to be placed in the room.

Cabinet

The cabinet of the Malibran model is made in finely-shaped multi-layer and thick MDF veneered in real wood finely polished. Front panel is lined in leather that act as a washer for loudspeaker. The MDF front panel is 4 centimeter thick and milled on both side to avoid cavitation of the air flow. The curved multi-layer sides are 3 cm thick while the rear MDF panel is six cm thick. The cabinet is really heavy and rigid.

The internal volume of the cabinet is divided so that each woofer has its own volume separated from midrange volume. Also the midrange chamber is divided into two separated volumes to avoid standing waves. All this reinforces the structure and raises the frequency of the normal standing waves so that they are easily pulled down by the absorbing material. The inside of the cabinet is filled with a good quantity of acrylic wadding which eliminate internal reflections and aids bass frequency damping.

Drivers

The 10" woofer is a new device developed by Seas that exhibit a very long linear excursion (28 mm pk-pk), an aluminium diaphragm and all the technical solution one need to reduce distortion like copper rings and rear holes for de-compression. Though you may use a single woofer in a reflex cabinet we choose to use three woofers in three separated sealed enclosures. In this way a couple of Malibran is able to move 3 litres of air. During normal use the displacement of each driver is so small that distortion and compression are reduced to negligible values. The woofer has a very stiff aluminium cone, natural rubber surround and aluminium voice coil former. This woofer has an excellent response up to 1000 Hz with very low distortion as requested for this design.

The Malibran model uses four mid-woofer drivers with the progressive low-pass cross-over. The Mid-woofer is a 5" cone driver developed for use as a high fidelity Woofer/Midrange unit. The extremely stiff, yet light cone and the acoustically transparent basket give tremendous bass precision and midrange detail. Precision cast and surface treated magnesium cone coupled to a natural rubber surround showing no sign of midrange (edge) resonances. Heavy copper rings mounted above and below the T-shaped pole piece, to reduce non linear and modulation distortion and to increase overload margin. Gold plated terminals mounted on a stiff glass fibre reinforced plate to reduce contact resistance and improve reliability. Extremely stiff and stable injection moulded metal basket to keep the critical components in perfect alignment. Large windows in the basket both above and below the spider to reduce sound reflection, air flow noise and cavity resonance to a minimum. That means, also thanks to the wide linear excursion of the moving coil, little distortion and negligible compression.

Thanks to the high radiating surface and to the top quality of the drivers the Malibran model exhibit a very low harmonic and intermodulation distortion. The tweeter is the well known and valued Scanspeak 9700 model. You find one tweeter on the front panel, for direct sound, and four of them on the rear side to form the CLD unit that feeds the reverberant field in the room. The 9700 tweeter has a very low distortion (substantially of the second order) and can support a great amount of power thanks to the wide linear displacement allowed. The very low resonance frequency allow a simple filtering with a 2KHz/12dB high pass filter with a minimum number of components.

Compression and Distortion

As current flows through the loudspeaker's moving coil the temperature increases and alter the ohmic resistance as well as other driver's parameters. With multiple drivers the power coming from the amplifier is reduced 3 times (woofer section) or 4 times (midrange section) and the temperature of each driver remains low: this avoid compression effects and transient distortion.

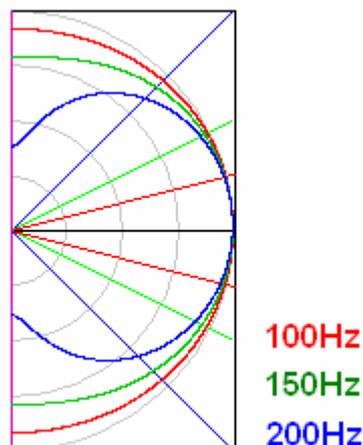
In the Malibran model harmonic distortion is lower than 0.32 % from 50 to 20000 Hz for 90 dB SPL output (at one meter) with minimum values less then 0.1% in the mid-bass region around 200 Hz. These are values that you can define good for a valve amplifier. That means great details, no listening fatigue, and great sound transparency. In most situations distortion components will be lower than the acoustic noise level in your listening room.

Low Frequency Section

Each 10" sub-woofer has its own 40 litres chamber and they all work in TEB (Totally Enclosed Box). The maximum dimension of each chamber is about 80 cm and the frequency of then first standing wave is higher than the cross over frequency. Efficiency of the TEB is not as high as a reflex alignment can be, but TEB gives some advantages: there are no duct (no cavitation noise) and no passive radiators (no mechanical losses) and the cone movements is fully controlled by its rear air volume. The low frequency slope of the TEB is less sharp than reflex one and so the bass are more deep. Last but not least a TEB system is easier to place in the room.

Malibran' s woofer are placed in an uncommon position: they are all on the same side of the cabinet. In this way the great part of the acoustic load at low frequency is due to the large cabinet itself, only a little part of the acoustic load, at the very low frequency, still depends upon lateral walls. This make the Malibran insensible to the relative position of the lateral walls. The woofers of the right channel should face those of the left channel.

The acoustic barycentre of the woofers is placed at middle height of the cabinet and about 25 cm behind the mid-woofers (not below the midrange as usual in a three way system) . They radiate the upper part of their frequency range toward the rear wall. The sound radiation become directional starting from 100 Hz: most acoustic energy is concentrated in the region between the rear wall and the listening point. Less energy than usual reflect on floor and ceiling. Also this effect contribute to make the Malibran model less sensitive respect the position in the room.



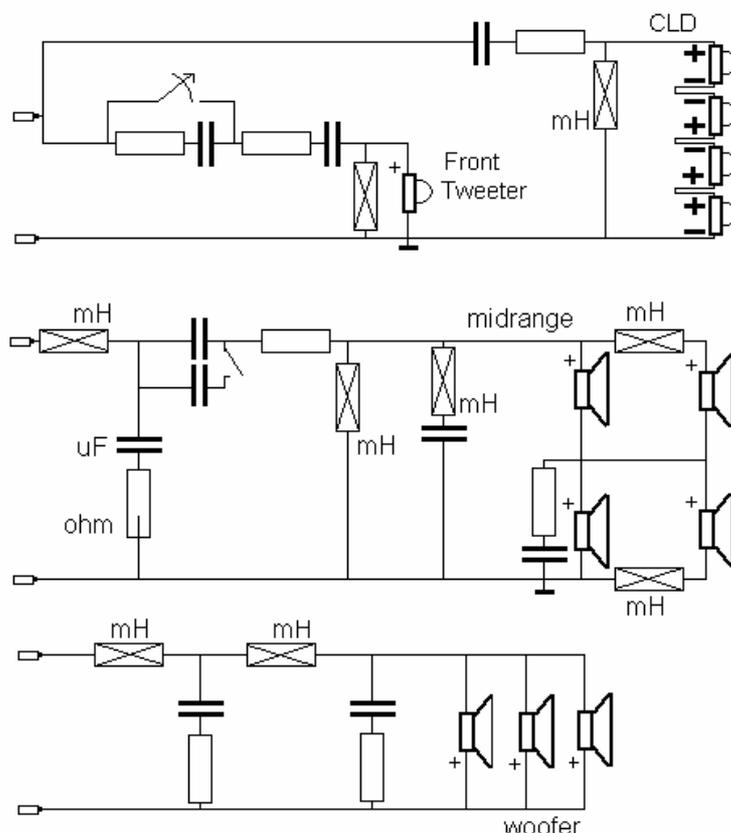
Woofer's vertical dispersions plot at 100, 150 and 200 Hz

The Cross-over

The Malibran cross-over is not as complicated as it may seem (consider there are 12 loudspeakers!). There are four sections:

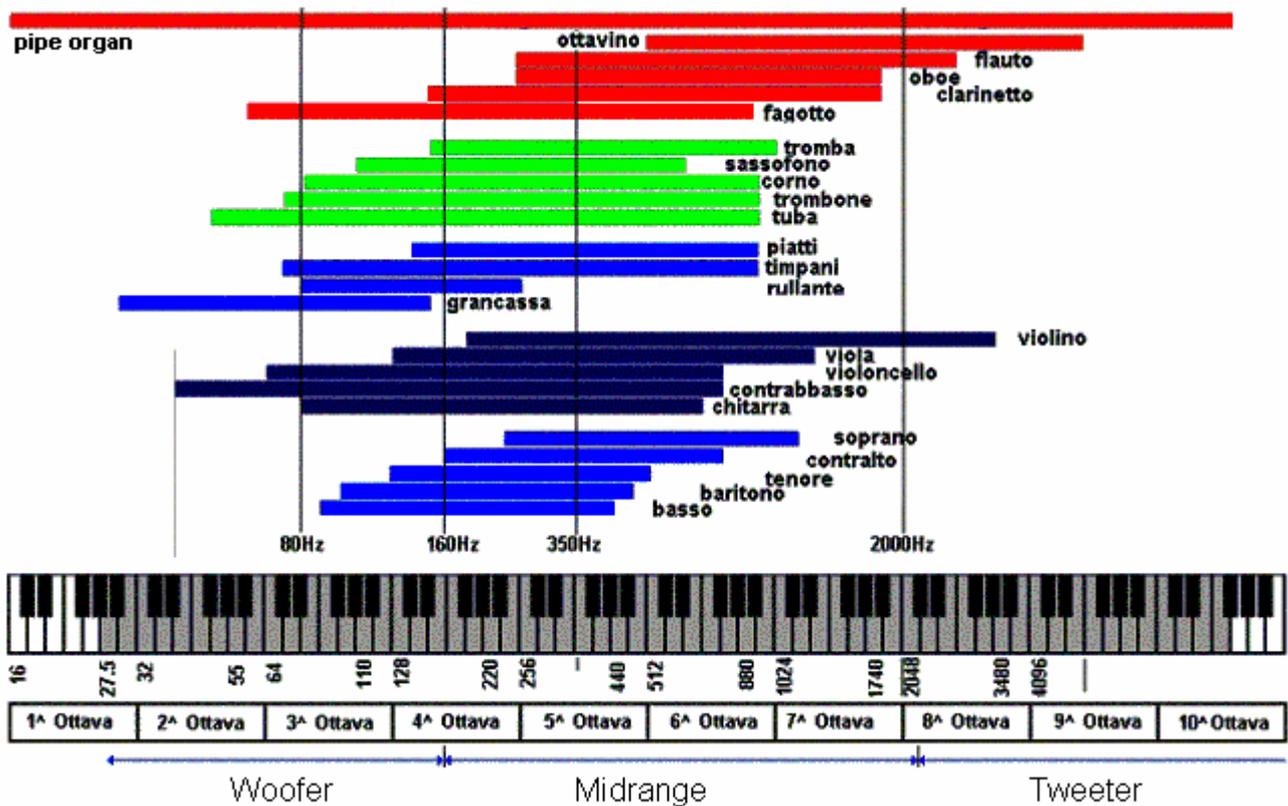
rear tweeters (CLD)
front tweeter
midrange
woofer

Two switches allow to alter the mid-bass response and the front tweeter level. The CLD emission level is fixed.



Cross-over frequencies are 160 or 200 (woofer-midrange) and 2000 Hz (midrange-tweeter) with 12 dB per octave slope. The cross-over is divided into several different boards to keep coils far from each other avoiding cross-talk due to magnetic induction. The woofers are connected out of phase, mid and tweeter are in phase.

In the following figure you can see the emissions of many instrument and voices and how they are reproduced by the Malibran model: for example the contralto and soprano voices (but also the violin, oboe, flute, octavin, viola) are fully reproduced by Malibran's midranges. In our opinion choosing a low cross-over frequency between woofer and midrange gives a better performance and a more natural vertical dimension to the sound stage.



The “isotipica” region, mono recordings

In the Italian literature you find the definition of the “isotipica” region (literal: same kind region). When you are inside the isotipica region you hear the mono signals as coming from the centre of the two stereo channels. The “isotipica region” is usually small. This is a problem when there are many people listening. One way to enlarge the isotipica region is to increase the number of sources (two for the right and two for the left channels). As the isotipica region enlarge, the focusing of the mono recordings became poorer. The rear system acts as a second couple of sources that is about 60 cm. behind the “main” source and thus “enlarge” the isotipica region but this happen only at high frequency and is distinguishable only with mono recordings.

Technical Specifications: Opera Malibran

System	Floor Standing - TEB Finishing: cherry and leather
Loudspeakers	Three 10" sub-woofers, aluminium cone Four 5" midrange, magnesium cone One 1" inch front tweeter – silk dome, decompression chamber CLD rear radiating system (four tweeter)
Number of Way	3 ways + rear CLD
Frequency response	20 -20000 Hz
Cross-over	Hard wiring 12 dB/octave for the woofer 12 dB with progressive low pass for midrange 12 dB/octave High pass for the tweeter Cross-over frequency 160-200 and 2000 Hz
Maximum power (long period)	750 watt RMS (IEC signal)
Maximum power (music)	Crest factor > 14 : no practical limit Crest factor > 4 : 1500 watt. (no clipping)
Suggested amplifier	From 10-15 Watt RMS (without clipping)
Sensibility	89 dB/2.83 Volt/1 metre
Nominal impedance	4 ohm (Zmin >3.2 ohm)
Position within surroundings	At least 30 cm from rear wall (avoid angle position)
Dimensions	140 x 39 x 80 cm (H x L x D) 55 x 15.3 x 31.4
Net Weight	125 Kg 275 pound x speakers
Packed weight	150 Kg 330 pound x speakers