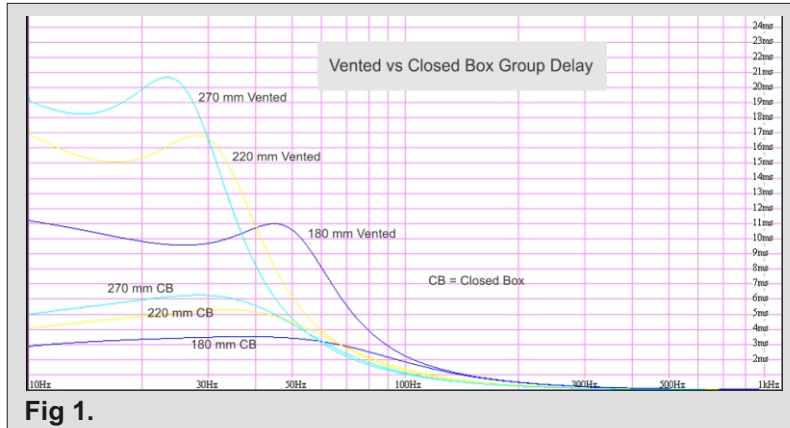


General Cabinet Parameters

Unless otherwise stated, all cabinets are of the closed box type with low Q factors between 0.5 and 0.6 where size permits.

The controlled resonance of vented enclosures gives rise to excessive group delay at low frequencies which should be avoided.

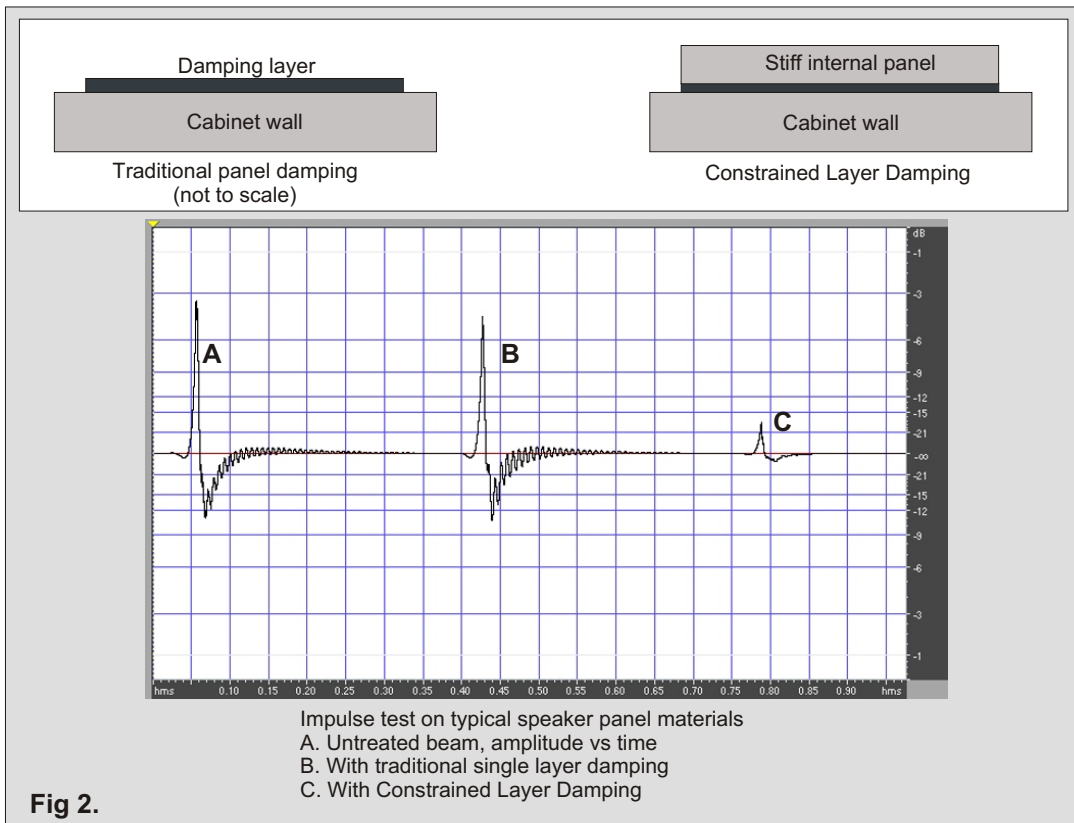
Fig 1. shows a comparison of typical group delays for MC loudspeakers with 180, 220 and 270 mm drivers having 3dB frequency points at 80, 50 and 40 Hz respectively.



Constrained Layer Damping (CLD)

Panel damping is used on all products with a considered compromise between panel stiffness and damping effectiveness. A comparison between typical simple damped panel cabinets and CLD is shown in Fig 2.

Overall panel thickness is 30 mm for the smallest 2 way speakers, increasing for larger units.



Note the panel vibration without CLD lasts for up to 300 ms.

Driver Technology

All woofers and mid range drivers used have shorted turn technology which is important to reduce distortion across the full mid range. This becomes apparent as a reduction in colouration.

A variety of cone materials are used. Coated paper is commonly used except where a driver is used for woofer applications in which case aluminium may be specified.

All tweeters are soft fabric extended surround types with a rear added chamber giving increased low frequency power bandwidth. Upgraded tweeters have 6 mm solid aluminium front panels.

Crossovers

Low order 'linear phase' crossovers are used throughout, similar to the Bessel type.

Air cored inductors and substantial polypropylene or poly carbonate capacitors are specified.

Loudspeakers in finite cabinets will always exhibit a shelving effect giving half the bass output at frequencies typically below 400 Hz. Correction is applied in all MC products to compensate for this which sometimes leads to low overall efficiency (85 dBA).

D'Appolito Configuration

This may be adopted on various units primarily to improve the distortion characteristics in the mid range. It has other potential advantages however which are well documented. These concerning the reduction of lobing in the vertical plane between the mid range driver and the tweeter.

A 2 way speaker is essentially asymmetrical when listened to off the vertical axis producing deep nulls in the

response. It is claimed that this may colour the reverberant sound field. Similar nulls will occur from reflections off the floor immediately in front of the listener, the depth depending on the extent of floor absorption.

Both these effects are improved by having 2 mid drivers as they will both fill in each others nulls.

Cabinet Finishes and Veneers

MC uses real veneers on all products with the standard 0.6 mm thickness. A mixture of traditional materials and glues are used throughout with a view to using sustainable sources wherever possible.

Final finishing is based on natural materials such as wood oils, shellac and wax polishes.

Standard veneers are as follows:

Cherry, American White Oak, Zebrano, Ash with a black ebonising process.

Most products are stocked in cherry and other more expensive veneers are available to special order at extra cost.

Images of current burr veneer options are available on the website.

Connectors

Most loudspeakers in the range use a Cardas screw terminal compatible with spade or banana connectors. These are heavily gold plated over pure copper conductors.

We recommend the use of soldered banana plugs such

as the Cardas type CBER.

Most loudspeakers in the range are available with optional Cardas Patented Binding Posts which give the most secure connection to spades with any connector system that we have tested.

Sub Woofer Technology

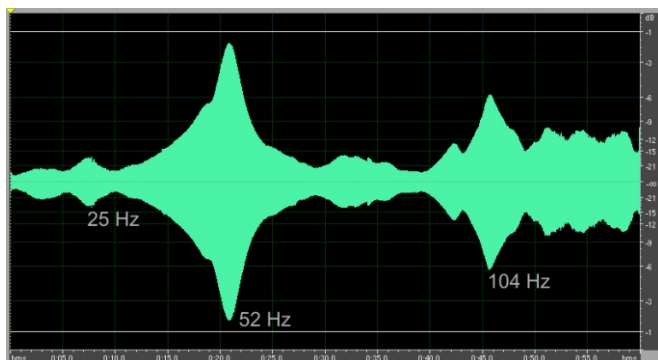
Most loudspeakers in the range have deliberately limited bass response so that unwanted excitation of room bass modes is avoided. This is a necessary compromise between bass bandwidth and uneven bass response caused by the room. In any case, bass power bandwidth in small loudspeakers is usually limited by their bass drivers.

However, the large 3 way monitors are available with an extended bass response for customers with that particular requirement.

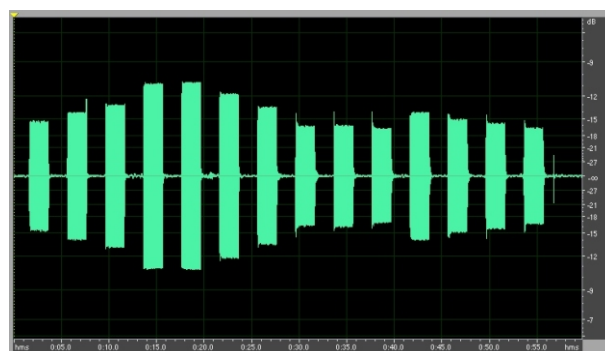
Marshall Choong advocates the use of multiple sub

woofers placed in optimum room positions. Good results are obtained with 2 units placed behind the main speakers, and even better subjective results are obtained with 2 further sub woofers on a rear wall set up to cancel the build up of standing waves within the room. Further details are available in a document available in the main website article download section.

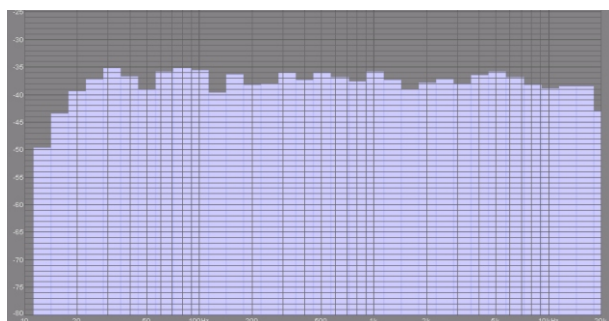
The 2 way monitors are recommended for use with sub woofers.



**Fig 3. Level corrected slow bass sweep, 20 Hz to 160 Hz.
No sub woofers.**



**Fig 4. Sub woofer system, 1/6th octave bass tone bursts
20 Hz to 100 Hz, each tone burst is 2 seconds long**



**Fig 5. System with sub woofers, in room pink
noise response
10 Hz to 20 kHz**

Fig 3. Slow bass sweeps are more revealing of room effects than, for example, pink noise sources. This represents the room response with normally placed speakers and no sub woofer system.

Fig 4. This is the response of the full sub woofer system with 4 sub woofers and with standing wave cancellation. The tone bursts have good rise and fall times largely unaffected by the static room modes and the overall response is far smoother than in Fig 3.

Fig 5. This is the overall in room pink noise response with the same system as in Fig 4.