



Front Channel LCR'S

How they work...

The Science of Sound is easy...mostly because the engineering principles that govern how audio is perceived have been studied and applied to speakers for many years. Factors such as distortion, power response, phase, etc. are well understood. The Art of Sound is another matter...

A perfect example is the rapid acceptance of flat panel video displays replacing the CRT; the need for a speaker to adapt to these new displays was obvious to anyone in the speaker industry who was paying attention. The emergence of the on-wall loudspeakers (LCR's, Soundbars, etc.) is the result of the new televisions that are dominating the market today.

Some speaker manufactures have simply made a flatter speaker which hangs on the wall next to their television. Artison was one of the first companies to recognize the need for a new form factor, and approached the new design concept starting with a "clean sheet of paper".

We first put together a product definition for a system which if met, would provide a true audio solution for the flat panel television. The design of this speaker created some interesting challenges, requiring a new thought process and way to resolve a number of problems. This is the product definition for our first Flat Panel Video Display Speaker:

- Visually disappear within the environment.
- Accurately Reproduce 5.1 channel sound.
- A wide dynamic range to reproduce Home Theater sound pressure levels.
- State of the Art sound quality.
- Allow the speaker to travel with the display to Integrate the Audio Track with the Video...regardless of the installation.

A typical flat panel installation was to hang it on the wall, which was one of the big selling features of these new types of televisions. Therefore, the speakers needs to be designed to work in "half space"; this simply means that it is on or near a wall and projecting into the

listening area from that position. When you place a speaker on the wall, there is an increase in the amount of energy produced at low frequencies, this is caused by the fact that the non-directional energy is now focused into this half space. The near field boundary of the wall also creates early reflections which interfere with the original signals that are sent to the speakers. We have solved these issues by controlling the low frequency energy reproduced by the speaker and the directional or polar response of the drivers.

Below are some of the ideas that were developed and incorporated into our flat panel speakers which allowed us to meet the requirements that we had established.

Attachment & Integration

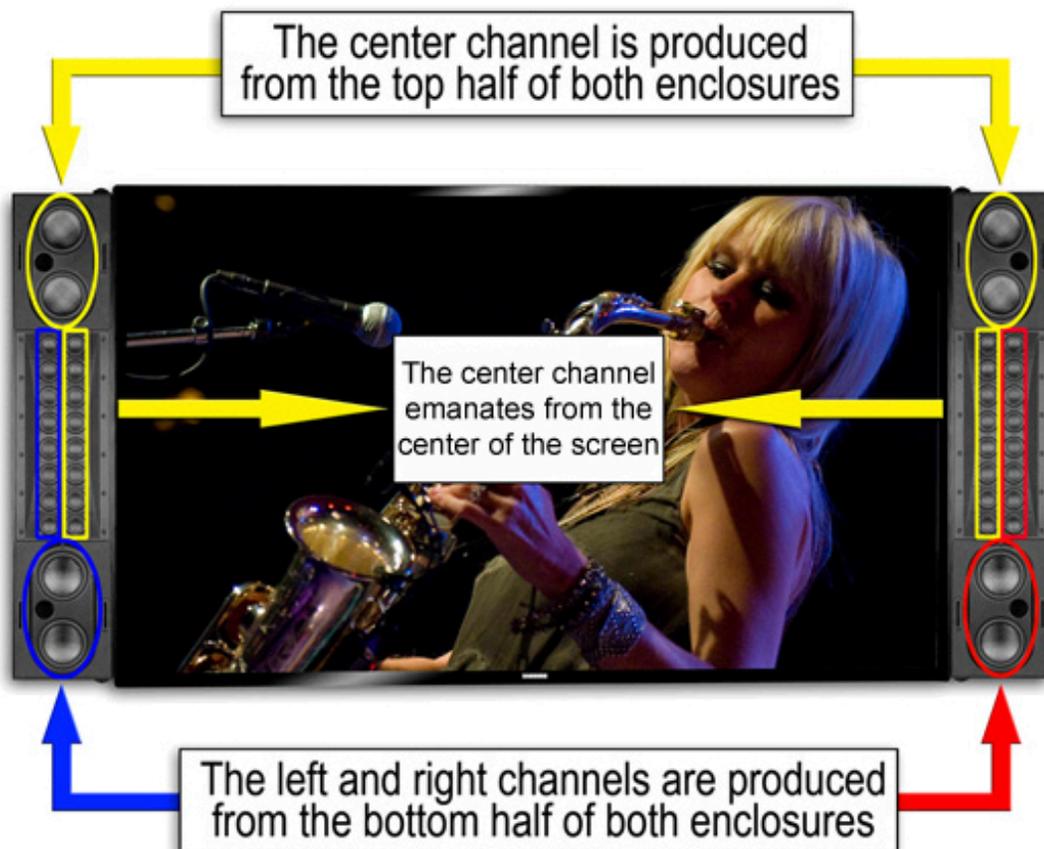
The best way to integrate our LCR Speakers was to make them attachable to the video display, so that the sound always travels with the picture...we solved this by creating a Universal Mounting Bracket (UMB). The UMB is sandwiched between the wall mount bracket and the wall mounting points on the back of the display, or simply just to the TV. The UMB is adjustable so it will allow the Masterpiece LCR to attach to and display 55" diagonal and larger, and our Portrait/Sketch LCR models to attach to any display 46" diagonal and larger...also, all of our LCR speakers are On-Wall mountable.

Our grilles match the height, and color compliment the display for a seamless cosmetic effect. Custom colored grills are available to further allow them to disappear into the environment.

DualMono™ Center Channel

One of our most important inventions was the DualMono Center Channel, which solved many of the problems addressed in the product definition. This technology allowed us to eliminate the typical center channel box; we did so by using two center channels incorporated into the upper half of the Left/Right channel enclosures. The center channel audio appears to emanate from the middle of the video display instead of from either above or below...this is because our brain interprets a monaural sound coming from two points as being generated from between the two sources. With this design we created a cosmetically friendly speaker and a better center channel. With this new configuration we could:

- Attach the speakers to the monitor, allowing the sound to move with the video.
- Create a grille system for the speakers that would match the height of the various televisions, integrating the speakers cosmetically.
- Create a more uniform power response for the Center Channel, this way viewers sitting off axis have the same high quality audio as those directly in front of the television.



The graphs below show the acoustic improvements of the DualMono Center Channel over the typical MTM (Midrange-Tweeter-Midrange) Center Channel. Figure 1 shows the measurements of the DualMono Center Channel at 0°, 15°, 30°, and 45° off axis. Notice the general shape and overall flatness of the curves at all angles. Figure 2 shows the same measurements with a high end MTM Center Channel.

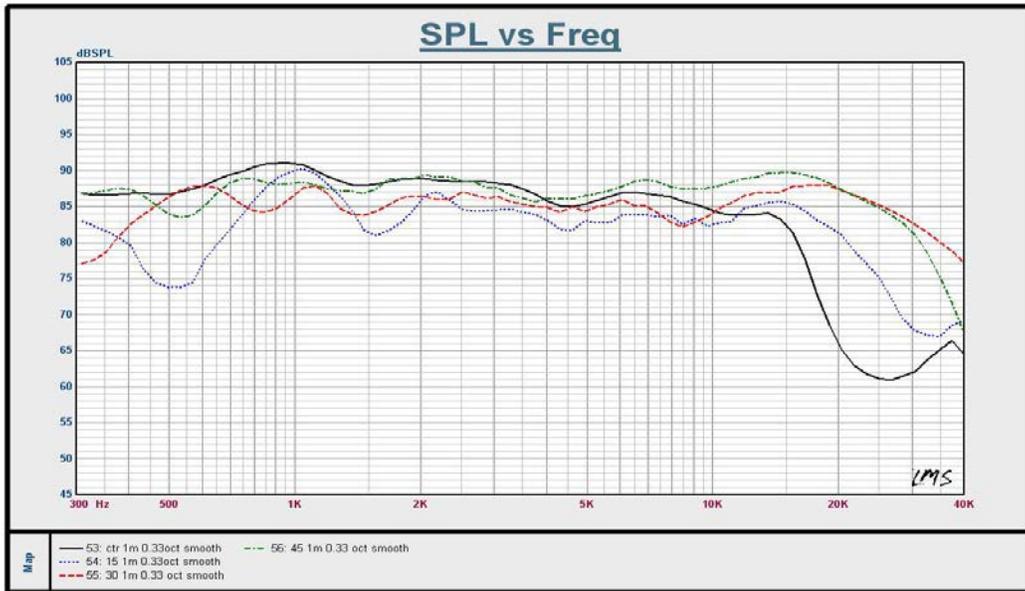


Figure 1 - DualMono Center Channel Off-Axis Response

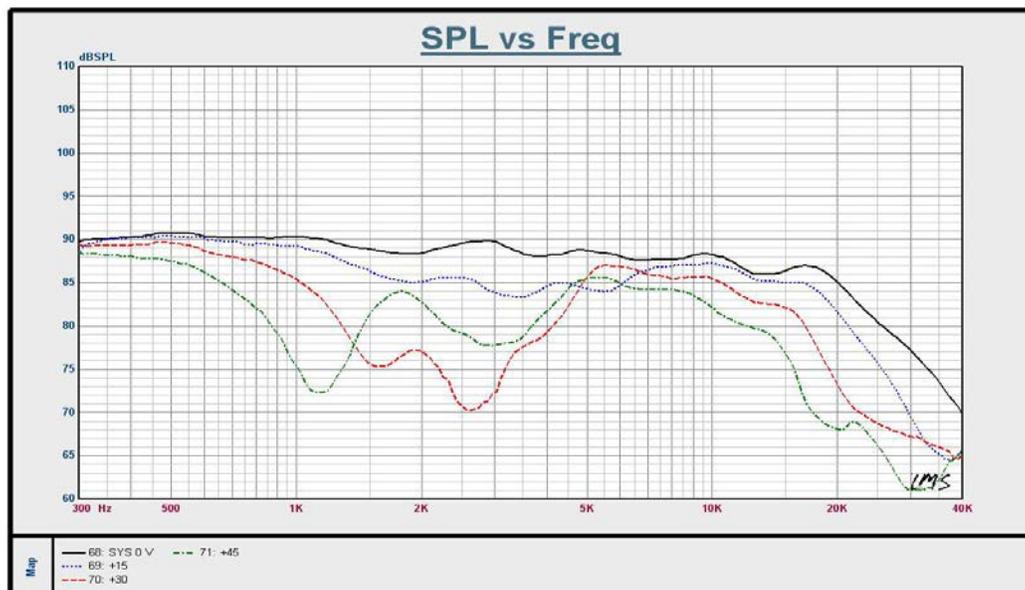


Figure 2 - MTM Center Channel Off-Axis Response

Figures 3 and 4 plot the overall power response of the DualMono and MTM Center Channels. This is simply the total amount of energy produced by the speakers and is approximately arrived at by averaging the energy of all frequencies at the measured listening positions. Note the overall flat response of the DualMono and the tilt of the Conventional Center Channel.

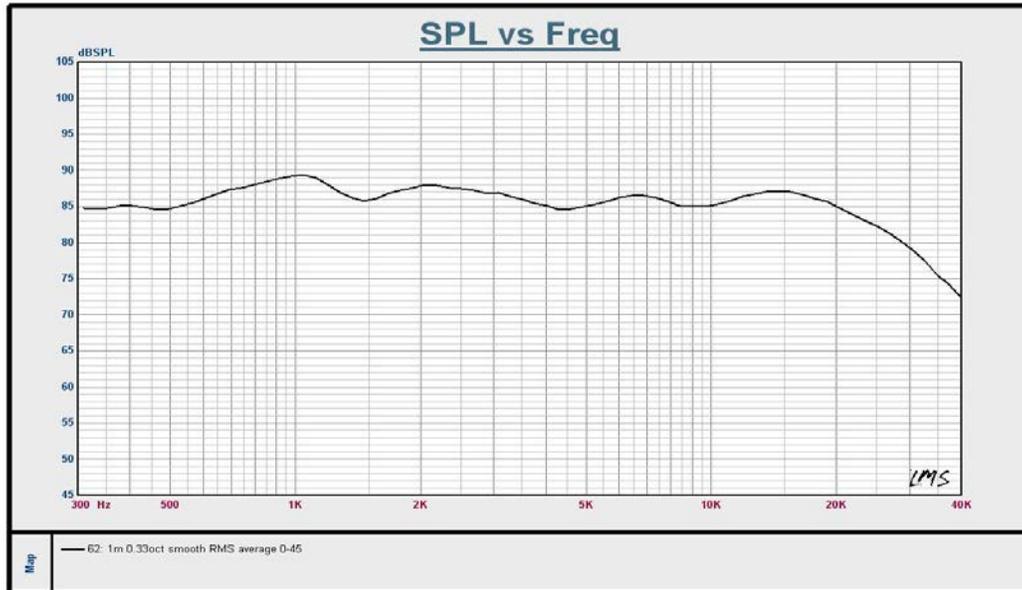


Figure 3- DualMono Power Response

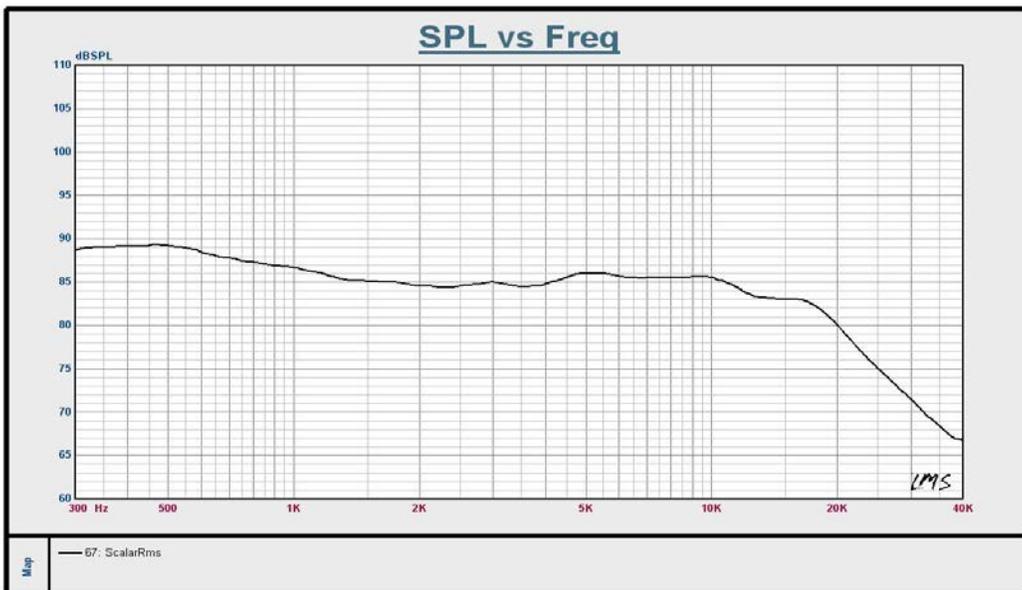


Figure 4 - MTM Center Channel Power Response

Front Channel Stage Tweeters

Because our front channel speakers attach directly to the various video displays, the left and right channels are only separated by the width of the set; because of this it is difficult to achieve the same sound stage width that you would expect from a high end home theater system. To resolve this problem, we added a Stage Tweeter to the left and right channels. This tweeter is positioned at approximately 135° off axis from the forward firing speaker drivers and reflects high frequencies away from the speakers...this angle was arrived at through many hours of listening and experimentation. Because your brain uses high frequency location as one of its methods of determining the source of the sound, this added tweeter convinces the listener that the sound is actually appearing from a location much further away from the television than it actually is.

Driver Technology

We use high quality woven carbon fiber woofer/midrange drivers. This is a great material because we can control consistency, it is inherently well damped, and has good stiffness to mass properties. Our woofers have extended pole pieces, aluminum shorting rings, and long throw (also known as X-Max)...allowing them to play very loud with good dynamics, low distortion, and good phase characteristics.

Super Audio Tweeters are used for our primary high frequency drivers because they are light and therefore have excellent transient response, this allows the speakers to play complex information which sounds very natural and dynamic.

The DualMono Center Channel drivers are toed in slightly, while the left and right channel drivers are toed out, this helps us this is to help focus the center image and widen the overall image.

Cabinet Materials

Our Aluminum cabinet has a high stiffness to mass ratio, which allows us to use a thin wall that is also very rigid...a typical MDF cabinet material would have to be prohibitively thick.

We utilize a closed extrusion and machine the holes for the drivers, grille pin cups, etc. for optimum stiffness. We then use a thick rubberized foam baffle damping material to further eliminate any high frequency resonances and absorb near-field high frequency reflections. This subtle but important treatment adds to the speaker's musicality and low distortion.

This combination of driver and extrusion technology allows our LCR's play down to about 70Hz, excelling beyond the recommended Dolby and DTS requirements while attaching to the display...with a very respectable sensitivity of 89dB @ 2.83 volts/meter.