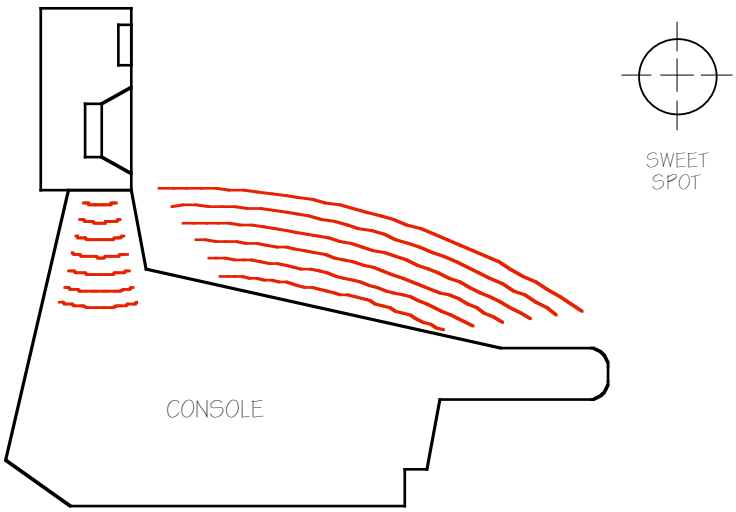
PLACEMENT OF SPEAKERS

The placement and the listening environment can completely compromise the performance of any speaker. No matter how much it costs or how flat its response can be, speaker performance can be very different than what we expect if it is in the wrong place…
It is important to understand near-field speakers limitations and listening environment interaction to get the most out of a monitoring system.

OVER THE CONSOLE VS STANDS

It is a very common practice to place speakers over the console meter bridge. Close to the speakers you get more direct sound energy (that you may prefer in a near-field situation) and less room interference. Perhaps it is the closest place you'll find for your speakers, but surely not the best…

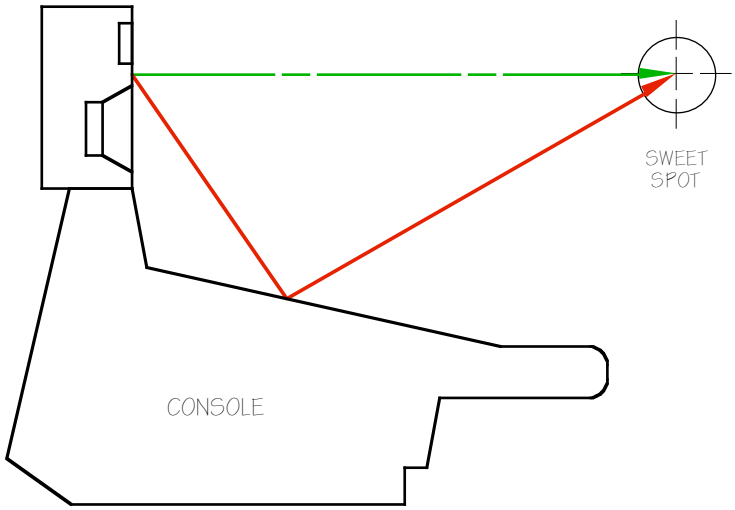
Placing the speakers over the meter bridge will make the entire console surface area vibrate. This will affect the perceived sound quality in the way that this additional sound energy will be radiated off the console surface towards the listener.



The low frequency vibration is also transmitted through the console to the listener body while arms rests on the console (that's very comfortable while working).
To reduce this effect, you may try to mount the speakers over a rubber pad or neoprene pad. This not only absorbs vibrations, but also helps prevent the monitor from vibrating off the mounting surface.

Unwanted reflections are major problem! The console is the most influential reflecting surface when you are listening music. The quality of the sound perceived, with the speakers over the meter bridge, will be hardly affected by the interference of reflections on the console surface.

It is not the intention of these lines to explain why this practice is still applied but to measure its importance; you should try a simple experiment:
Place a speaker on top of the console and feed pink noise through it. Be sure to be at the listener position. Listen carefully the audio being reproduced. Ask someone to move the speaker upwards and downward (maintaining speaker axis pointing to you) while speakers are playing and notice the change in sound character. You'll hear a flanging due to a comb filtering produced by the interference of reflections on the console surface.



Direct sound is the first wavefront that arrives at listener position. Reflections, delayed in time accordingly to the extra path they travel, then follow. This time difference can be traduced to a physical distance (the extra path traveled by reflection) from the formula below:

$$distance = \frac{speed\ of\ sound}{delay\ time\ of\ reflection}$$

Meters & Seconds

Distance: [m]
Speed of sound: 344m/s
Delay time of reflection: [s]

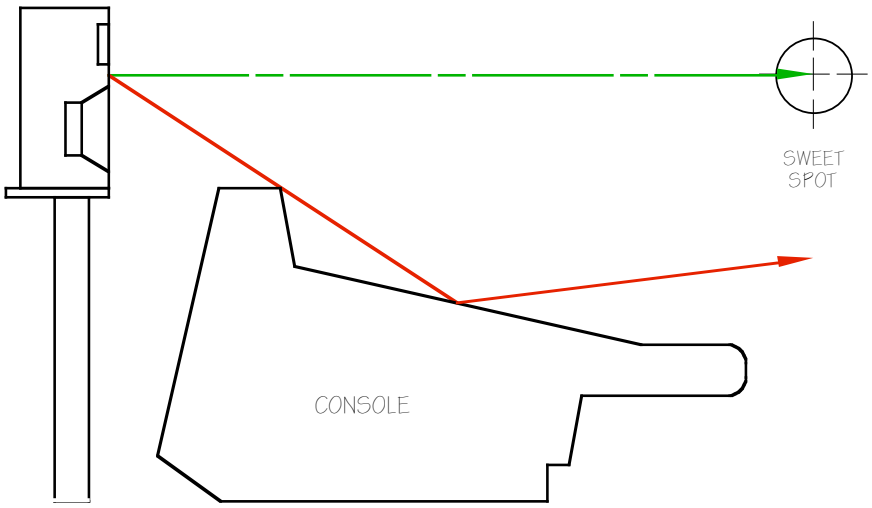
Feet & seconds

Distance: [ft]
Speed of sound: 1130ft/s
Delay time of reflection: [s]

When both direct sound and the reflection on the console surface are acoustically combined at the listening position, significative changes to the sound are produced due to comb filtering effects.
In the lower range, where the wavelengths are long enough that you don't get cancellation, you'll get the waves adding together causing an increment in the level over the lower range. In the midrange, where wavelength are comparable in size to the extra path traveled by the reflected sound, cancellations occurs. It is a fact that this problem can't be corrected with any type of equalization, *once the waves have been cancelled, there is nothing left to boost*.

Finally one more problem can be described; the change in directivity caused by the addition of a boundary surface. Speaker spreads out sound waves according to their own dispersion characteristics. The console surface helps redirect off-axis sound waves towards the listener area increasing the directivity.

Humans perceive reflections arriving within 10 milliseconds (1 millisecond equals 0.344 m or 1.13 ft) of the direct sound as part of the sound itself. In the case of a speaker system, these reflections can pull the stereo image around in different directions at different frequencies.



Every set of components requires a particular study of the situation and results are only applicable to every particular case. Placing the speakers in separate speakers stands, the cases described above can be avoided allowing the listener for a smooth and clean speaker performance.