

BRAVOX CS-603CF

3-WAY COMPONENTS SYSTEM REVIEW

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Photos by ????

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The country of Brazil is famous for a lot of things, and there are a great many famous Brazilians in all walks of life. But, this being a magazine about cars and audio, and also because I don't care about any sports except motor-sports, the most famous Brazilians who immediately come to my mind are men like Emerson Fittipaldi, Rubeus Barrichello, Nelson Piquet, Mauricio Gugelmin, Helio Castroneves, Felipe Massa, and of course the master, Ayrton Senna. That's a lot of driving talent from a single country! And I'm finding out the talent in Brazil is surely not limited to racing drivers. As it turns out, they can build some really respectable audio gear as well!

The Bravox company is proudly Brazilian, and was founded in 1953. They have been working on the design and manufacture of high quality loudspeakers all these years, building quality loudspeakers for many different customers, as well developing the Bravox car audio products.

The company is what's called vertically integrated, which means they basically design, tool, and manufacture all of the individual parts and components that go into the products they produce. The main advantage to this method of manufacturing is that the company has complete control over the quality of every component in their products.

A while back I reviewed one of their reasonably priced 2-way 6.5" systems, but this time they pulled out all the stops and sent us a pair of their top of the line 3-way 6.5" component systems. While 3-way systems are no where near as popular as 2-way systems, they can offer some unique advantages. With a three way system, the mid bass driver no longer has to reproduce high frequency information all the way up to where the tweeter takes over. The addition of a dedicated midrange driver allows the 6.5" "woofer" to be

designed to handle the low end, while the critical midrange frequencies can be handled by a smaller driver with a lower mass diaphragm much better suited to that part of the spectrum. The tweeters crossover point can also be raised, which improves power handling and reliability. When it's done correctly, the result can be a very natural sounding system, with optimum capabilities delivered by each of the 3 drivers. Getting it right can be a challenge, and as always there are compromises in both designs. But when the price of the system allows engineers to use top quality materials and components, such as found in the Bravox CS-603CF system, the results are much less of a compromise.

WOOFER

The 6.5" woofer in the system uses a strong and rigid cast aluminum frame, which provides a solid foundation for the woofer. The aluminum basket also helps to carry heat away from the 1.5" voice coil, which is wound on a heat resistant Kapton former. ➤



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The cone material is woven carbon fiber. Yes, the real stuff, not the stuff that you see painted on everything from dashboard trim to cell phones. The carbon fiber material provides a very stiff, strong yet ultra light weight cone, for excellent bass response and low distortion. The fairly shallow cone is attached to the outer diameter of the basket with a double roll surround made of a special material called NBR. NBR rubber is an expensive type of rubber (the proper technical name is Acrylonitrile-Butadiene) that is very resistant to chemicals, oils and fuels, and has exceptionally good performance in extremes of temperature. While significantly more costly than ordinary butyl rubber, the performance advantages make it worthwhile on this type of product. In the center of the cone there is a spun aluminum phase plug, which helps maintain a flat response by preventing acoustical reflections from the drivers' pole piece. Underneath the cone is a high compliance spider, made of a material called CONEX, which is very heat resistant and allows lower resonances while maintaining the centering of the voice coil in the magnetic gap. And speaking of the magnetics, this drivers magnetics were designed using a high tech process known as "finite element analysis" or FEA for short. This process allows the designers to make changes in the model and see the results of those changes without having to build a prototype and re-test it every time they make a change. The result is a motor with optimized magnetics, providing the best balance of sensitivity, low distortion, and high excursion. Connecting the wires to the driver is a snap as well, with large, heavy duty terminals that easily accept 10 gauge cables, secured with hex head screws.

MIDRANGE

The 3" midrange driver supplied in the system uses a 3" silk dome, with a matching 3" ferrofluid cooled voice coil, also wound on a Kapton former. The motors magnetic system is high power density neodymium, for reduced size without compromising performance. This specialized driver has the responsibility of reproducing the critical midrange frequencies, in this system it operates from about 800Hz to 5000Hz. It also



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has beefy wire connections like the woofer, and will mount in a depth of about 35.5mm. The driver is mounted via a sturdy cast aluminum trim ring, with a matte silver finish. The delicate silk dome is protected by a sturdy steel mesh grille.

TWEETER

The tweeter in this 3-way system is a 25mm aluminum dome unit, also using the heavy duty terminals and has matching cosmetics. The tweeter swivels in the housing up to about 15 degrees in any direction.

CROSSOVER

The crossover housings in this system are different, in that they basically use a version of the cast aluminum woofer basket as the case. That makes them round, easy to mount, and cool looking, but they are quite large, and will be difficult to hide if your install is going for the stealth look. One advantage to this design is the connections are on the bottom or underneath when mounted, so screwing them down on a panel with the wires going through

the mounting panel will create an installation where not a single wire shows.

Inside the housings you'll find top quality components, with large air core inductors, and low ESR, fast polypropylene capacitors. The crossovers are advertised to all be of the "second order" or -12dB/octave variety. These high performance parts are soldered to a heavy duty double sided fiberglass printed circuit board. There are level switches for both midrange and tweeter, allowing level adjustments from +3dB to -3dB for each. These level controls will come in handy when tuning a system, as different vehicles may need more or less level depending on the mounting location of the drivers.

Did you know? – The "+dB" crossover level settings on all passive networks are actually the unadjusted positions, while the positions labeled 0dB and -dB are actually attenuated settings. This is because a crossover cannot "amplify" the signal, so the labels are done with "+3dB, 0, and -3dB" positions because it's easier for most people to understand than a "0, -3db -6dB" label. >>

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LISTENING

After building some panels to mount the 3 way system into my labs baffle board, I sat down for my favorite part of any review, the listening evaluations. I evaluate and audition about 150 different models of loudspeakers a year, and with that much listening experience, I can generally tell whether or not I'm going to like a particular pair of speakers very quickly.

I left the levels for both mids and tweets set to the 0dB level, which if you're paying attention, you know by now is actually -3dB.

As soon as I fired up the system and heard the first 20 seconds of k.d. Langs – "Save Me", I knew I was really going to enjoy the session. Listening to this somewhat sibilant recording, which tends to be a little hot and brittle on the top end, I thought the Bravox CS-603CF system had exceptionally good spectral balance. I found warm, tight bass, natural sounding midrange, as well as very smooth tweeters, which I still find a bit surprising from an aluminum dome. These tweeters sounded sweet, more like very good silk domes, with a smooth and natural top end. The saxophone at the beginning of Jennifer Warnes – "Famous Blue Raincoat" was very realistic sounding, and her vocals came through with all of the presence and sense of space that recording provides. The critical transitions between the woofer to mid,

and mid to tweeter were transparent, and the system just sounded "right".

Changing musical gears, I played a few of my favorite rock tracks from Pink Floyd and Supertramp. Again, the Bravox system exhibited a pure, natural sounding timbre, with very good overall spectral balance. At low volumes or at loud levels, the system sounded equally good, with the lowest frequencies dropping off only at very low levels. Going back to some of my more revealing tracks, I played Livingston Taylor's – "Grandmas Hands", which is an a cappella chorus, I found it quite easy to distinguish each voice, which doesn't always happen on lesser systems. Similarly on the amazing harmony guitars found in Ottmar Liebert's amazing rendition of "Barcelona Nights", I could easily distinguish each guitar and the natural resonances of the guitar bodies. Next up was Michael Ruf's "Wishing Well". This track has some very well recorded vocals accompanied by excellent percussion and tasty guitar work. The Bravox system reproduced the stickwork on the snare and high-hat, combined with the tight, deep kick drum nicely, and Michael's voice was forward and retained the ambience of the recording studio's coincident stereo pair mixing technique.

My only negative comment during several hours of listening was that at high volumes, there was occasionally a bit of glare in the

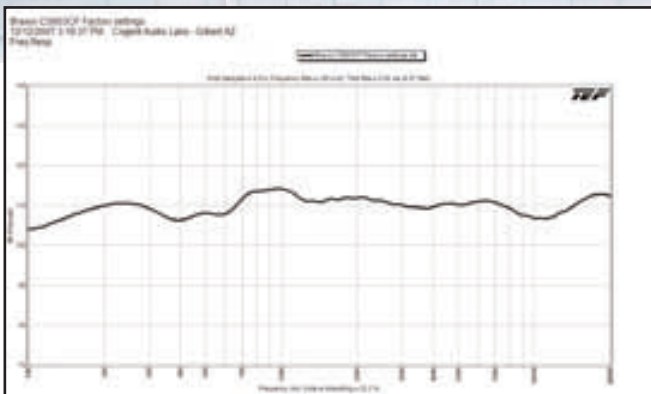
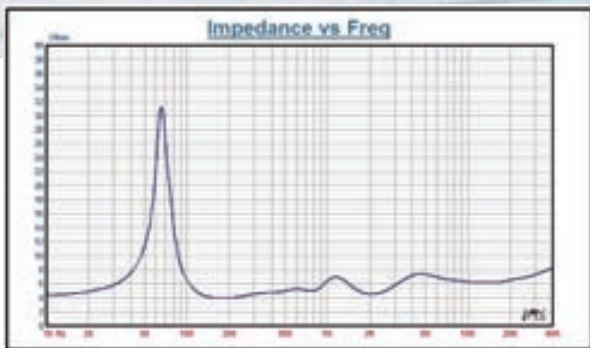
Power Handling	120 watts RMS
Crossover, Midrange	800Hz high pass @ -12dB per octave
Crossover, Tweeter	5000Hz high pass @ -12dB per octave
Frequency Range	50-25000Hz
Sensitivity	90.2dB/SPL @ 1W/1M
Nominal Impedance	4 ohms

upper midrange. Nothing that would make you wince or turn it down mind you, just something that I knew wasn't a part of the original recording. But these occurrences were rare, and only occurred briefly on a few of the many tracks I listened to.

Overall, the sonic performance of the system is everything you'd expect... this is an expensive system, and quite frankly, it sounds like one. Of the 20 or so systems I have listened to in this price range or above, the Bravox would definitely be in my top five for sonic performance.

TECH SPECS

The Bravox system I tested actually measured better than the published specifications in the owner's manual. I measured the frequency response to be significantly flatter than their published graph, and an impedance plot of the system shows a very flat impedance curve for the crossover points, indicating that someone really did their homework when designing the network.



CONCLUSION

When reviewing a speaker system like this in the upper end of the price spectrum, one expects good performance, and exceptional attention to detail. In these high end systems, expensive materials and components are common, but regardless of the money spent and parts used, the final result is what counts.

Every once in a while I get the privilege and enjoyment of evaluating a system like this Bravox system, where everything comes together. Becoming more than merely just the sum of its parts, the end result in this case is a system with overall performance that's uncommonly good.

Till next time... Good Listening! **PAS**

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