



Impedance System Zero Ohm

Defying the Laws of Electricity



The golden age of electrical entrepreneurs and pioneers is over. Gone are the days when speakers were conceived and built in a garage and amplifiers were assembled on the corner of a student's desk. Just about everything has now turned digital. And yet, our cousins in Montreal have put together a passive system that essentially dethrones the old 100V (70V) traditional solutions and relegates them to the attic of audio history. Without getting into the details, the concept is quite simple. Essentially, you can now connect a substantial number of speakers in parallel (which results in an astonishingly low impedance line) to the output of one amplifier.

OUR OPINION

WHAT WE LIKE

- Innovative approach, product simplicity, ease to use, preserves the integrity of the signal/sound.
- The distinctive 2+ 2- / 1+ 1 - pin connection in order to avoid mistakes in plugging in the unit.

WHAT WE DIDN'T LIKE

- The rack-ear kit seems less robust than the rest of the product.
- The 2+ 2- / 1+ 1 - pin connection requires alternative wires.

FOR WHO? AND WHY?

- All installers or end users of low impedance loads distributed over a multi-speaker setup.

This box connects between the output of the amplifier and the speaker line. The manufacturer has told us that you can add up to 40 speakers or more, at 8-ohms each, in parallel, and the amplifier continues to function without alterations or disruptions to the sound. The math is simple, 40 speakers at 8-ohms each would result in a 0.2-ohm impedance load which should be largely sufficient to trigger the amplifier's "protection" mode. In order to better understand what is going on here, we had to conduct a test under the advertised claims.



A WORD FROM THE BRAND ADVOCATE: Nicolas Granval

The Zero-Ohm unit was created to make life easier for sound technicians. It is essentially geared towards fixed installations, large commercial spaces, stadiums, theaters, restaurants, conference centers, shopping centers, places of worship...

With the Zero-Ohm system you get; a simplified plug & play solution, the ability to connect a higher than normal number of speakers, lengthy cable runs without sound degradation, less amplifiers, and the ability to simplify and save on cable (since all the speakers

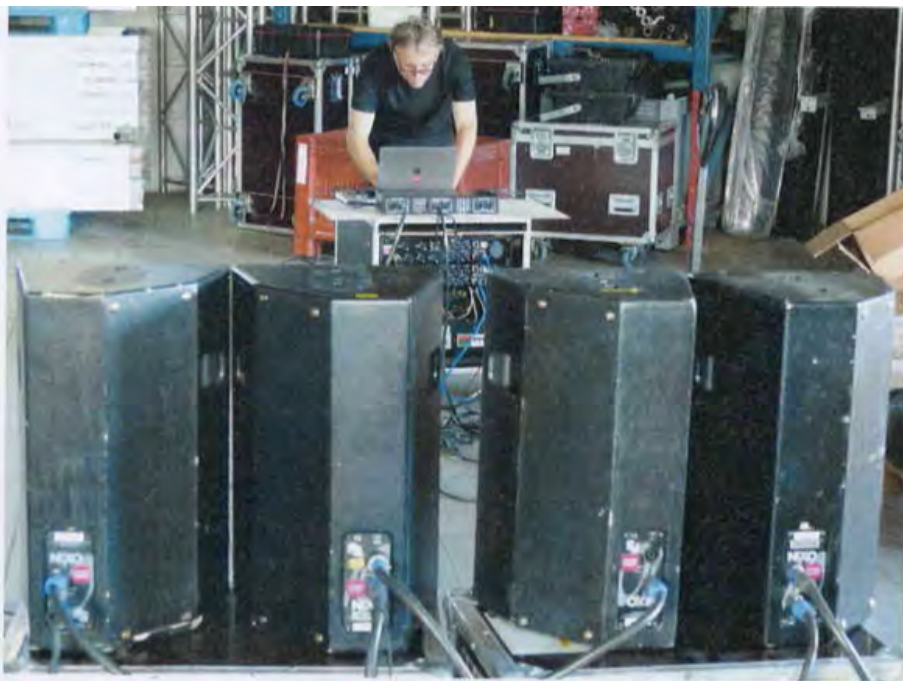
are wired in parallel). The system is passive and guarantees a high-quality audio output while protecting the amplifier. In short, the unit simplifies installations while staying musically sound (essentially all the advantages of a 100V line without the complications!)

Distributor:	MID
Warranty:	2 Years
Development:	Canada
Manufacturing:	Canada

Manufacturer Details

Brand:	Zero-Ohm Systems
Model:	MS-4R
Input Channel:	2 on Speakon NL4
Output Channel:	2 on Speakon NL 4, per channel
Max Power:	4000 watts per channel
Output Equivalent impedance at minimal:	0.1-ohm
Frequency response:	20 Hz to 20 kHz
Accessories provided:	Racking brackets 19"
Wight:	3.2kg (7 lbs)
Dimensions:	19" 1U x depth: 5.9"

Therefore, an appointment was made with Alain Roy of Espace Concept. This company is based in Besancon and is a distribution hub for SONO Mag (you can purchase SONO Mag's latest issues at their location). They carry an impressive inventory of NEXO speakers, including the PS10 and PS15 as well as NXAmps amplifiers. These products are ideal for our testing. Our main objective is to compare the behavior of one amplifier connected directly to the speakers (line A) versus the same set-up going through the Zero-Ohm unit (line B) with instant evaluations while shifting between lines A-B. We will also be measuring the frequency response and electrical conductivity/intensity.



Alain Roy on the controls. Two pairs of PS10 speakers are placed across from him to compare lines A-B on audible sound quality and readings.



Our two NXAmp amplifiers fed to our test signal. No sound adjustments were made during the listening and testing phases.



Speakon Inputs and Outputs with the guideline schematics for pin 2+/- for the Inputs and pin 1+ /1- for the Outputs. The manufacturer's intention was to eliminate the risk of confusion between Input and Output interfaces.



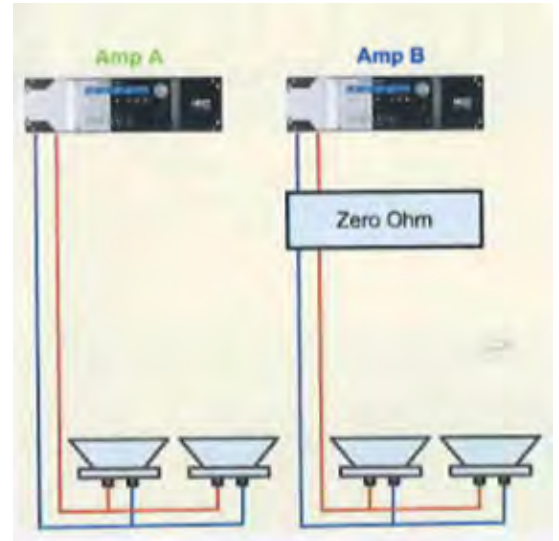
TEST

1. Comparison of lines A-B with same loads

First observation; the gain settings on both amplifiers are identical in order to obtain the same acoustic output on both circuits. Both NXAmps see equal measurements. Consequently, the Zero-Ohm system is fully transparent and has no effect on the amplifier.

As for the sound, the same neutrality can be observed. The frequency response and power on both lines give similar results. In order to validate our acoustical observations, we alternated the sound through both setups. Nothing changes, all 4 PS10 speakers sound the same.

Setup and listening area / zone



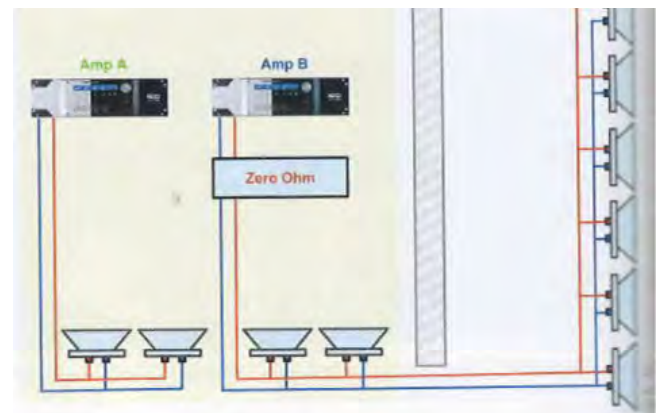
2 PS10 speakers wired in parallel to each amplifier resulting in a 4-ohm impedance load for each line.



2. Comparison of lines A-B – 2 speakers versus 8 speakers

To balance the two systems, we were anticipating the need to increase the gain of amplifier B (Zero-Ohm). However, there was no need. In this regard, the setup behaves exactly like a conventional parallel speaker setup.

This is where the mystery begins. The total impedance load of eight 8-ohm speakers in parallel is ... 1-ohm! The NXAmp amplifier is designed to significantly limit the current as soon as the impedance load drops below 2-ohms. In our case, we have to admit that the amplifier doesn't see the low impedance load of 1-ohm. The Zero-Ohm unit acts as a decoy in the sound chain. Acoustically, we note a small anomaly. Although the results are definitely not altered, we do notice a small loss on the high frequencies. The sound is less refined. On the lower frequencies, we noted that they are less precise. A halo effect was observed, muffling the sound's impact. The bass came off a little moist and blistery. Nothing crippling or damaging though. That said, these observations aren't really surprising since these electrical and audio behaviors are very familiar consequences. When the impedance load is that low, the frequencies naturally diminish.



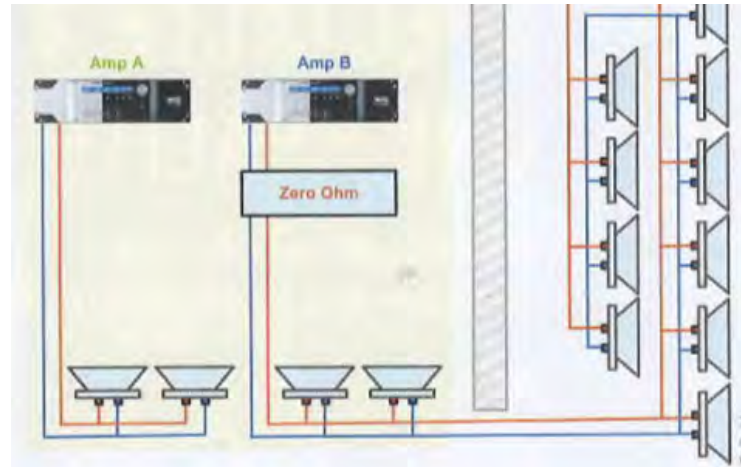
2 PS10 speakers on one side and 8 PS10 speakers in parallel on the other. The impedance load drops to 1-ohm. The six additional speakers are placed in another room to avoid interfering with our listening and testing.



3. Comparison of lines A-B – 2 speakers versus 12 speakers

Alternating between lines A and B yields no acoustic differences between both systems with regard to the two-front facing PS10 speakers. Amplifier B seems to be supplying all the speakers as if they were directly plugged to the amplifier's output. The impedance load now drops to 0.66-ohms. The amplifier is not fazed, but the fan is finally triggered. We feel that the electrical setup is now highly charged. We confirm the situation as we enter the second room and pass by our "wall of sound." The acoustic levels are powerful and robust. Regarding the sound, the same observations as with the 8-speaker setup were noted; naturally it was a little more noticeable with the lower impedance load. After a few minutes of pushing the system at these high levels, we precariously placed the palm of our hand on the Zero-Ohm unit. Surprisingly, it was at room temperature... Therefore, it is unlikely that there is any "serial resistance" inside.

Through the built-in processor on the NXAmp (on line B), we attempted to adjust the levels. It only took a moment for Alain Roy to install a bass shelving at 170Hz -6.5dB, while also adjusting the highs at 1.8kHz and +6dB. The impact was immediately heard, and the finer sound had returned. Only the lower frequencies seemed not to have fully regained their original punch. Again, none of this is crippling.

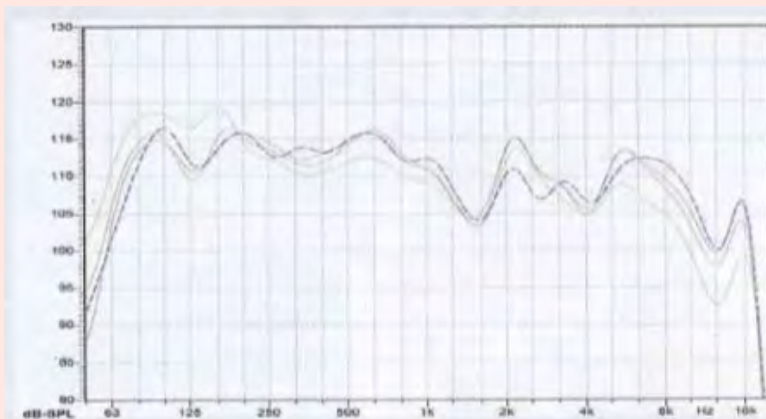


To our 8 PS10 speakers we added 4 PS15's. An impedance equivalence of 0.67-ohm.



Outside of our testing room, the ten speakers used to load the Zero-Ohm unit on top of the two PS10s in front of the controls and amplifier

Frequency response readings



The baseline is the dotted blue line. It represents the frequency from two PS 10s hooked up directly to the NXAmp. As was the case for all the measurements, the mic was placed on sound absorbing material on the floor in order to limit the acoustic refractions. The pink line represents the frequency measured of the 2 speakers through the Zero-Ohm unit. We note a

slight decrease in the pitch, around 2 to 3dBs. This is also the case in the lower end of the spectrum. The maroon line represents the 8 speakers added to the Zero-Ohm unit. A slight slippage in bandwidth is noted bringing the pitch reduction to about 5dBs. Finally, the green line shows the results with the 12 parallel speakers and now an 8dB reduction in pitch is noted. The bass sees an 8 and 10 dB gap. The readings confirm the previous acoustic observations.



With the correction applied to recover the initial sound in both setups. Logically we find the frequencies found in the 3rd case.



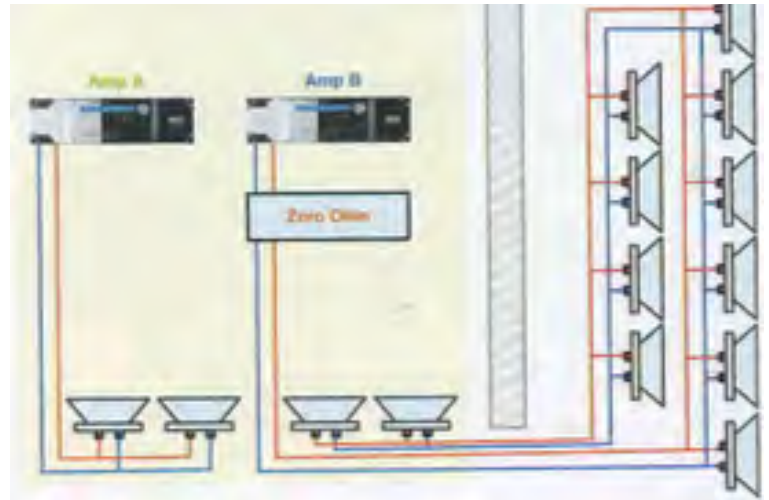
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4. Comparison of lines A and B - with 12 speakers with a longer cable run

At very low impedance and higher power, the sound can be influenced by the type of cable used when adding resistive and non-resistive components on the line.

Our last test will involve adding 30 meters of cable and focusing on the result at the end of the line. This cable addition would result in the total distance now rising to more than 60 meters from the Zero-Ohm unit.

Acoustically, we notice only a very slight degradation of the sound. Again, in the highs and bass. The conclusion here is that Zero-Ohm surprisingly seems to accommodate long cable runs as well.



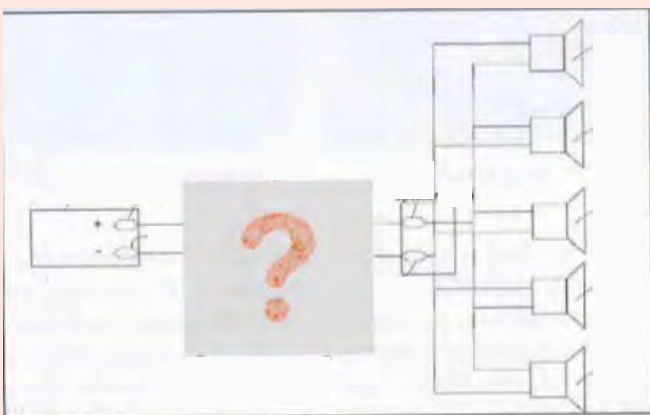
Added thirty meters of cable to the setup to measure the sound at the end of the line.

5. Comparing the current/conductivity

With a clam-on-amp-meter and spilt cables, we measured the intensity of the current at the amplifier's output on a 100Hz signal. For the NXAmp set to 2 PS10 only, the current reaches 0.2 A. When we add 8 more speakers and measure through the Zero-Ohm unit the measurement is 0.7 A and 1.1 A with 12 speakers set in parallel.

The formulas used to calculate the intensity is $P=R \cdot I^2$. While we are well aware of the tolerated approximations, particularly with regard to the impedances, we can obtain intensity measurements for each setup. We see that the power used by the amplifier set to the Zero-Ohm unit is proportionate to the number of speakers.

Patented principle



After coming face to face with the impenetrable resin covering the circuits, we decided to contact the manufacturer in order to find out what is inside. Under a formal NDA we were able to gain access to the technology. The schematic is at the same time simple and well thought out. It pivots around a handful of components. But we cannot say more. We were given access to the Zero-Ohm internal lab tests which were done in a similar fashion to our

tests and they confirm our findings. Specifically, with and without the Zero-Ohm unit and the same number of speakers, a proportionate level of power, with the number of speakers set up in parallel. Finally, we can confirm that the full functionality of the amplifier was maintained despite the low impedance load which is much lower than the amplifier can normally tolerate.

2Ω Load without circuit						
Uopen [V]	Uload [V]	I [A]	F [Hz]	Zo [Ω]	Zo [Ω]	
1	0,891	0,469	100	0,23240938	1,89978678	
1	0,891	0,454	1000	0,24008811	1,96255507	
1	0,891	0,416	20000	0,26201923	2,14182692	
2Ω Load with circuit						
Uopen [V]	Uload [V]	I [A]	F [Hz]	Zo [Ω]	Zo [Ω]	
1	0,902	0,453	100	0,21633554	1,99116998	
1	0,902	0,435	1000	0,22528736	2,07356322	
1	0,902	0,4	20000	0,245	2,255	
0.47 Ω with circuit						
Uopen [V]	Uload [V]	I [A]	F [Hz]	Zo [Ω]	Zo [Ω]	
1	0,706	1,284	100	0,22897196	0,54984424	
1	0,706	1,33	1000	0,22105263	0,53082707	
1	0,706	1,24	20000	0,23709677	0,56935484	



TEST

Manufacturing

The unit is elegant and robust. We have a small concern about the rack-ear brackets. They seem quite adequate on a fixed rack or a well-protected rack but seem like they may not withstand the more rigorous demands of a touring rack. Having said that, the unit is more than adequate for the majority of setups where Zero-Ohm will be ultimately used such as fixed installs and events.

Concerning the electrical components, based on what we know, the assembly is simple, sturdy and professional. No concerns regarding the unit's reliability. Especially when you consider that the product is passive.

With the exception of the Speakon connector, everything else is covered by the manufacturer's warranty seeing that main component is encased in a block of resin.

When should one use a Zero-Ohm unit?

The general principle of 70V or 100V distribution lines is the same as that of a high-tension current. By increasing the current, with the same power, one diminishes the current on the line, thus the losses are always observed. But it is possible to draw long distance runs, in large settings, to distribute amongst many speakers. However, the limitations of a 100V configuration are well documented. Specifically, in terms of sound quality, the transformers, while

indispensable, limit the frequency response and introduce sound distortion.

The Zero-Ohm unit allows you to create a configuration that essentially solves the same problem as 100V (70V) systems. However, with Zero-Ohm you have a low impedance system that preserves sound quality and considerably limits the number of amplifiers required. Installing dozens or even hundreds of speakers at low impedance to one amplifier in series/parallel is possible today (see SONO Mag No 444 p.90), however, this process will never be as simple a task as it is with Zero-Ohm. The expression "plug & play" has, without a doubt, never been more appropriate than with this unit. This technology finds its utility as soon as an important number of speakers need to be linked in parallel from a single source or amplifier. The applications are endless where a plurality of speakers are necessary. With the Zero-Ohm unit these multi-speaker set-ups are simplified. They make it easy for professionals and they are simple enough even for beginners.

To conclude, the distributor in France mentioned that a 10kW per channel unit is in the works, which would allow for bigger and more powerful installs.



REPORT CARD

INNOVATION

useful and original idea

MANUFACTURING QUALITY

Very good quality with a concern regarding the rack brackets

UTILIZATION

simplicity

PERFORMANCE

very good

BANG FOR BUCK

strong for needed applications