



Can be a R1 column  
a loudspeaker ?

STOP PRESS



**When** does the grouped R1 work ?

Can we hear that or sense the moment?



R1 - Detailed Mounting

Instructions

## Roundffusor1 or... R1



- ▶ R1 in simple words
- ▶ Do - Don't Carefully
- ▶ Roundffusor1 theory
- ▶ Low frequency-Why?
- ▶ R1's Tests
- ▶ Recording Studios
- ▶ High - End
- ▶ Finishes
- ▶ Ideas & Sound
- ▶ How to buy R1

**This is a story on how I try to improve**

**the World's interior acoustical architectural data and attitude !**

That's why we can see that after the R1's introduction on the market, the architectural acoustics changed from straight vertical lines to curved and rounded surfaces. We have demonstrated a simpler and more effective acoustical and architectural way, covering just a fraction of the lateral wall surfaces...The sophisticated acoustical studies, are a thing from the past. But some brave acousticians around the world are still "devastating" entire forests in order to fully cover the walls and ceiling in concert halls !

**ESR is controlling & producing a new generation of complete acoustical materials**

**Roundffusor 1 - The unique acoustical material**



This site is made,  
written and updated

by

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The  
United  
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Zainea Liviu Nikolae  
US Patent No.:  
US 7,261,182 B2

Member of Acoustical  
Society of America  
from 1990



In this very hall, in Resita's City Hall / Romania was held from

21 to 24 October 2009 an International Conference „Acoustic , Vibrations” .

About 200 specialized people know by now what is R1 and its amazing efficiency...

I proudly present here a sound diffuser device that surpasses all previous competitive diffusers and is ready to be installed easily in any critical listening or performance facility. It is a lightweight, thermoformed complex hard plastic device, which is self-adjusted for low and very low frequency absorption and acts as a clean diffuser for mid and high frequencies. Partners and end-users sought for commercial agreement with technical assistance or license agreement for further exploitation.

■ Don't forget: the sound quality that you may perceive in any room from a sound installation is more or less 60% (worst case scenario) to 40% (best case scenario) Real Room Acoustics and 40% to 60% Sound System dependent.

■ Bellow is a R1's presentation written by Constantine Karamanis at the Enterprise Europe Network - National Documentation Centre - Hellas. Parts of it were enlarged by the inventor.

■ Description:

■ Roundffusor1 is composed from a main body and two lateral drivers. These two drivers support steadily the diffuser upon the surface to be mounted: walls or ceiling. The diffuser may be used in any kind of room where the critical listening is needed.

Roundffusor1's unique advantage is that it is working simultaneously in two ways

1. As a clean active sound diffuser for mid and high frequencies - from around 180-250Hz to 20.000 Hz and...
2. As an adaptable absorber for low and very low frequencies from 5 Hz to about 250 Hz, depending on R1's columns length.

The R1 is a unique sound device, effectively working at all sound levels, from whispering to more than 130 dB SPL without being saturated.

**It was successfully tested to a real helicopter recorded sound !!!**

■ The Roundffusor1 offers a milder, wide-bandwidth (low-Q) type of absorption which is similar to the sound of a "flexible wall" bass absorber. Unlike a custom-built soft-wall, membrane, foam, or fiberglass absorber - the said "bass traps", the Roundffusor1 is more adaptable (by extending the column length) and movable. Because of the large surface area and the wide bandwidth of the R1's bass absorption, the resulting sound is an improvement over a very wide range of listening positions and frequencies. Subjectively, this results in a truly dramatic improvement compared to a conventional bass absorber. The fact that the Roundffusor1 does not absorb high frequencies, but diffuses them throughout the room instead, means that the spectral decay (often measured as the RT60) will stay even from the bass to the treble range.

■ This is possible, because being mounted in a new way works like a complex Helmholtz resonator. In real time, there is a kind of reconstruction of all music characteristics/parts diffused or absorbed or both. Even for the trained ears, there is no time to realize when and how the music is processed and the listener is just immersed in the sound without any trace of coloration. Additionally the sweet spot becomes obsolete and the consequence is that almost every person in the room senses the same sound mix.

■ The Roundffusor1 is relative simple as an object and can be easily mounted by anybody with simple tools. Another basic characteristic is that is easily affordable. Generally, all that is necessary as a room treatment are 9 Roundffusor1 units (or more, depending upon the application and the volume of the room). All 9 Roundffusor1 units occupy only a total area of 174x174 cm (Dimensions for each: 58 x 58 x 11 cm) from one wall and weights only about 18 kg. It may be used at any formation of at least 3 units in a row: 2X4, 2x5, 3x3, 3X4, 2X5, 2X6, 4X4, 5x4 or various combinations for one wall and ceiling.

■ No other room changes are required. Roundffusor1 must be mounted symmetrically towards the common loudspeaker axis plane either behind the speakers, either on the opposite wall, or on the ceiling if necessary. Each diffuser is mounted upon 2 lateral supports, and all diffusers are mounted in parallel rows, vertically or horizontally relative to the floor, if to be put on the back wall.

■ Why I insist so much about symmetry in the room? Like that we have a field "ready" for the original field of the recording, there will be minimal interferences between them. With the help from the R1's diffused field, your CDs or LP or movies will sound like the original ones, with their perfection (meaning the reality at the recording's moments and space) or imperfections. A blend of music lovers dreams with the real high fidelity. And all this, is done practically simultaneously with the incident sound, because our hearing system cannot perceive...when. This "when", in my opinion is the human perception's / sensorial delay. So the said...real time, is not quite real time, even for sound neither for vision... Just be happy - as me - that the R1 is...in time. About this when, read more [here](#).

■ In case your room is not symmetrical or the R1 are covering half wall or less, , we have evidence that using the R1 the acoustic field is "forced" to symmetry, or ...the wrong stereo image becomes a wide natural well defined stereo image.

■ One way that our Roundffusor1 treats and solves all room acoustic problems is just this: being an adaptable low and very low frequency absorber - the simple masking and dynamic masking phenomena that exist because of low frequency overloads are reduced so much so that are not being perceived by the human ear. Self adaptable means that our device filters, from case to case, the undesirable room responses and lets your preferred music sound as it was recorded. The same object, the Roundffusor1, with a minimum area (58x58cm) and only 12 cm depth is simultaneously a powerful wide band diffuser that solves the difficult problems of room standing waves creating a diffuse sound field where no sound detail can be hidden from the listener.

■ It sounds simple but in fact, from a theoretical point of view is so complicated that the actual theoretical background level is not enough to fully explain the Roundffusor1 functions. Research is done by the patent holder mostly in the psychoacoustical domain, because there lays the key to its behavior and perhaps the answer.

■ The question that you must ask yourselves is the following: What is more important, to have a real device that works near to perfection "independent" from the theory or to obey the "absolute" theory which is not practically applicable in so many ways? Roundffusor1 "must" follow the actual acoustical measurements standards or, the huge practical evolution brought by R1 have to be included into the standard's texts? Because "cutting" such a square device just to follow a "circle" rule, is not that acoustical wise....

■ The Roundffusor1 is the world's most efficient acoustical diffuser and self adaptable low frequency absorber, an all in one small package.

■ In any kind of rooms and dimensions, using an adequate number of R1, the reverberation time RT60 will be something like 0,5-0,4 sec, or less (the R1's "constant" if you prefer) meaning that the various types of echoes will be attenuated towards inaudibility.

■ Roundffusor1 may be used in all critical listening rooms including recording & TV studios, home theatres, big cinema multi-channel audio halls, quality control rooms, film mix and dubbing stages, Churches, CD mastering, music practice or normal residential rooms and also rooms for professional reviewers.

■ Innovative Aspects:

- It works simultaneously in two ways: as a clean diffuser for mid and high frequencies and as a self controlled absorber, below 250 Hz, for low and very low frequencies
- Based mainly on psychoacoustic research
- Solves complicated problems of small and medium rooms

■ Main Advantages:

- Outstanding performance
- Easy to mount by anyone, almost everywhere using simple home tools
- Extremely affordable

Quite simply...the world's best complete sound diffuser device

**A MASTERPIECE YOU CAN AFFORD**

■ Technology Keywords:

Telecommunications

Audiovisual Equipment and Communication

Construction Technology  
Sound Insulation  
Sound Engineering/Technology  
Physics  
Acoustics

- **Current Stage of Development:** Already on the market
- **Exploitation of RTD Results:** PRIVATE RESEARCH
- **Intellectual Property Rights:** Patent - Greek Patent Granted , US Patent Granted , European Patent Pending

■ **Comments** G10K 11/20 , E04B 1/84 until 22/05/2022. Additionally a world wide patent and PCT is pending.

Important note: The documents considered to be relevant for this invention- the Roundffusor1, were all in the "A" category [document defining the general state of the art which is not considered to be of particular relevance]. There are 3 older patents [1939,1957,1983 , with indications, where appropriate, of the relevant passages, also, not considered to be of particular relevance ] and a sole paper to be open from here.

This indicate the almost absolute originality of our invention. Is like "reinventing" the wheel. The paper is an indication of our predictions that the Roundffusor1 may be used and as Music hall's ceiling stage reflector or generally in Music Halls because is the most efficient diffuser on the market, its diffused field being easily perceived at more than 12 meters from any angle.

The polar plot resulting from a surface of grouped R1, is of a very wide & elongated 3D shape / lobe tending to the theoretical perfect diffusion D=1

■ **Organization/Company Type:** Other  
SME

■ **Organization/Company Size:** 1-10

■ **Brief Market Application Codes:** OTHERS (Specify in Market Application Highlights)

*Comments*

■ **Detailed Market Application Codes (VEIC):** *Keywords*

Radio and TV broadcasting and other related equipment

Elementary and Secondary Music Education Colleges & Universities

Performing Arts Centers, Theatres

Rehearsal rooms of any dimensions  
Movies, movie products and theatre operations

Amusement and recreational facilities  
TVs, radio, stereo equipment and consumer electronics

Recording Studios - Music, records, production and

instruments

Churches

#### Highlights

Recording & TV studios, home theatre installations, quality control rooms, film mix and dubbing stages, CD mastering, music practice or normal residential rooms and also rooms for professional reviewers.

■ Collaboration Type: Joint venture agreement  
License agreement

#### Comments

Target partner expertise sought: Companies related to acoustical applications (especially in studio and P.A. installations) or companies that are just interested in exploiting further the patent in national or trans-national level.

■ Preferred Countries for diffusion: ALL

*Reaching "terra incognita" is the dream of any inventor...*

The Roundffusor1 is now granted with an United States Patent 7,261,182 - full text [here](#)



United States Patent 7,261,182 - Zaina Liviu Nikolae. Title: Wide band sound diffuser with self regulated low frequency absorption and methods of mounting.



[Roundffusor1 - our first prospectus](#)



[Roundffusor1- The new Commercial brochure](#)



[Roundffusor1 prospectus - can be printed in A2 format](#)



[Roundffusor1 - poster, can be printed in A2 format](#)

#### Important professional links

- MIX Magazine on line: Acoustic materials 2005-guide to new professional acoustic materials for the studio
- MIX Magazine on line for the AES NYC 05

## Architectural acoustics ?

Your architect choose the Music Hall's geometry within known shapes

We solve the acoustical problems !

We can also tune your existent room to subtle musical requirements



For every technology, there comes a tipping point when adoption starts to spread like wildfire

#### My previous important projects

- Room acoustics improvement or new constructions for sound recording facilities: Studios, TV, amphitheatres, music halls or dedicated rooms for listening music. One project was Thanos Mikroutsiko's recording studio where he already finished enough professional recordings.
- The GIALINO MOUSIKO THEATRO in Athens (the Gialino Teatro's site is here), our most complex project, maybe, is the best music hall in Greece, built with the previous acoustical materials technology and very expensive.
- We design and supervise special sound insulation constructions for any industrial or naval situation.
- Our bigger industrial project was a successful prototype sound insulation of machinery engine room to a 110 meters cruise ship "Princess Danae" and a much bigger one, a Greek military complex of 16 tank motors testing chambers. It is finished a full project heavy sound insulation, interior acoustical design and 12 KW audio array-a multipurpose hall in Sparta.
- We were invited paper at the Acoustical Society of America's Pittsburgh 2002 Poster Session: Halls for Music Performance: Another Two Decades of Experience 1982-2002. I presented "THE GIALINO MOUSIKO THEATRO".
- In Greece, a paper about the ROUNDFFUSOR<sub>1</sub>, was presented at the first Congress of the Hellenic Institute of Acoustics (HELINA) University of Patras, September 30, 2002. HELINA is a member of EUROPEAN ACOUSTICS ASSOCIATION (E.A.A.).
- In Romania, a work about the corrected studios of the State Romanian Broadcasting Co. was presented at the Second International Conference of Romanian Society of Acoustics on Sound and Vibration (is a member of EUROPEAN ACOUSTICS ASSOCIATION (E.A.A.)), 14 – 17 October 2004, Bucharest.

#### Greek language data links - independent tests, interviews

> Company Profile

> Musical acoustics - Zainea Liviu published articles in Greek

-  [????a???st??? fa???µe?a st?? ?au???? s????t?te?, ???t??? 1991,](#) 
-  [??e?e????ta? t? µ??s???, µ???? p??t?, ?p?????? 1991,](#) 
-  [??e?e????ta? t? µ??s???, µ???? de?te??,????? 1991,](#) 
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-  [?????e? t?? a???st???? s?st?µat?? , ????? 1992,](#) 

> 'Hxos-Eikona": R1's Test , here the original article

> Funny Publicity

> AV Pro's article: R1's Test

> Radio-Link's article: R1's Test

> Radio-Link - Zainea Liviu Interview