



# Audio Processors

## FM, Streaming and Recording

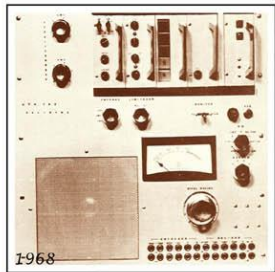
- Our advanced technology has improved during 50 years, the sound of the Radio stations in 65 countries
- Use arrow keys to change slides
- → ← change slides

We started at 1968 the manufacture of audio processors for radio stations...

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Our competition at 1968 were CBS Labs, RCA, Gates and Telefunken....

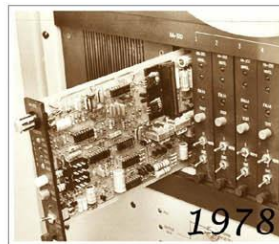
...All those companies disappears from the processor market... Now Solidyne with 50 years of continuous innovations is the world oldest company; then, only Solidyne is able to offer your the largest experience in this field !



1968-1971



1973



1978



1975

1975



1980

1980



1985



1994



1995

1995



1998

1998



2001



2005

2005



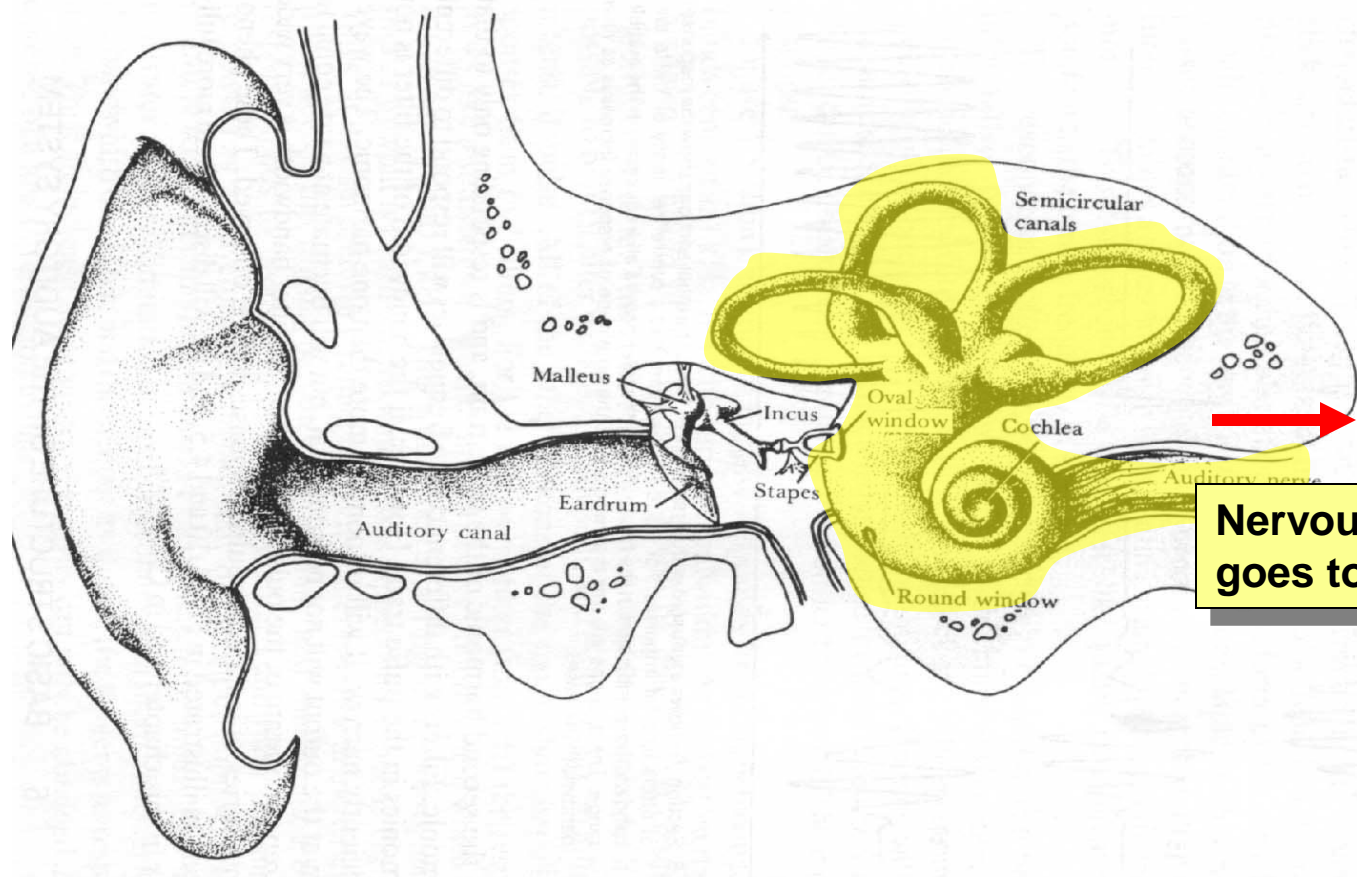
# Our superior experience is a guarantee of the audio quality of our processors

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- The design and manufacture of audio processors is an Art and a Science... It is like manufacturing violins...
- We spend many years of research and publication of many scientific papers. Our 50 years of full commitment will help your radio to sound better and to improve your coverage
- Now we will show you a brief description of the psychoacoustics involved in audio processing technology

# The psychoacoustic process starts at the internal ear

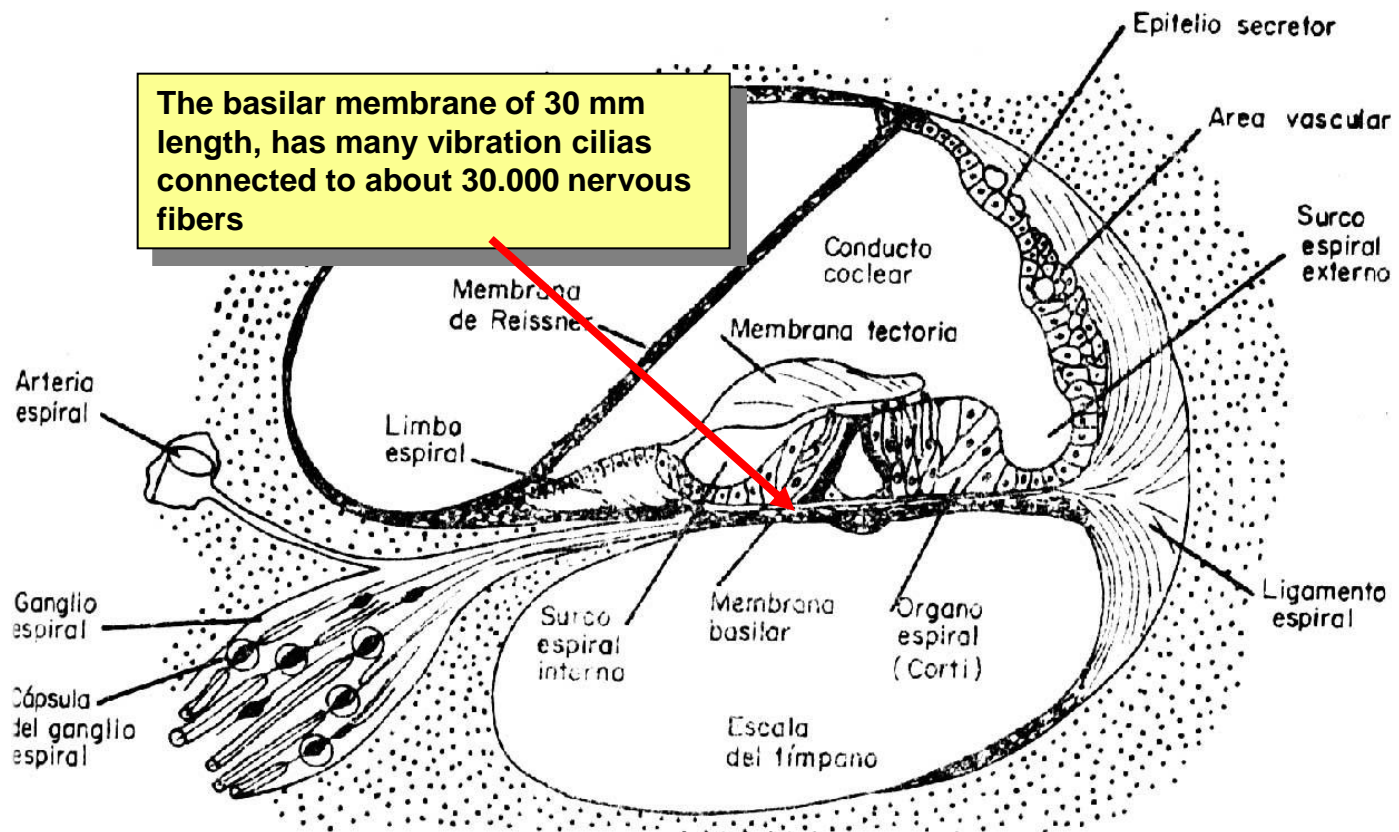
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**Nervous fibers  
goes to brain**

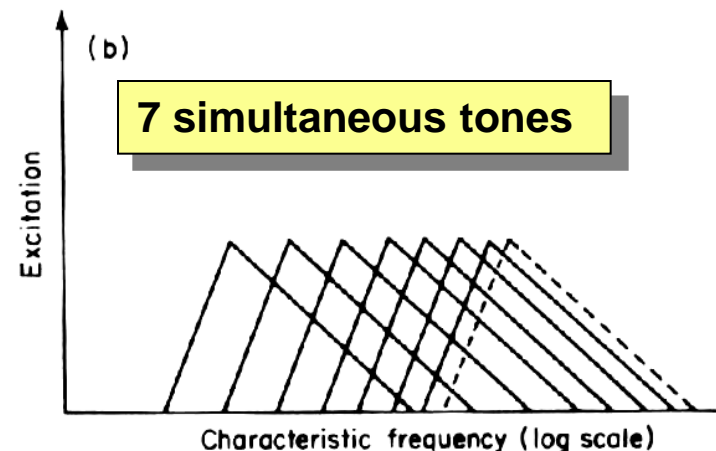
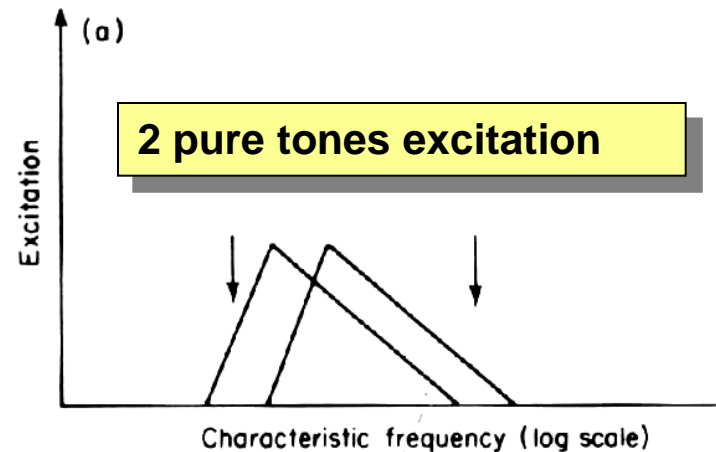



## The basilar membrane is located at the internal ear



## The standing acoustic waves produces excitation of the cilia. The movement activates the nervous fibers

- Each audio tone produces excitation according your audio frequency
- According to the audio frequency, different zones will be activated



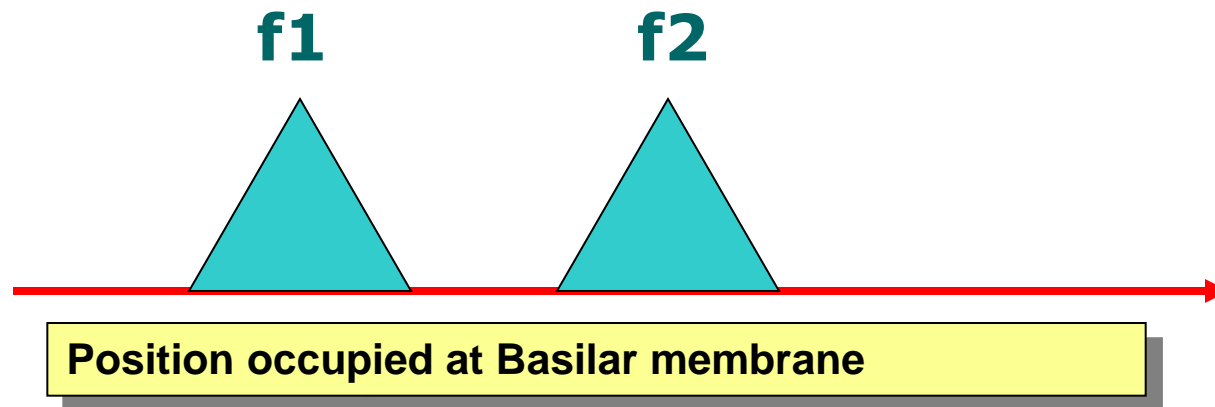


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**In order to get the auditory sensation of strength and loudness, it is necessary the excitation of almost all the basilar membrane**

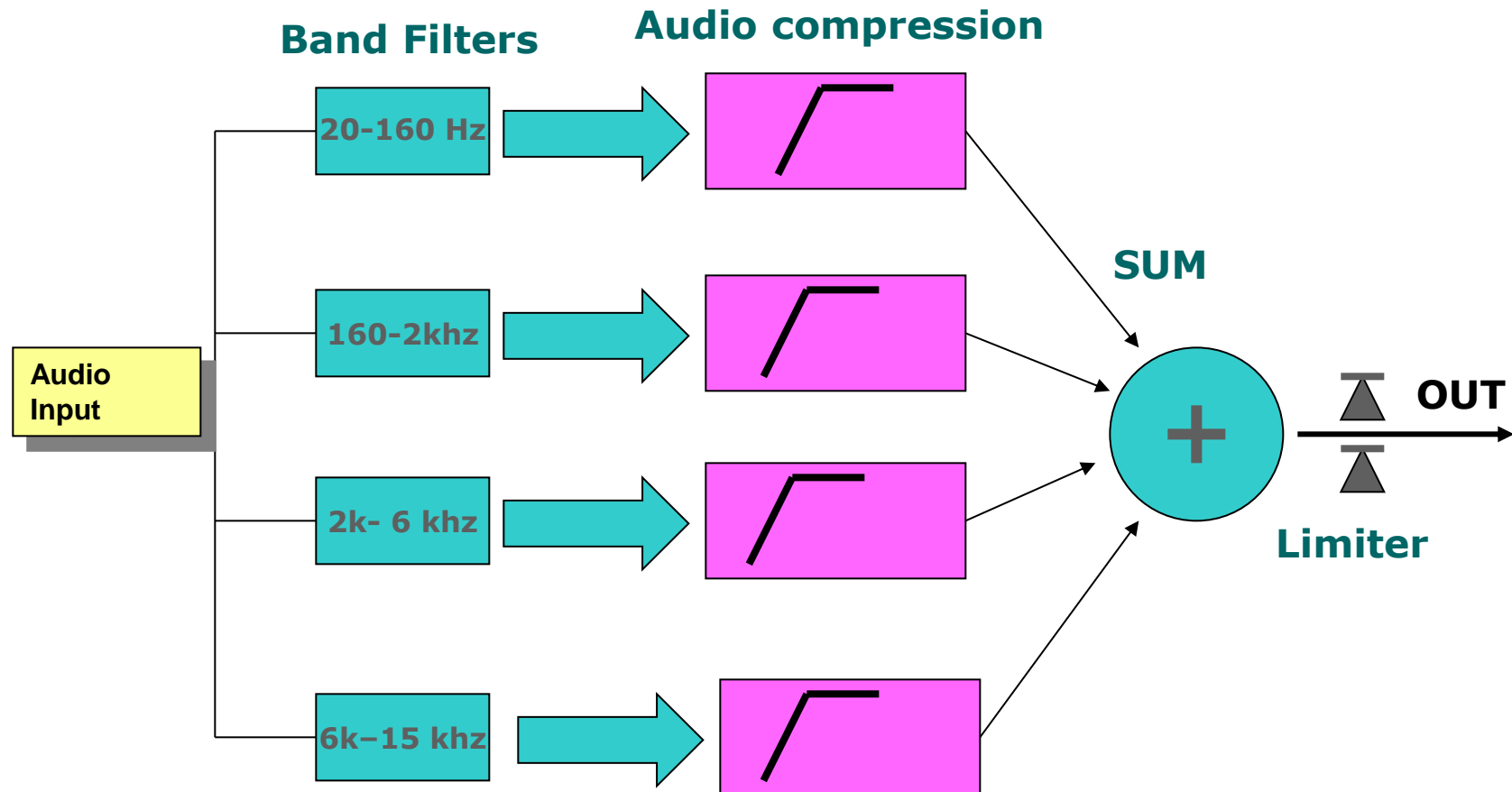
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**Unprocessed music and voice usually only gives excitation to a couple of bands**





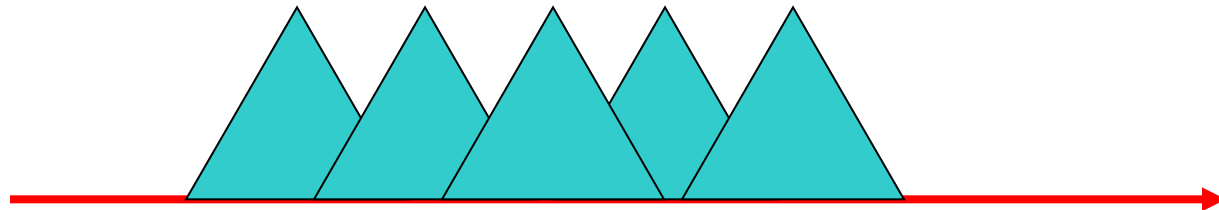
# Multiband audio processors elevates the sound energy of all audio bands by individual compression and digital limiting



**After audio processing all audio bands has high excitation at the Basilar membrane**

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**High basilar membrane excitation = loudness sensation**

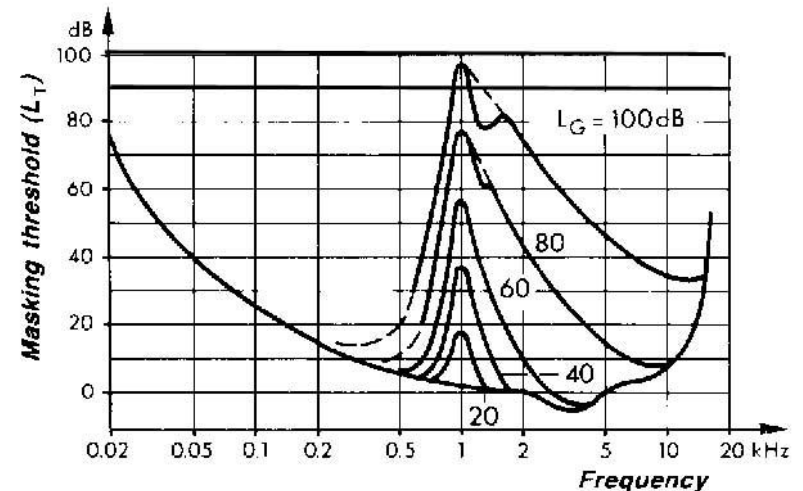
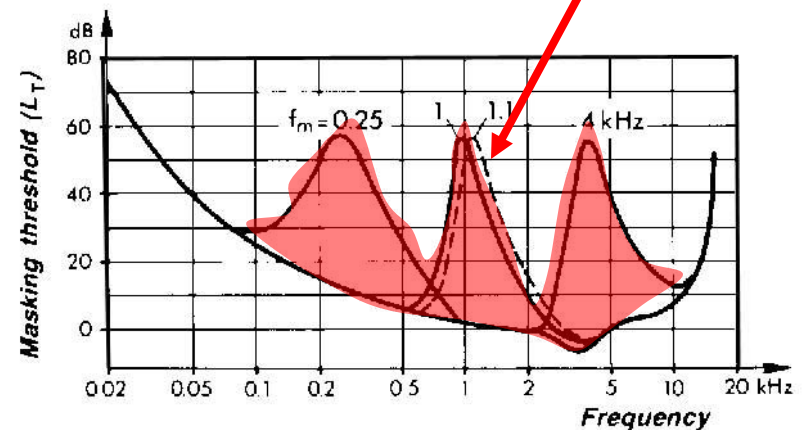


**Position at basilar membrane**

# Masking of audio bands

- Masking is the property of the ear to avoid the hearing of some tones due the presence of other tones at high level
- This property of the ear allows the processor designers to use high compression ratios without loss of the audio quality
- By example, masking allows using audio clipping without perceived distortion
- If you are interested in learning more, we recommend you the AES paper: "Multiband Audio Processing and Its Influence on the Coverage Area of FM Stereo Transmission", Oscar Bonello, Fellow Member Journal of the Audio Engineering Society, New York, March, 2007 ([www.aes.org](http://www.aes.org))

Masking of audio due to 3 pure tones of 0,25, 1 & 4 KHz  
Into red zone the sound is not perceived by the ear



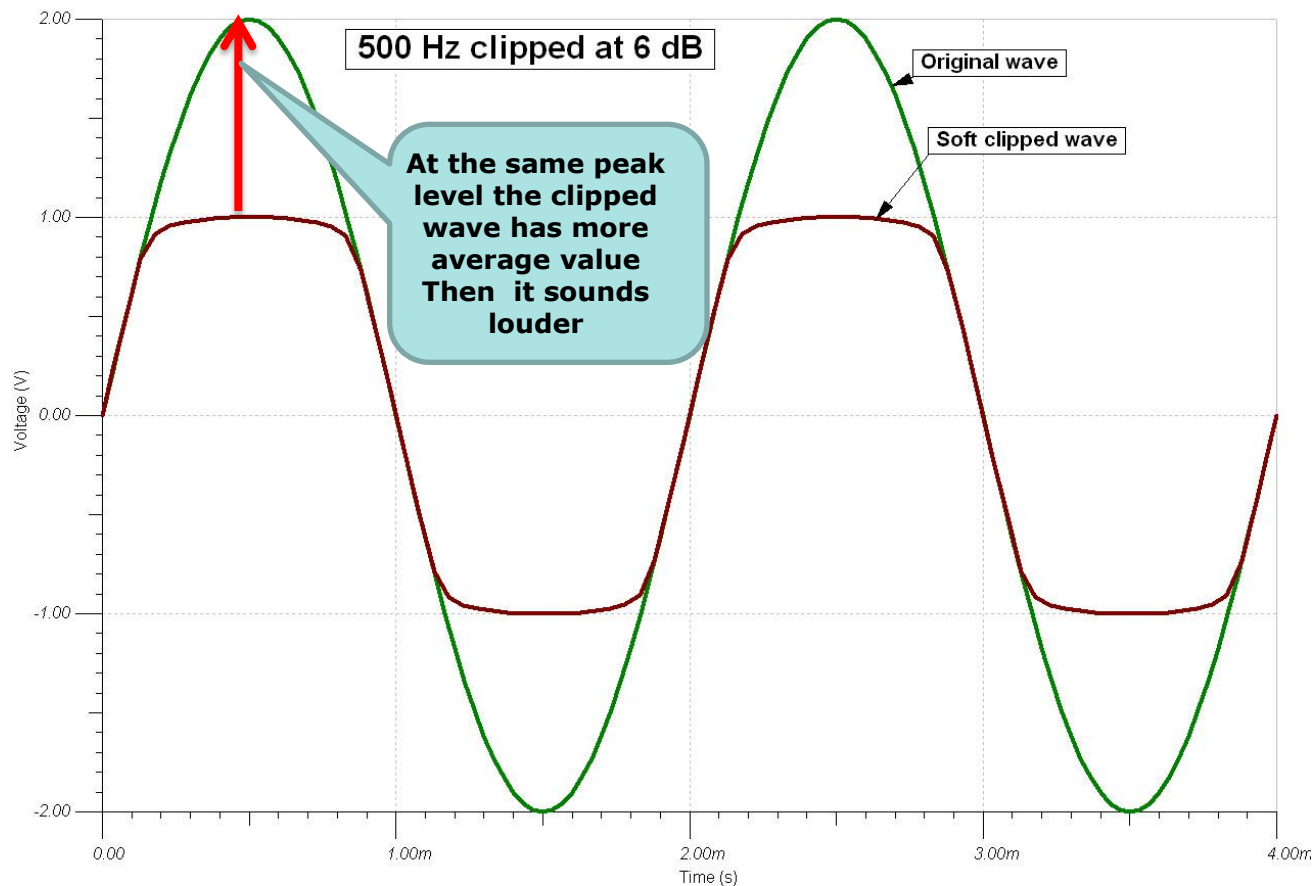
## Audio clipping analysis

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- The use of audio clipping greatly increases the transmitted power (more energy= more scope) because the cropped wave has more surface for the same peak value. But ... what about the distortion?
- We will perform an analysis of the audibility of the distortion, taking into account, as we always do, the masking that the tone produces
- To plot it, we will use the masking calculation equations proposed by: • *Terhardt et al, JASA, Vol 71, page 679, March 82*
- We will use a 84 dB SPL tone trimmed 6 dB. We will plot at the same graph the masking and distortion produced

# Example: the 6 dB clipping of a sine wave

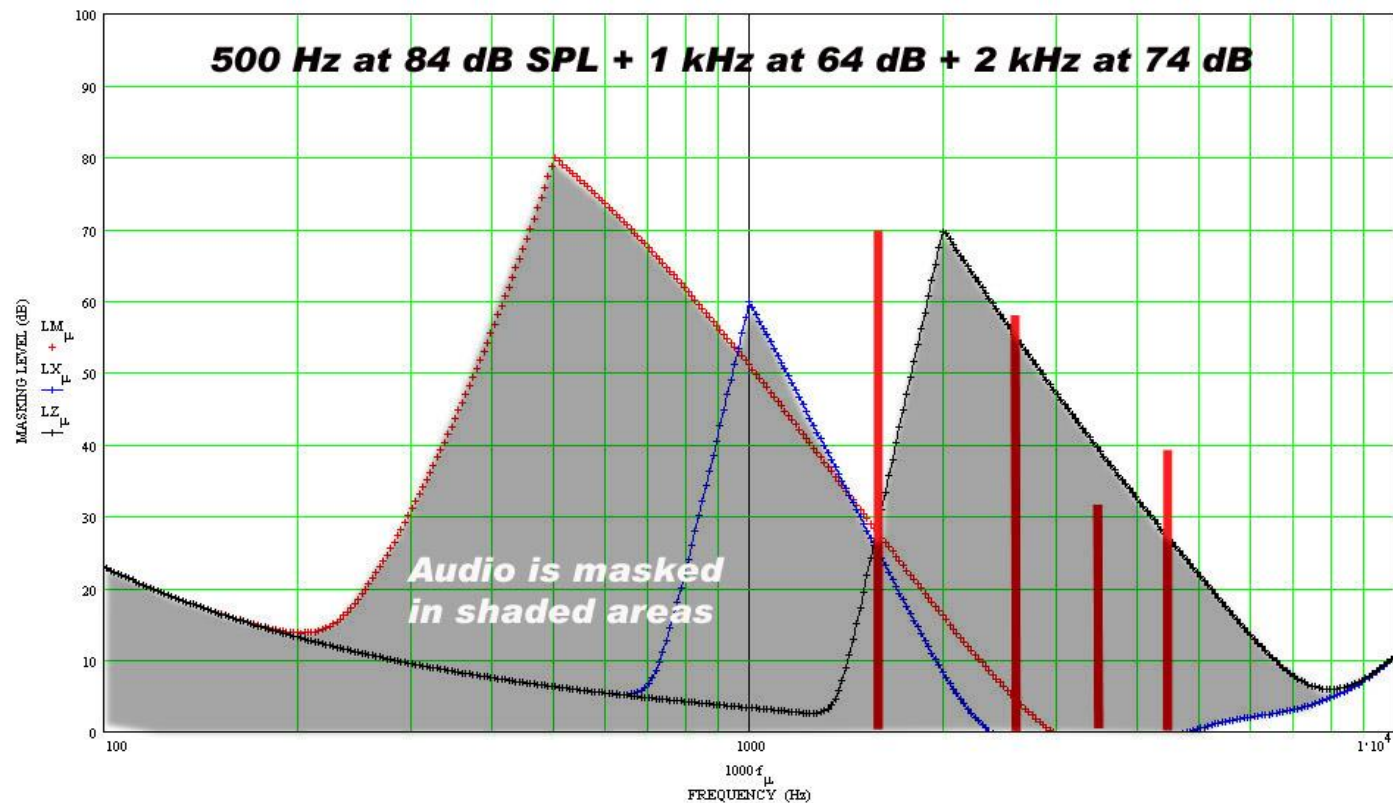
- 500 Hz sinewave at a 84 dB SPL level





# Perceived clipping distortion

When processing the audio are added other bands present in the music, albeit with less intensity (64 dB SPL in 1 kHz and 74 dB in 2 kHz) The harmonics 5 and 7 have stopped of being listened

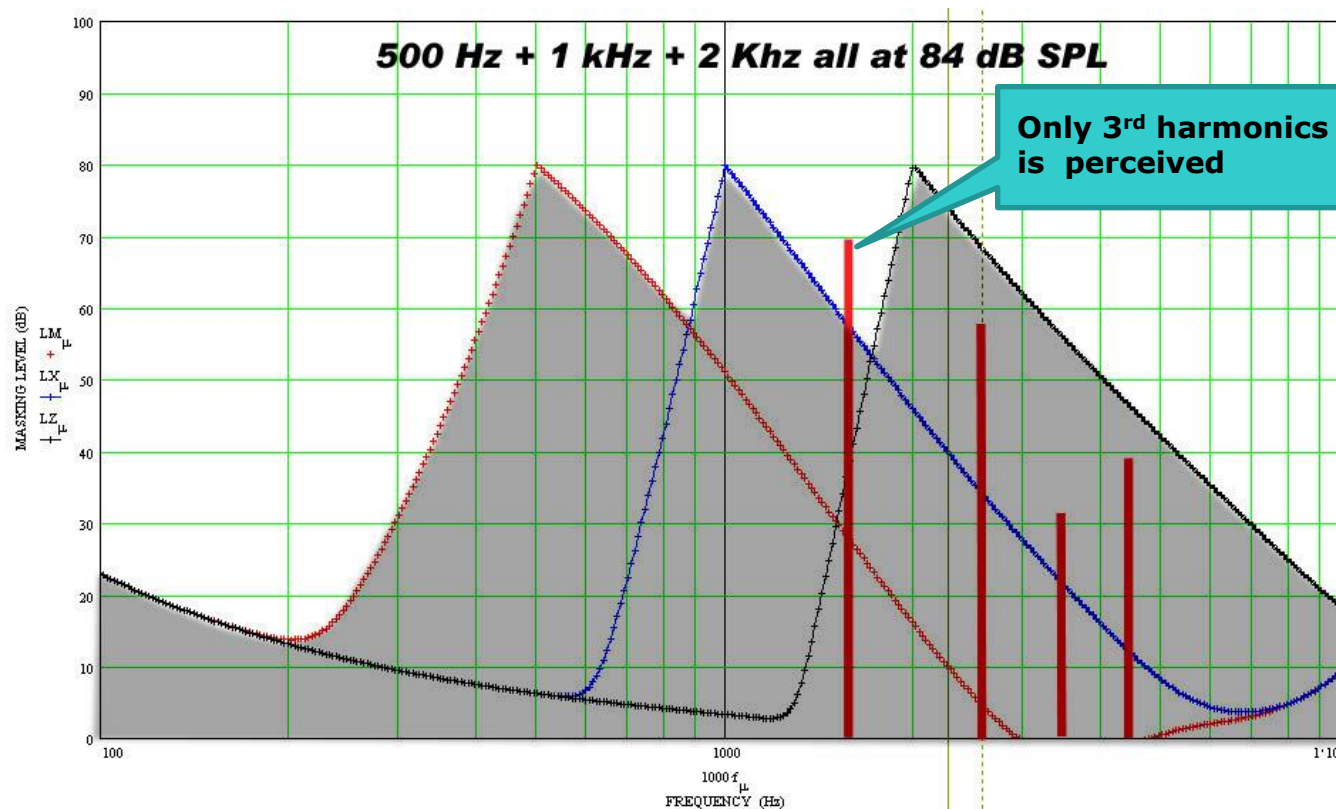




# Perceived clipping distortion

If the multiband processing level is increased, the 3 bands can achieve the same level of 84 dB, almost eliminating the perceived distortion, which is only of third harmonic, of low degree of annoyance.

The processor must do this computation several times each second to warranty a clipper free of distortion





# Peak symmetry

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- Another way to increase the transmitted energy (and therefore the perceived loudness and the scope of the transmission) is to get the symmetry of the human voice at the audio peaks . With the advantage that this does not produce distortion because the ear is almost insensitive to phase variations.
- Audio signals from the voice have strong asymmetries in their peaks due to the way the vocal cords and resonance cavities in the mouth work
- The asymmetry reduces the average modulation because a positive peak of 140%, for example, reduces the gain of compressors by 3 dB and causes the following negative peaks never to reach 100%
- In contrast, if the peaks were all equal in both polarities, this would increase the average modulation. This is what the peak symmetry tech does

# Peak symmetry

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- The first peak symmetry device was made for AM due to Leonard Kahnn in the USA in the 1960s. But its correction method was secret (it was built into an epoxy block) and never he offered evidence of its operation principles.
- Therefore, it was never intended to be used in FM until the publication of the paper: *New improvements in audio signal processing, Oscar Bonello, AES Journal Vol 24, # 5, USA, 1976*
- The paper of Mr .Bonello explaining the principles of symmetrization, and providing the concept of logarithmic phase rotation, led to a new generation of corrective technologies that could be used in FM
- Very shortly after the publication of the article in JAES, the new technology Kahnn-Bonello was an integral part of the best high-quality FM processors.
- Let's see how the phase rotation gets the voice peak symmetry

# Peak symmetry

Figure taken from O.Bonello, JAES June 1976

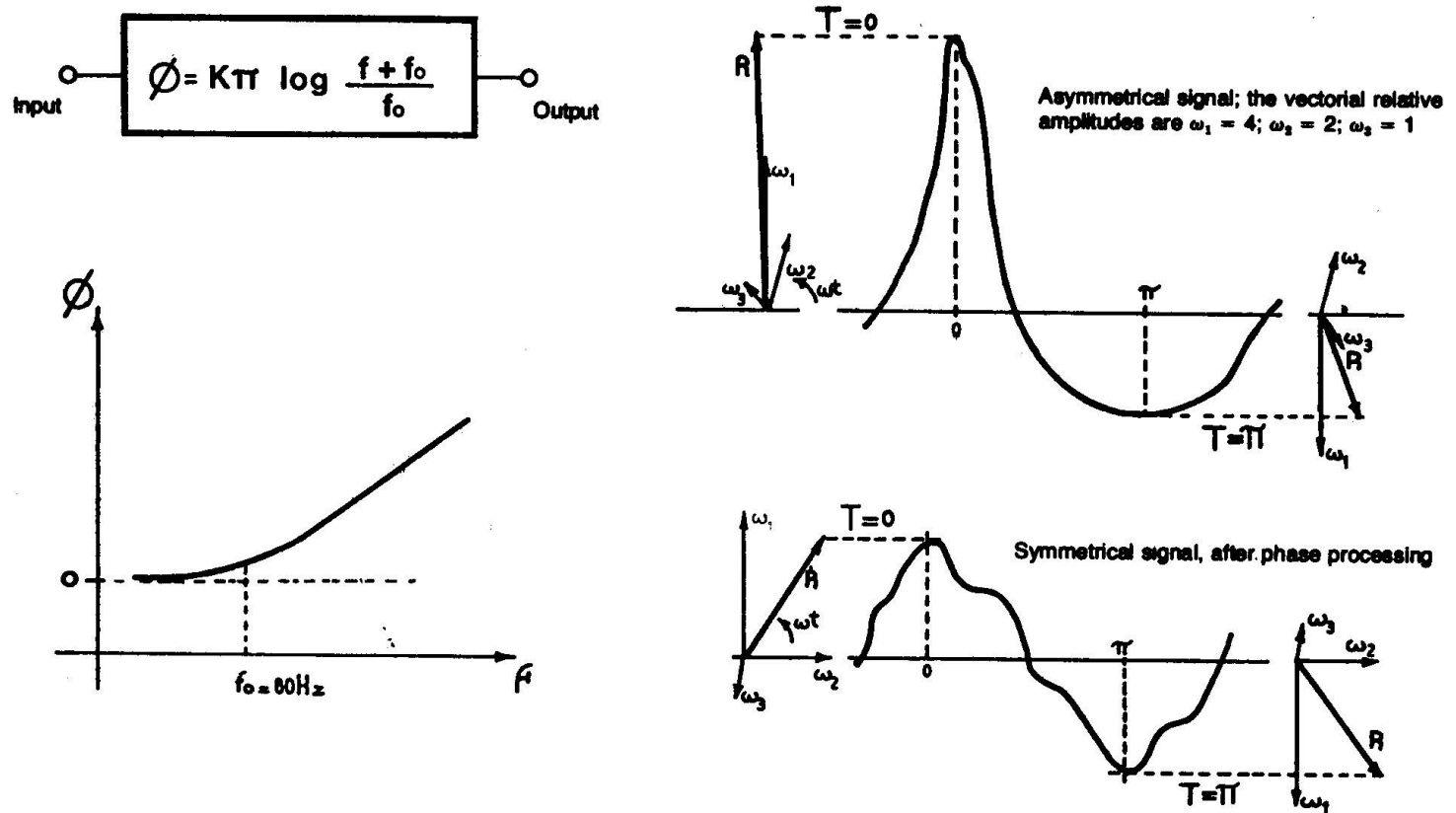


Fig. 2. Vector diagrams of asymmetrical signal before and after passing through phase networks.

# A good audio processor improves the sensation of audio quality

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- *We spend thousand of hours during 50 years, hearing on air AM & FM transmissions and digital streamming in order to get the best sound quality*



# A good audio processor increases the coverage area of AM & FM Radio Stations

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- Audio processing increases the energy of the audio signal
- The coverage area will increase between 50 to 80 %
- Not convinced ? Please read a scientific demonstration at:
  - O.Bonello, "New Improvements in... " JAES vol 24 Journal of the Audio Engineering Society (USA), June 1976 ([www.aes.org](http://www.aes.org))
  - O.Bonello, "Multiband Audio Processing...", Journal of the Audio Engineering Society, New York, March, 2007 ([www.aes.org](http://www.aes.org))
  - Or ask Solidyne for a copy of these papers





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Now you will see the best market  
audio processors...



# Solidyne 542 APC

## Audio Processing Core

The APC 542 is a processor from four to eight bands.  
Designed for those who need to have the best sound on the market  
It Includes RDS coder and FM Monitor with Modulation Analyzer



# Solidyne 542 APC

Audio Processing Core

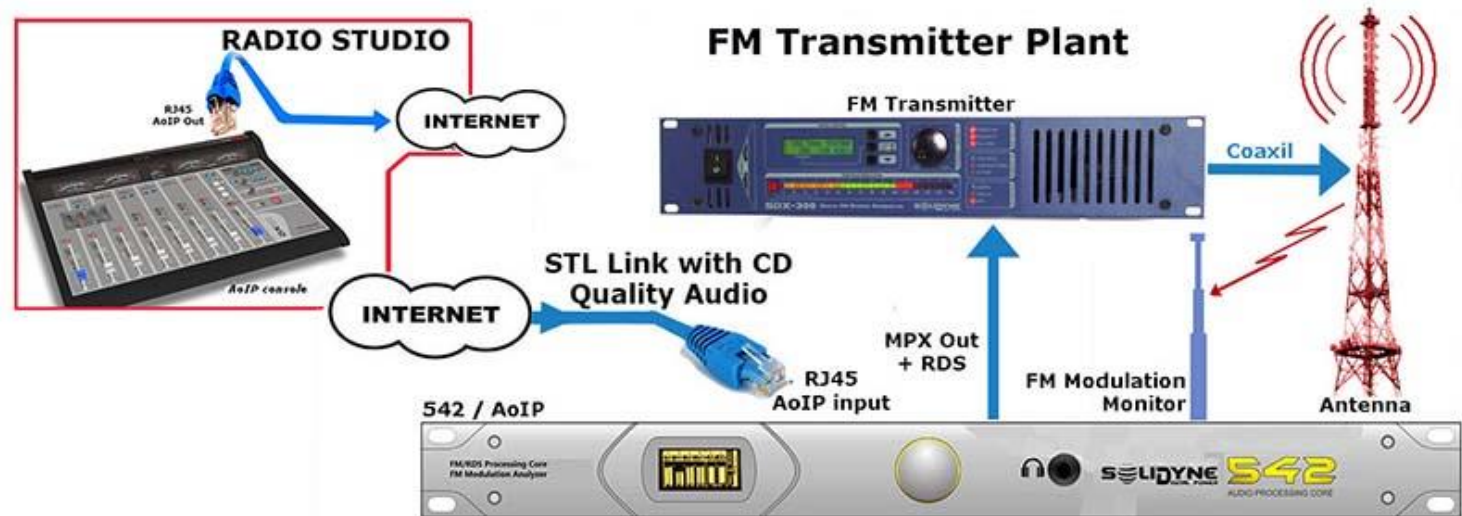
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- The 542 eliminates the need to continually change equipments to keep pace with technological advances.
- Because it is software based; You buy the equipment only once and update it for free for many years by changing the software from anywhere on the Internet and **without interrupting the transmission.**  
Only 542 brings you this advanced tech

# Solidyne 542 APC

Audio Processing Core



- The 542/AoIP allows you to connect with digital audio directly to the transmitting plant without having to purchase an expensive STL digital link
- RDS information will also travel over the Internet (or 5,8 GHz link)
- Sound quality and transmission parameters are measured by a Digital FM Modulation Monitor and are viewed in studies

# Solidyne 542 APC

## Audio Processing Core

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- *The processor 542 synchronized with its Modulation Monitor allows to compensate in module and phase the transmitter, coaxial cable and antenna to obtain an excellent feeling of stereo that no other processor offers*

Is it well known that the coaxial cable and the FM antenna produce standing waves that greatly reduce the stereo effect of your FM radio by introducing audio distortion  
(See paper by Jampro Antennas in AES 31st Convention Preprint 502)

For this reason, never a radio is heard on the air with the same good quality that is heard at the audio processor output...

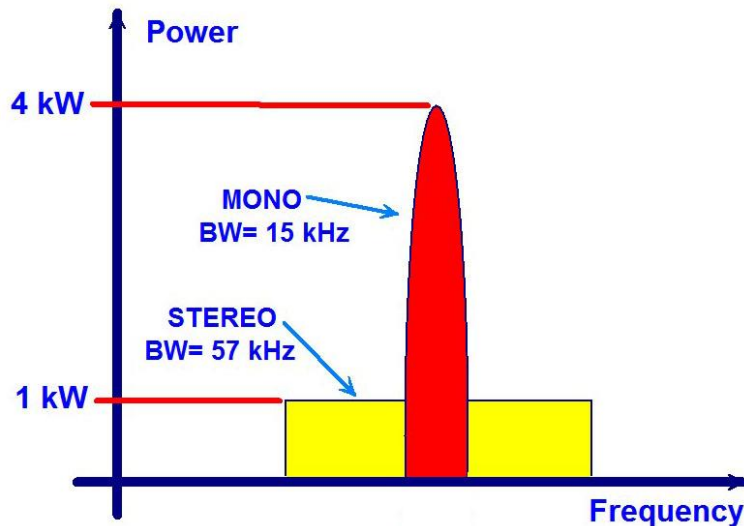
But now, for the first time in the history of radio, an audio processor includes a modulation monitor that operates synchronized with the transmitted audio signal. This allows to compensate the module and phase errors of the transmitter, coaxial cable and antenna, achieving a perfect stereo sensation

# Solidyne 542 APC

Audio Processing Core

## Another exclusivity of the 542:

You can achieve a big reach improvement by multiplying by 4 the RF radiated power at the Journalism programs , News, Sports and commercial announcements



An automatic programming system allows using MONO transmission during programs that use the human voice, without the audience noticing the change at all.

Only music is radiated in stereo.

The energy of the transmitter that in stereo scatters over a large bandwidth, in mono it concentrates in barely a quarter of the bandwidth, increasing 4 times its effective power in the air (*See the NAB Engineering Handbook*) This increases the scope and eliminates the interference of adjacent FM stations and multipath distortion .

Please hear the Demo at our website

# Solidyne 542 APC

Audio Processing Core



It is known that the optimal processors program preset IS VERY DIFFERENT for voice or for music.

Usually the radios end up using an "average fit" that is never perfect for none of both cases ....



But now when using the 542, always will have the optimum setting. Because when the microphone channels are open at the studio, at the transmitter plant the 542 is switched to the **announcer voice** mode. The same way at Music mode, the automation software can switch the 542 to different music styles settings. Only Solidyne allows the radio station workings this way.



## Audio Processing Core



From any PC or WiFi Tablet  
you can view and modify all  
of the 542 settings, from  
anywhere in the world

For the first time you can also view and measure sound quality, channel separation, dynamic range, the effective power radiated, etc.

No one can offer you this great leap that will allow you to win more audience

*If some technical failure is detected the 542 will send an email to your cell phone to know immediately about the problem*





# Low Cost audio processors

Low Power FM stations, University  
Radios, Voice Recording Studios

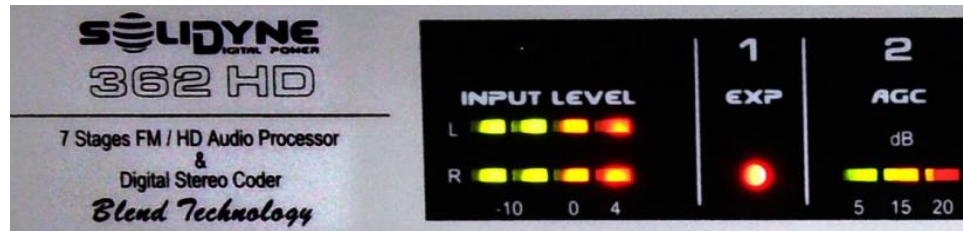
## AudiMax 362HD: the high end analog sound

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- For low budgets but audiophile ears, the AudiMax 362HD, 3 bands analog processor has seven processors inside the cabinet, plus stereo coder
- Very easy to adjust
- You do not need anymore an engineer to set the best sound. Controls are fool proof; you can not make mistakes



# AudiMax 362HD : the high end analog sound



- The 362HD has automatic adjustment of input level (AGC) that manages all console models...and even makes happy to the operators ...
- Is very easy to adjust (you will not need a technician)
- It has 2 MPX outputs and is ready for an optional plug-in with USB digital inputs & outputs for direct PC connection

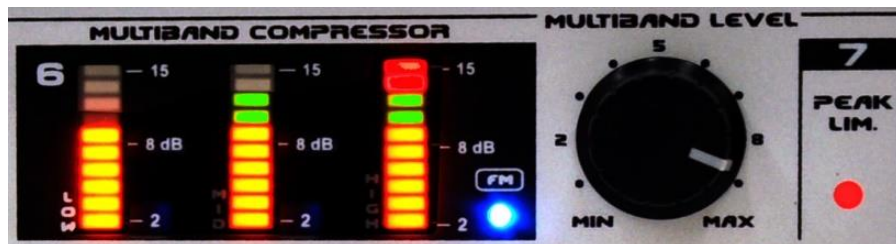


## AudiMax 362: the high end analog sound



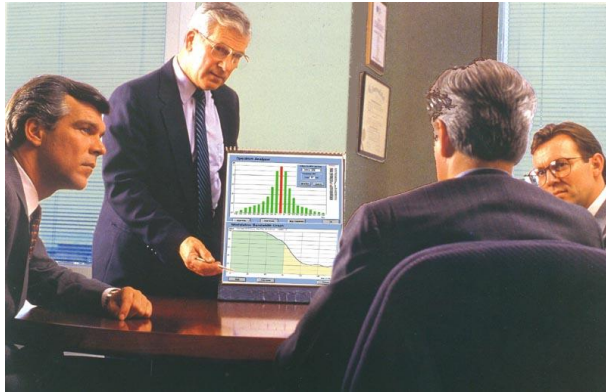
- The 362 offers the classic sound quality of High End analog equipments.  
The legendary sound of the vinyl records

But better... listen to the audio demo



**When you decide to purchase an audio processor  
you know that the brand name is very important...**

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**Then purchasing  
Solidyne is your best  
option due two  
important facts...**





# 1

**Research and publication of scientific papers  
is very important**

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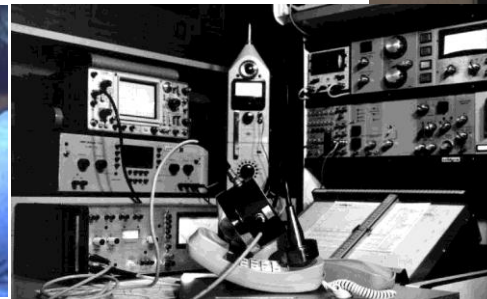
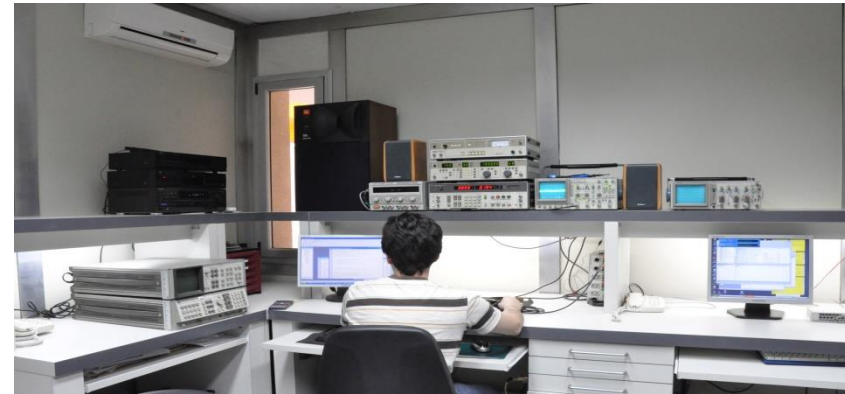
- If a company do not have published papers, then they do not research...

If they do not research... only can give you very poor imitations of the good equipments



**Solidyne made research during more than 50 years.  
We have many published papers about audio processing  
and 11 invention patents**

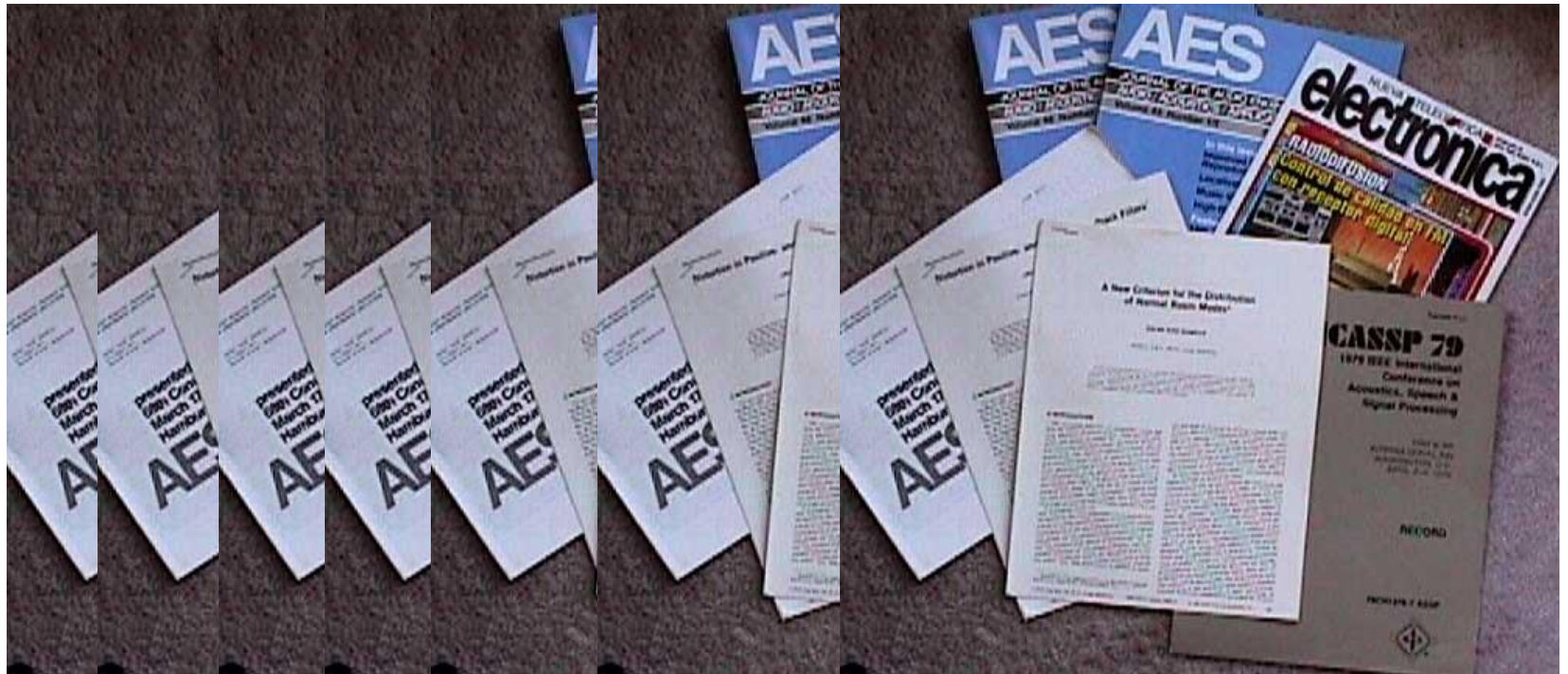
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# We have more than 150 papers and technical articles published

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## **2 Solidyne is the world most experienced manufacturer of audio processors**

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- We start manufacturing audio processors in 1968; 50 years ago
- We have about 7.000 units sold in 65 countries



## **Solidyne is the world most experienced manufacturer of audio processors**

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- You always must hear a processor before purchase it
- Solidyne provides you (at our WEBSITE) video and audio demos of its audio processors.
- All are recorded from the air in a real FM transmission at the city of Buenos Aires



# Audio Processing

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- Thank you very much for your time

If you are interested in learning more, we recommend you the AES paper: "Multiband Audio Processing and Its Influence on the Coverage Area of FM Stereo Transmission", Oscar Bonello, Fellow Member  
Journal of the Audio Engineering Society, New York, March, 2007 ([www.aes.org](http://www.aes.org))