

*COMMUNITY NOISE CONTROL:  
REVIVING A MORIBUND PROGRAM OR  
CREATING ONE ANEW*

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Education Programs  
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*Sic utere tuo ut alienum non laedas*

One should use his own property in such a manner  
as not to injure that of another

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*Quiet, adj.*

Unmolested, tranquil:  
free from interference or disturbance.

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## Sound vs. Noise

- Sound occurs when a vibrating body causes motion in a medium such as air or water.
- Noise occurs when this sound is unwanted.
- Legally, noise is often defined as sound which exceeds a standard set in a code.



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## Noise Impacts

- At high levels – Noise Induced Hearing Loss
- Elicits stress response - with biochemical, physiological and psychological impacts
- Noise-induced sleep loss results in reduced work efficiency, accidents, and a cascade of negative impacts
- The sick and the elderly are more sensitive to disruptive noise
- Noise disrupts the educational process and hinders language development

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## Noise Impacts

- Noise can obscure warning signals
- Can rise to the level of nuisance, annoyance
- Interfere with conversation and social interaction
- Deprive people of the peaceable enjoyment of their private property
- Can cause extreme emotions and behavior

*There are documented cases of noise-induced  
arson – assault – murder - suicide*

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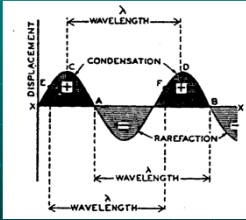
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## Properties of Sound

### - Intensity -



- Decibel (dB) - unit of measure and reporting
- Logarithmic scale
  - 3 dB = doubling of intensity
  - 10 dB = doubling of perceived loudness
- 0 dB is the average threshold of human hearing, not the absence of sound
- 130-140 dB is the pain threshold

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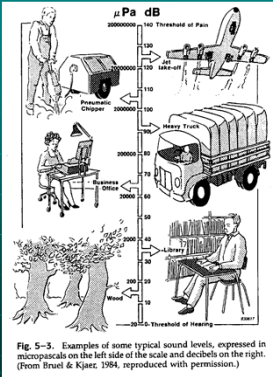
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## Representative Sound Levels




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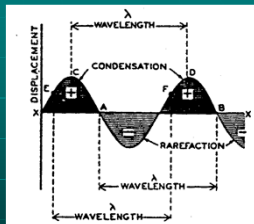
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## Properties of Sound

### - Frequency -

- Unit of measure – Hertz (Hz)
- Range of human hearing 20-20,000 Hz
- Humans are most sensitive to 1k-4k Hz
- Human perception of loudness is influenced by frequency
- Low frequency - less sensitive to sounds of low intensity, but are much more sensitive to high intensity sound.




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## Weighting scales

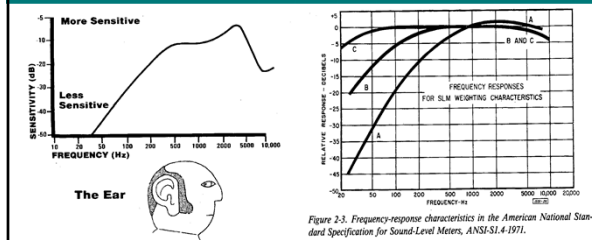


Figure 2-3. Frequency-response characteristics in the American National Standard Specification for Sound-Level Meters, ANSI-S1.4-1971.

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## Requirements for a Successful Noise Enforcement Program

- *The ordinance* – must be relatively simple, yet specific, so it can be clearly understood by both the enforcement and regulated communities
- *The enforcement agents* – must be comfortable with the technology and procedures of sound level measurement
- *Command and prosecution* – must support the program
- *The judicial system* – ideally, they should be consulted when drafting the ordinance; it's important that they are educated about the validity of the methods, and the issue of noise
- *The regulated community* – must be made aware that there is a credible and motivated enforcement program

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## The Noise Ordinance

- The ordinance must be technically easy to enforce.
- Deterrence is only achieved if enforcement actions are fairly regular.
- Self-policing extends the efficacy of the noise program.

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### When crafting a noise ordinance – keep legal considerations in mind

- A noise ordinance is not just a technical specification, it is also a legal document stating the government's intent, to be enforced through its police power.
- Crafting the ordinance provisions should be mindful of the opportunities and limitations this presents.
- Working with the municipal attorney will not only improve the product, but also vest them in its defense.

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### Nuisance Code vs. Performance Code

- Nuisance codes are flexible, but adjudication may be unpredictable due to the subjective nature of nuisance determination. Often, inspectors avoid enforcement of a vague code.
- Performance codes are inflexible, but adjudication is more certain. The investigation is precise and content-neutral. Challenges are less likely.
- Field enforcement of a nuisance code is relatively quick and easy. Performance code investigations may take more time, require training, and the purchase of sound measurement equipment.
- Codes based upon a "plainly audible" standard may avoid some of the problems associated with both nuisance and performance codes.
- Performance code violations may result in higher fines than nuisance code violations, therefore result in greater deterrence.

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### "Plainly audible" provisions

- Relatively easy to enforce by any investigator, thus expanding the available pool of investigators, and decreasing enforcement response time.
- Enforcement delayed may be enforcement and deterrence denied.
- Because it is easy to understand, it allows for simple self-policing, which can significantly extend the efficacy of a noise control program.
- Relatively precise and content neutral. The determination is not subjective.
- The standard has been repeatedly upheld in court, as meeting the requirements set forth by the Supreme Court to withstand constitutional scrutiny.

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## Ward v. Rock Against Racism 109 S.Ct. 2746 (1989)

The United States Supreme Court has held that:  
"To withstand constitutional scrutiny, government restrictions must be:

- (1) content neutral, in that they target some quality other than substantive expression;
- (2) narrowly tailored to serve a significant governmental interest; and
- (3) permit alternative channels for expression."

Amplification of speech is not constitutionally protected. It may be regulated through restrictions on time, place and manner.

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## "Plainly Audible" Standards are Not Vague

- A vague regulation is one that fails to provide a person of ordinary intelligence a reasonable opportunity to understand what it prohibits.
- One of the first courts to analyze the constitutionality of the Plainly Audible Standard, *Holland v. City of Tacoma*, 954 P.2d 290 (Wash. Ct. App. 1998), found that:  
"This ordinance has clear guidelines. A person of ordinary intelligence knows what it means for sound to be 'audible' at more than 50 feet away."
- This analysis is still valid. Recent cases are still finding that the plainly audible standard provides fair notice of the prohibited conduct and a clear guideline to those charged with enforcing it.

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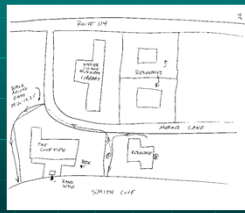
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## Regulatory Compliance – Field Enforcement Report

Shelter Island Noise Measurement Report			
Name/Address of Sound Source <i>THE GARAGE</i>	Date of Measurement <i>6/20/07</i>	City of Wash. <i>SHERRILL</i>	Time of Day <i>12:00 PM</i>
Frequency <i>125-2000 Hz</i>	Measuring Agency <i>OFFICE OF THE CITY ENGINEER</i>	Name and Title of Responsible Party of Abatement of Complaint <i>JOHN F. GIBSON, JR. CITY ENGINEER</i>	City <i>SEASIDE</i>
Weather and conditions of sound measurement <i>Clear, 65-75°F, 40-50% humidity, 10-15 mph wind from SW</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>
Distance and location of measurement <i>SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Direction and location of measurement <i>SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Direction and location of measurement <i>SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Direction and location of measurement <i>SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>
Description of measurement <i>NOISE MEASUREMENT PERFORMED AT THE SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>
Measurement of Neighborhood Residential Standard <i>NOISE MEASUREMENT PERFORMED AT THE SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>
Measurement of Total Sound <i>NOISE MEASUREMENT PERFORMED AT THE SHERRILL GARAGE, 100-1000 FT. FROM SOURCE</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>	Sound level <i>62-65 dBA</i>



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## Reviewing Sound Studies

- Sound studies may have several different purposes. The methodologies used are not necessarily the same, and are not interchangeable.
  - Regulatory compliance
    - Isolating the source under investigation - often short duration measurements; excluding extraneous sounds and removing ambient
  - Environmental Impact
    - Often analyzing long-term impacts, including all the sound sources in an environment; the required protocols may range from quite specific to somewhat vague
  - Permitting
    - A variety of protocols, specific to the regulation and/or jurisdiction; the requirements may be quite specific
- Make sure that the appropriate methodology was followed

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## Measurement Metrics

- Lmax – maximum sound level measured
- Lmin – minimum sound level measured
- Leq – energy averaged sound level for the duration of the measurement, which is noted
- LDN (or DNL) Day-Night Level; a 24 hr. Leq with 10 dB added at night
- L10 – sound level exceeded ten percent of the time
- L90 – sound level exceeded ninety percent of the time
- SEL (Sound Exposure Level) - sound energy from a discrete event normalized to one second

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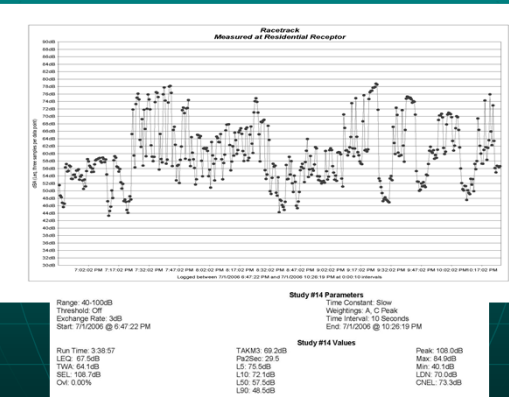
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## Interpreting data




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## Zoning

- Zoning seeks to protect public health, safety and welfare by regulating the use of land and controlling type, size & height of buildings, lot size & setbacks, etc.
- Greater interaction of different uses; greater likelihood of noise issues/complaints
- Noise issues are more abundant at the interface of differing zoning districts/uses with inadequate buffers
- List of Uses/Districts:
  - Industrial
  - Recreational
  - Commercial
  - Residential
  - Major Roadways/Railways/Airports
  - Agricultural

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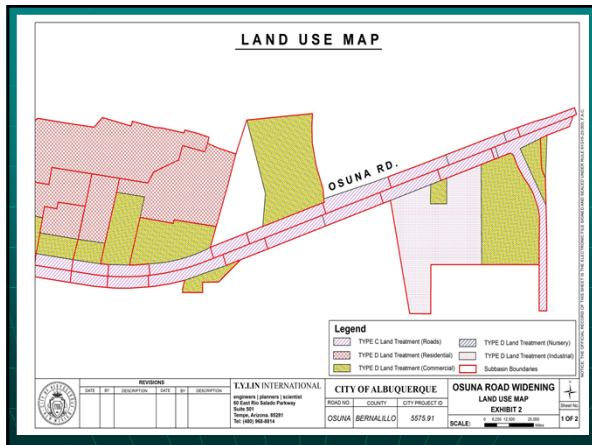
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## Reviewing Project Site Plans

- Does the project require rezoning or variances?
- Are there noise-sensitive receptors nearby? (residences, schools, etc.)
- What are hours of operation? (general operations, deliveries – trucking operations, property maintenance, etc.)
- What is the location of each noise source? (trash compactors, HVAC, transformers, loading docks, employee parking lot, truck-mounted refrigeration equipment, etc.)
- What noise standards apply, if any?

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## Reviewing Project Site Plans

### Mitigation Strategies

- Can the configuration of the building(s) shield the receptors?
- Require an adequate buffer area – increase distance between source and receptor
- Limit hours of operation
- Select quieter equipment
- Install barrier or berm to enhance buffer area
- Vegetative Buffer

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## Site plan shielding



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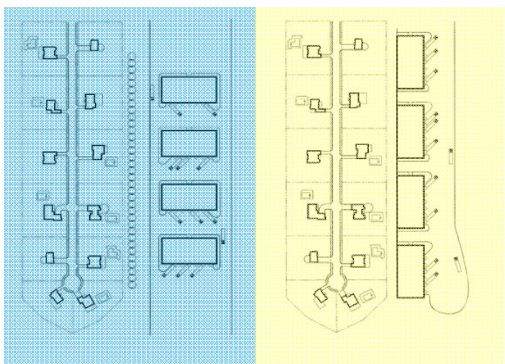
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## Facility Orientation and Proximity



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## Ineffective sound wall



To be effective it must, at least, break the line-of-sight

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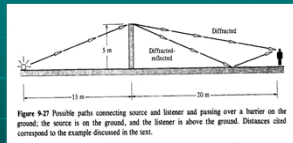
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Does a sound barrier stop sound for everyone outside the barrier?

- Absolutely not. There is a clearly defined “shadow zone” immediately ‘behind’ the barrier where it is quite effective. Beyond that, the barrier has little to no effect. That distance is several hundred feet, at a maximum.



**ACOUSTICS**  
An Introduction to Its  
Physical Principles and Applications  
Published by the Acoustical Society of America  
through the American Institute of Physics

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## Hours of Operation



Late night loading dock

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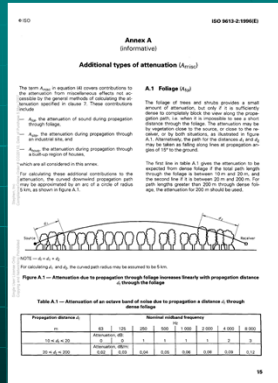
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## Vegetation does little to stop noise

- Is there a claim that a vegetated buffer will significantly reduce the off-site noise levels?
- Vegetation provides little sound attenuation, unless foliage is so dense you can't see through it.
- The lower the frequency of the sound, the less effective vegetation is at blocking it.
- Even if the sound travels through 250 feet of dense vegetation, it will only reduce low frequency sound by 3 decibels.

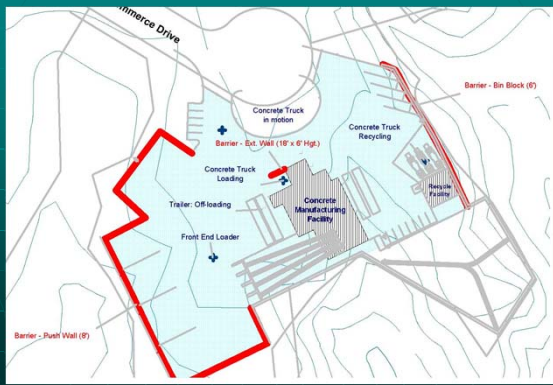
(Reference: International Standard ISO 9613-2  
Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation)



## CadnaA Graphic - Concrete Plant Overview



## CadnaA Graphic - Concrete Plant Detail



### What do you look for when reviewing a consultant's report?

- Does the metric used for reporting meet the requirements of the regulation or code?
- Was the meter set properly?
  - Reading range
  - Weighting (A, C, Z – typical to use A-weighting)
  - Time constant (Fast, Slow, Peak – typical to use Slow)
  - Exchange Rate (3dB environmental; 5 dB occupational)
- Does the meter meet ANSI standards?
- Laboratory certification and field calibration checks

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### Source Sound Levels

Are the data reasonably representative?

- Measurement specifics
  - What is the metric of measuring and reporting?
  - If the actual source is not measured, is the 'stand-in' reasonable?
  - Are the operational conditions properly represented?
  - If manufacturer's data is used, under what conditions was it collected?
  - Are all sound sources accounted for?
- Do the reported sound levels make sense?

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### Ambient (background) Sound Levels

Are the data reasonably representative?

- Measurement specifics
  - Location of measurement
    - Near the road? Next to an air conditioner?
  - Activity in neighborhood
    - Someone mowing their yard? High winds rustling trees?
  - Time of day, day of week, season
    - Rush hour? Friday? Crickets?
  - Inclusion of extraneous sounds
    - Occasional truck, airplane, dog barking, etc.?
  - If the source under investigation can not be turned off, the ambient measurement should be taken in an alternative location which is equidistant to the primary source of ambient sound.
- Do the levels make sense for the location?
- Proper determination of the ambient sound level can be critical!

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## Construction Noise

Can be high intensity but relatively short-term

May be addressed through one or more of the following approaches:

- Require the filing of a Construction Noise Management Plan
- Equipment-specific provisions
  - Sound level limit for each piece of equipment or operation
  - Incentivize the use of quieter equipment
- Site-inclusive provisions
  - Sound level limit for the construction site as a whole
- Time of day, day of week provisions
  - Curfew of activities

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## Construction Noise

Issues may be addressed at the Source, Path or Receptor

SOURCE – employ quieter or remediated equipment



Electric pavement breaker



No Racket Jacket

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## Construction Noise

PATH – employ a barrier between source and receptor



Shipping (Conex) containers  
- longer term -



Sound barrier curtains  
- movable -

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## Construction Noise

RECEPTOR – in this matter, it's all about communication

- Establish channels of timely communication
  - Agency
  - Prime contractor
- Consult about duration, times, noisiest operations
- Manage expectations

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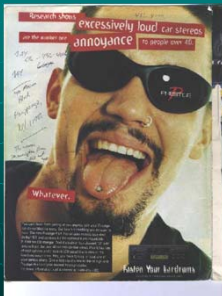
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## Deliberate Acts Car Stereo Advertising



You can't hear them yelling at you anyway with your Prestige car stereo blasting away. But here's something you do want to hear. The new Prestige P-84 has an auto reverse tape deck, Dolby NR, and controls for the optional trunk mountable P-1000 mm CD changer. And it's built-in four channel 120 watt amp will put the over 40 set into cardiac arrest. Plus it has lots of cool options and a back lit LCD panel that makes all the functions easy to see. Hey, you have to keep at least one of your senses sharp. Give a listen to the whole line of high-end Prestige Audio at your nearest Prestige dealer. For more information, call Audiowox at 1-800-645-7750.

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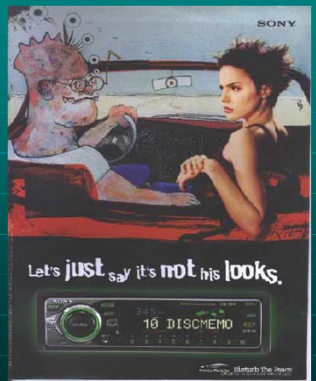
## “Disturb the Peace”

Sony has trademarked the term  
“Disturb the Peace”  
for their mobile audio systems.

“XPLODE – All-new ways to Offend”

“Disturb the peace 24 hours a day  
with XPLOD stuff”

**Manufacturer's Info:** Sony dares  
you to pour on the power and  
disturb the peace with their XS-W  
series of 2-way speakers.



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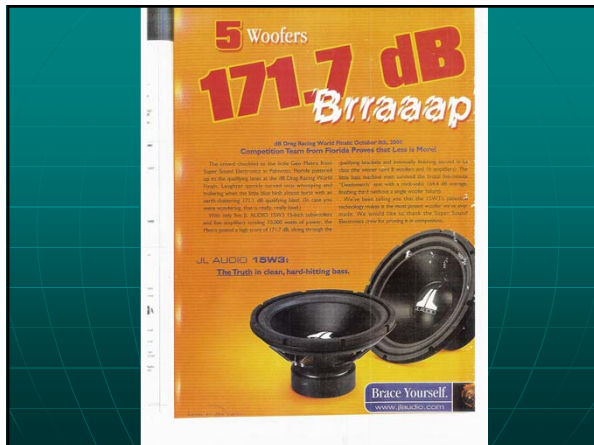
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