NOISE/NEWS INTERNATIONAL

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2021 December

A quarterly news magazine and online digital blog published by I-INCE and INCE-USA

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A quarterly news magazine in PDF format with an Internet supplement published by I-INCE and INCE-USA

Volume 29, Number 4 **2021 December**

Features

Departments

Cover Image: The Scottish Event Centre in Glasgow, with the distinctive Armadillo Building

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NOISE/NEWS INTERNATIONAL

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I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its blog. I-INCE has an active program of technical initiatives. It currently has fifty-one member societies in forty-six countries.

INCE-USA

The Institute of Noise Control Engineering of the USA (INCE-USA) is a nonprofit professional organization incorporated in Washington, DC, USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE-USA publishes the technical journal *Noise Control Engineering Journal* and with I-INCE publishes this quarterly magazine and its blog. INCE-USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE-USA members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an associate of INCE-USA and receive both this magazine and *Noise Control Engineering Journal*.

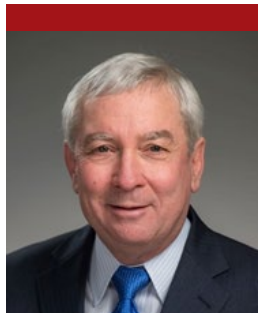
NNI and Its Online Supplement

www.noisenewsinternational.net

The PDF and blog versions of *NNI* allow for links to references, articles, abstracts, advertisers, and other sources of additional information. In some cases, the full URL will be given in the text. In other cases, blue text will indicate the presence of a link. The *NNI* blog contains additional information that will be of interest to readers, such as the following:

- The current PDF issue of *NNI* available for free download
- Links to previous PDF issues of *NNI*
- An annual index of issues in PDF format
- A conference calendar for upcoming worldwide meetings
- Links to I-INCE technical activities and I-INCE technical reports

From the President of I-INCE: INTER-NOISE 2022 and the Future of Congresses



Bob Bernhard

Greetings! I hope all of you are safe and healthy. The challenges of the pandemic continue to cycle up and down. I hope this has not caused you undue stress.

In this note, I will focus on news about the INTER-NOISE congress series.

We have now had a chance to analyze the feedback about INTER-NOISE 2021. I repeat again my sincere appreciation to Congress President Raj Singh, the Organizing Committee and INCE-USA for the excellent job they did converting the format to a remote congress and all of the significant work and expense that went into making the congress synchronous (live for all attendees) and to explore how to include networking and social elements into a virtual congress. The post-congress surveys indicate that our noise control engineering community still prefers an in person format but a substantial number of survey respondents appreciate the opportunity to attend virtually. This diversity of preference makes sense given the different career stages of members of our community and the trade-off we all must make between travel cost and the opportunity to network with our international colleagues. The I-INCE Board of Directors is continuing to consider new approaches of presenting INTER-NOISE to address the diverse preferences of our community.

Preparations for INTER-NOISE 2022 are well underway. If all goes according to plan, the Congress will be held in Glasgow, Scotland from August 21 - 24 at the same venue that recently hosted the COP26 Climate Summit 2021. Given the success of COP26, we are optimistic that we will be able to have a nearly normal in-person congress. However, the 2022 Organizing Committee is making contingency plans in case we face travel challenges next August. The working assumption is that a significant part of our community will be able to attend in person. If travel is a challenge for another significant part of our global community, say due to inter-continental travel restrictions, the Organizing Committee is looking into some form of hybrid congress. Let's hope this contingency isn't necessary.

INTER-NOISE 2023 will be 2023 August 20 - 23 in Chiba, Japan. The Organizing Committee is progressing well with planning for the 2023 Congress. All preparations are on schedule. Wouldn't it be great if they had no pandemic related challenges!

And lastly, it is my pleasure to announce that INTER-NOISE 2024 will be held 2024 August 25 - 28 in Nantes, France. The I-INCE Board selected the Nantes venue from a group of excellent European proposals. The Organizing Committee has begun planning. The venue and preliminary program look very interesting. I hope you will all plan to attend.

I wish you all the best for a safe, healthy and prosperous 2022.

Bob Bernhard
President, I-INCE

NNI INCE-USA President's Message

By Michael Bahtiarian – Nov 25, 2021

Another year has passed as your INCE-USA President with one more year left in my term. I closed last year by "Wishing Everyone Happy Holidays and COVID-Free 2021", but it seems like we still have the effects of COVID-19 all around us. Yet, INCE-USA continues to be financially stable, a leader of the noise control community, and hopefully, a vital part of your profession.

Starting right at the top, I am happy to announce that Dr. Judy Rochat of Cross Spectrum Acoustics, Inc. is our President-Elect and will take over as president in September 2022. It might seem like I am counting the days, but that is not the case. I bring up Judy's presidency, because I am happy to hand the reins over to a younger person, who is well respected, dedicated member, and a woman. Judy will be only the third female of the 42 past presidents. Those previous female presidents were Nancy Timmerman and Dr. Patricia Davies, who are both still active within INCE-USA.

Next, I would like to thank all the officers, directors, and staff at INCE-USA for their tireless work this past year. This includes our management office team at Virtual, Inc. We would be lost without our eyes, ears and hands, Caitlin McAuslin. She has been there for INCE-USA on many critical occasions. I also want to thank John Lessard for account leadership and guidance. While not paid staff and one of our most respected members, I cannot fail to recognize Joe Cuschieri, our Executive Director. His full-time job is with Lockheed Martin, yet he finds time to dedicate many hours per week to the operation of INCE-USA. Thanks, Joe, for your continued leadership as ED!

Team from Metropolitan Acoustics with the first INCE-USA Member's Choice Award, (l to r) Stephen Leiby, Felicia Doggett (President and holding the silver bowl award), Maeve Cantwell, and Scott Hulteen.

Conferences have been the biggest challenge during the COVID years. As you may all know, *INTERNOISE 2021* was supposed to be held in Washington DC this last August, but instead was moved to online. It marked the 50th anniversary of *INTERNOISE*, and was a great success as a virtual event. I would like to thank Chair Raj Singh and the rest of his committee for careful planning and finding unique ways to make a virtual event fun and engaging. We are now looking ahead to *NOISECON 2022* which will be in Lexington Kentucky from June 13 to 15 on the University of Kentucky campus. Chair David Herin is working on making this a full in-person event and we hope you will plan to attend. Also, David can still use help so if you want to be a part of NC22 please reach out to myself (mbahtiarian@acentech.com) or David (david.herrin@uky.edu).

In other big news, INCE-USA awarded the first member's choice award to Felicia Doggett and her firm Metropolitan Acoustics for the One Riverside Pool Isolation project (see photo of Felicia and her team with the award). VP of Awards and Honors, Dana Lodico, also awarded the first student scholarship to Sunit Girdhar who is studying at Michigan Technological University. We have to thank the INCE Foundation for financial support of this scholarship as INCE-USA and the INCE

foundation equally contribute to this $6,000 scholarship.

On other fronts, VP of Board Certification, Paul Burge, and the Certification Board are closing out the re-certification period for all of us "Board Certs". If you were originally Board Certified in 2017 or earlier and have not submitted the re-certification spreadsheet form, please work on this over your holiday break. The deadline is December 31, 2021. Also, I would like to report that we had 8 people sit for the INCE Professional Exam held this August in Minneapolis, MN and are currently being evaluated for Board Certification.

All of our other programs are buzzing along. NCEJ articles can now be published (if elected by the author) with open access. Thanks to NCEJ editor Jim Thompson for making that happen. Eoin King left Hartford, Connecticut and moved back home to Galway, Ireland where he continues to be our Noise News International (NNI) editor. Our Noise Control Engineering courses continue to be offered by three dedicated instructors: Tyler Dare, Andrew Barnard, and Corinne Darvennes. Thanks to all of these members for their significant contributions to INCE-USA.

Moving ahead into 2022, we have two exciting new programs that should be offered. One is an INCE-USA sponsored seminar in room acoustics which we hope to offer with CEU credits. The second program is a "sound-technician" certification program. This program is designed for non-engineering staff to have formal training and certification in things like making interior and exterior sound measurements to certain standards. Stay tuned for both new programs.

Finally, I would like to close out by saying we are in the first year of our new corporate calendar-year that runs from October 1st to September 30th of each year. This allowed us to have our first Annual General Meeting (AGM) at our yearly conference (this year was INTERNOISE). In the past the AGM was held during our winter board meetings and no members would attend. As I have said in the past, we hope the holding INCE-USA AGM at our US-based conferences will bring about greater member engagement.

What a year 2021 has been for everyone, and I truly hope that each of you and your families are healthy, safe, and employed! As I said last year, INCE-USA's successes are achieved only due to efforts from many volunteers, and will ask; How can YOU contribute?

Wishing Everyone Happy Holidays and all the best in 2022,
Michael Bahtiarian, INCE Bd. Cert.
INCE-USA President

I-INCE Young Professional Congress Attendance Grants For INTER-NOISE 2022

The Board of the International Institute of Noise Control Engineering (I-INCE) anticipates awarding 20 I-INCE Young Professional INTER-NOISE 2021 Congress Attendance Grants (YP Grants). Each I-INCE YP Grant has a value of 600 Euro.

- INTER-NOISE 2022 Congress is expected to be in person. Please complete the form(s) that are posted here (which assume in-person congress mode). The grant award committee(s) will determine the extent of the award and inform you accordingly when the award is made.
- Please carefully read the following narrative to determine eligibility and ground rules of each award.
- A student may apply to several travel awards but will receive only one award (I-INCE Young Professionals Award) to attend INTER-NOISE 2022. If the student is a potential recipient of two or more travel grants, only one (the most financially beneficial) award will be given to that student.
- Please continue to visit the website for latest updates including the abstract/ paper deadlines as the forms will not be updated. Share the information posted to ensure everyone can take advantage of these great opportunities.
- Additional Details on the I-INCE programs for students and young professionals will be described on the Inter-Noise 2022 website

Who is eligible?

Candidates can be either undergraduate or postgraduate students, postdoctoral, or young acousticians or noise control engineers working in industry. Candidates must be relatively early in their professional careers (typically **less than 10 years of active career**). Preference will be given to students.

Prior I-INCE grant winners are not eligible for the I-INCE Young Professionals Grants.

How do I apply for an INTER-NOISE 2022 Grant?

Deadline: Same date as the INTER-NOISE 2022 Abstract Deadline

Check the INTER-NOISE 2022 Website for latest information on Abstract Deadlines.

1. First, submit your abstract using the INTER-NOISE 2022 abstract submission portal. Instructions are given on the website: https://www.internoise2022.org/
2. Record the paper or abstract number given to you upon submission of the abstract
3. Download the Young Professionals application form in MSword format here or in PDF format here
4. Rename the file with your abstract number: #####_IN22_YPG_ YourLastName.pdf
5. Complete the YP grant application. Follow instructions given in yellow section on the form.

Describe research in only one paper for the YP grant process, even if you anticipate having multiple papers in the Congress.

The research described should relate to the paper that you will submit associated with the abstract reproduced in the application.

These are highly competitive, prestigious awards, so please follow instructions and edit your application carefully before submitting. If you do not follow instructions, you will not receive an award.

1. Required information and a copy of the submitted INTER-NOISE abstract.
2. One page that provides more details on theory, experiments, results or conclusions, as relevant to the paper that will be submitted for the abstract given on Page 1.
3. One-page professional biography of the applicant.
4. A copy of the applicant's passport or comparable (government issued) identity card.
5. (optional, but highly desirable) A recommendation or funding support letter from your supervisor or an officer of your local I-INCE member society. A list of member societies can be found at: http://i-ince.org/membership.php
6. Combine the above information into a SINGLE PDF file and upload to this I-INCE web site Young Professionals Section using the file upload portal below.

Getting to Know You: Luigi Maffei

Quick Stats

Name: Luigi Maffei

Location: Naples, Campania, Italy

Years with I-INCE: I have been a member of the Board of Directors of I-INCE since 2010.

Born & Raised: In Naples, a beautiful and eccentric capital of South Europe. Very special was the three years' permanence in Australia with my family in the 1970s during my High School.

Education: BS and MS in Mechanical Engineering from University of Napoli (1980), PhD in Technical Physics (Acoustics) from University of Ancona (1986)

Favorite music artist: Cat Stevens (Yusuf)

Favorite pastime/hobby: Olive oil and Red wine modest production in a small family farm.

Favorite sports team: Soccer Team Napoli

Career

What is the most important part of your job?
Transferring Innovation technology in and out the University of Campania "Luigi Vanvitelli". The University has launched an important program that contemplates the building of new vanguard laboratories and the support for researches in the field of green technologies and i-health.

What might people be surprised to learn about your job?
At the Department our research group is formed by many researchers and PhD candidates with background in engineering, architecture, design, psychology, medical sciences. We investigate, with an interdisciplinary approach and specific new facilities, the human reactions to multisensorial environmental stimuli.

What's the best part about working with I-INCE?
My first real contact with I-INCE was only during INTERNOISE 88 in Avignon. It was the first international conference I could join as young researcher and I remember the strong sensation to be fully immersed in a friendly and inspiring world: lots of people to exchange ideas with and to whom your technical and scientific results could be presented, interesting lectures given by experts from all over the world, new equipment and materials visible in the exhibition. Since then, I experienced this strong sensation at each of the following INTERNOISEs, probably because the Congress structure was able to evolve itself following the new times, the new needs of the society and the expectations of the noise control community.

I-INCE makes all this possible thanks to the search of new topics with a relevant impact for the industry and for the community, thanks to the invitation of well-known international experts for keynote lectures, and thanks to the use of the most updating technologies.

What do you want people to know about I-INCE?
The I-INCE Board of Directors, but also the CSC Congress Selection Committee, the CEC Congress Evaluation Committee, the FCTP Future Congress Technical Planners, and all other organisms that act in favor of I-INCE are formed by people that are member of National Societies member of I-INCE. Thanks to these people and to the local organizers, every year an INTERNOISE Congress will be run. In parallel other technical and editorial activities are organized and the young professional program (with grants, workshops, practice schools) is managed. They all work on a voluntary basis in a collaborative, and most important, in a friendly and open atmosphere. This is an invitation to other members to be part of this atmosphere offering their availability to help I-INCE in its activities.

Personal

If you'd like, tell us about your family?
My wife and I have two daughters. The first is a medical doctor for an international non-profit organization. The second is a labor lawyer. My missing brother's son is part of our family. He is seven years old and he is very ironic.

What would you do if you couldn't be what you are now?
I state that the work I do is really beautiful, and I feel very lucky. However, as I often emphasize, I am attracted to manual work and in particular to that done by farmers to whom all my admiration goes. Currently as a hobby I dedicate myself to a modest production of olive oil and red wine, but in the future, I could increase all this. I could also buy the most "silent" tractor in the world!

Best book you've read recently or movie you've seen recently?
I loved the story and the movie that I have seen very recently "A Beautiful Day in the Neighborhood" with Tom Hanks and Matthew Rhys.

INTER-NOISE 2022 Congress: Call For Papers

On behalf of the INTER-NOISE 2022 Congress organization, we invite you to submit an abstract for the 51st International Congress and Exposition on Noise Control Engineering that will be held in Glasgow, UK on August 21–24, 2022.

INTER-NOISE 2022 will be an on-site congress in Glasgow and attendees can look forward to a full technical program at the Scottish Events Campus, supported by social events in the city and surrounding country.

The congress is organized by the Institute of Acoustics of the UK, I-INCE and the UK Acoustics Network (UKAN).

The congress's theme is "Noise Control in a more Sustainable Future" and the program will cover all aspects of noise control engineering, acoustics, and vibration.

In addition, there will be special sessions on "Profession, Training and Outreach", which will be attractive to early career professionals.

Please submit an abstract and consider organising a session under one of the twenty main topics of the technical program.

MAIN TOPICS IN THE TECHNICAL PROGRAM

Under Engineering Science:
1. Physical Acoustics
2. Advanced Measurement Methods
3. Modelling and Simulation
4. Flow-induced Noise and Vibration
5. Vibro-acoustics and Structure-borne Noise
6. Signal Processing, Reproduction and Diagnostics
7. Thermo- and Aero-acoustics

Under Transportation and Industrial Noise:
8. Aircraft Noise
9. Environmental Noise
10. Industrial Noise
11. Building Acoustics
12. Transportation Noise and Vibration
13. Underwater, Ship and Offshore Acoustics

Under Control Systems and Treatments:
14. Active Control
15. Materials

Under Human Factors:
16. Community Noise and Planning
17. Human Response

Message from Conference President Barry Marshall Gibbs

INTER-NOISE 2022 provides an excellent opportunity for engineers and scientists working in the field of noise control, acoustics, and vibration to come together and exchange ideas about their work in an environment conducive to paper presentations and informal networking and with many exhibitors in attendance. More than one hundred technical sessions are planned, covering a wide range of issues facing the industry, research community and the community at large.

18. Soundscapes and Acoustic Quality
19. Profession, Training and Outreach
20. Theme-related: Noise Control in a more Sustainable Future

Summary of Important Dates

- Call for Abstracts and Registrations: November 1, 2021
- Abstract Submission Deadline: February 4, 2022
- Paper Submission Deadline: March 4, 2022
- Final Paper Submission Deadline: April 29, 2022
- Early-Bird Registration Deadline for Authors: April 29, 2022
- Non-authors Early Bird Registration Regular Registration: July 8, 2022

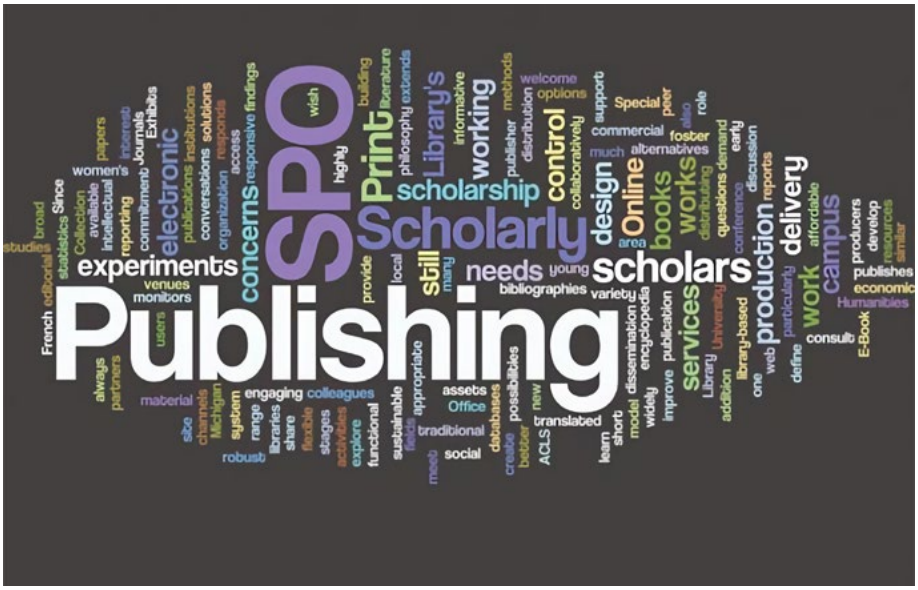
The Conference Venue: The Scottish Event Centre with the distinctive Armadillo Building

For More Information

More details sign up to internoise2022.org and register you interest and check for updates.
For further information email: internoise2022@in-conference.org.uk

Publishing Your Work

By Jim Thompson



Introduction

I have based much of this article on the presentation made to Young Professionals at various Inter-Noise conferences. Many people have contributed to this presentation. A primary author and contributor was Courtney Burroughs. Other contributors include Stuart Bolton and Patricia Davies. I am sure there have been others. I will primarily use the last version I put together, but it is the culmination of the work of several people. I owe them for their contribution.

Publications

There are numerous publications. Many conferences provide a means for publication. These may be with or without a review process. In some cases, like Noise-Con and Inter-Noise conferences only the abstract is reviewed. Others like SAE, ASME, and many more provide a more rigorous review of the paper with the opportunity for publication in a journal in addition to or as a substitute for the conference proceedings. My focus for this article is on publication in a journal. As the editor of the *Noise Control Engineering Journal*, NCEJ, this will be my focus. However, most of what I will talk about is equally appropriate for the Journal of Sound and Vibration, Applied Acoustics, the Journal of the Acoustical Society of America, and many others.

Why Publish?

I can see several reasons for publishing. If you have done something worthwhile, the best way to disseminate the work is through publication. Many more people will see the publication in a reputable journal than will every attend a conference. Remember your do not have to have invented a new theory of relativity. A novel twist on technology, demonstration of a new measurement method, understanding problems with a measurement or a model, or a new application of existing technology can make outstanding technical papers.

In addition, NCEJ accepts Case Studies. These are meant to be thorough application or investigations of noise control techniques. They should provide value to practicing noise control engineers and presented in a manner that provides useful insight.

Many people use publication as a tool in their research programs. Developing a publication forces them to organize their thoughts and document what they have done in deliberately logical manner. Often this process uncovers gaps that need to be addressed or provide insight to new work that needs to be done. In this manner, publishing can be a part of the research process.

In some instances, funding agencies impose a publication requirement. For the research program to be considered complete there must be publications in recognized journals. This serves as a quality control factor for the funding agency. If a publication cannot be approved through the journal review process, it is probably not of sufficient quality.

There are also personal reasons to publish. A journal publication demonstrates your credibility in an area or research and demonstrates the acceptance of your work by peers. It certainly looks good on your resume and some employers, such as universities, base promotions on your publication record.

It is also a good learning process for a researcher. Building a logical and well discussed publication from research is a learned skill. I see too many poor papers from people who have done outstanding work, but have a difficult time describing it in a clear and well-ordered fashion. Learning to work with publishers and reviewers is also a process that takes practice to develop.

Ethics

Before I go any further, I want to touch on ethics. Most authors and their submissions are highly ethical and appropriate. However, there are exceptions and you do not want to be and exception. Below are a series of things you should not do. Some may seem obvious but believe me I have seen all of these and more.

Do not submit the same paper to more than one journal at the same time. This shot gun approach will probably lead to the paper not being published anywhere. The pool of editors and reviewers is not so large that this will not be discovered. If it is, it will be rejected by everyone.

Do not attempt to publish the same paper or nearly the same material multiple times. It will get caught. This is a disservice to the technical community, and it will be a stain on your reputation. People will remember such incident and you will have a reputation of not doing original work.

Do not plagiarize in any way. Repeating your work as noted above is bad and it is a form of self-plagiarism. When it comes down to it, plagiarism is a nice term for stealing other peoples work. Most journals have software that combs publications and the Internet to see if similar work has been done elsewhere. I get a similarity report for each paper submitted to NCEJ. You will get caught. The result can be significant. Due to one case of plagiarism that are three authors from which I will never accept a paper for NCEJ.

Do not take a conference paper and send it unaltered to a journal. Such a submission may violate copyrights if the conference publishes the paper in the proceeding. In addition, a journal paper is generally much more substantial than a conference publication. It will often take significant additional material and editing for a conference paper or multiple conference papers to make a good journal paper submission.

Publication Process

The first thing that happens when your paper is submitted is that it is reviewed by the editor. This first review is simply to see is the paper appropriate for the journal, to check similarity to other published material, and to make a first evaluation of the quality and content. Once I have reviewed and approved the paper, it goes to an Associate Editor to send it to three or more reviewers.

NCEJ like most journals requires three reviews. We do our best to be sure the reviewers are knowledgeable in the area. To help to assure no bias in the review process, we submit blinded manuscripts to the reviewers. They do not see the names

or affiliations of the authors. This review process typically takes 2-3 months.

If the paper has recommendations for revisions and is not accepted as is or rejected, it will go back to the author for revision. I will talk more about this later, but the input from the review process is valuable and should be treated as such.

The author has a defined period to make the changes and resubmit the paper. It will then be reviewed again. This process will be repeated until the paper is either accepted or rejected. On average, NCEJ papers take less that six months from submission to acceptance. Currently, between 66 and 75 per cent of annul submissions are not published. Most of this percentage is due to rejections. The process is intentionally rigorous to ensure the quality of the journal.

My role as Editor is to perform the first review and monitor the process. In the case of difficult cases or other issues I will get involved to help decide on a paper. All decisions on a paper are led by the reviewers' input. I am heavily involved once your paper has been accepted. We will prepare a draft manuscript for your review, and I will work with you to prepare and publish the final issue of the journal containing your paper.

Ingredients of Successful Papers

Most of the items I am going to talk about in this segment are commons sense, but as the old saying goes "the only problem with common sense is that nobody has it". The most fundamental rule is that paper must present new material and back that up with the literature review that demonstrates this. Without new material there is nothing to write. Combined with the material being new it must be an important contribution to the research in an area of noise control. It may contribute new important knowledge or address a problem in current methods and research.

Before anyone says this excludes Case Studies, it does not. New material for Case Studies means a test method, noise issue, or other aspect of noise control engineering that has not been previously covered in a Case Study. Simply documenting a traffic noise survey in a metropolitan area is not new. However, including the study of the implications of this data and the methods of environmental noise reduction can be new.

It should go without saying that the paper must be well-written. There should be

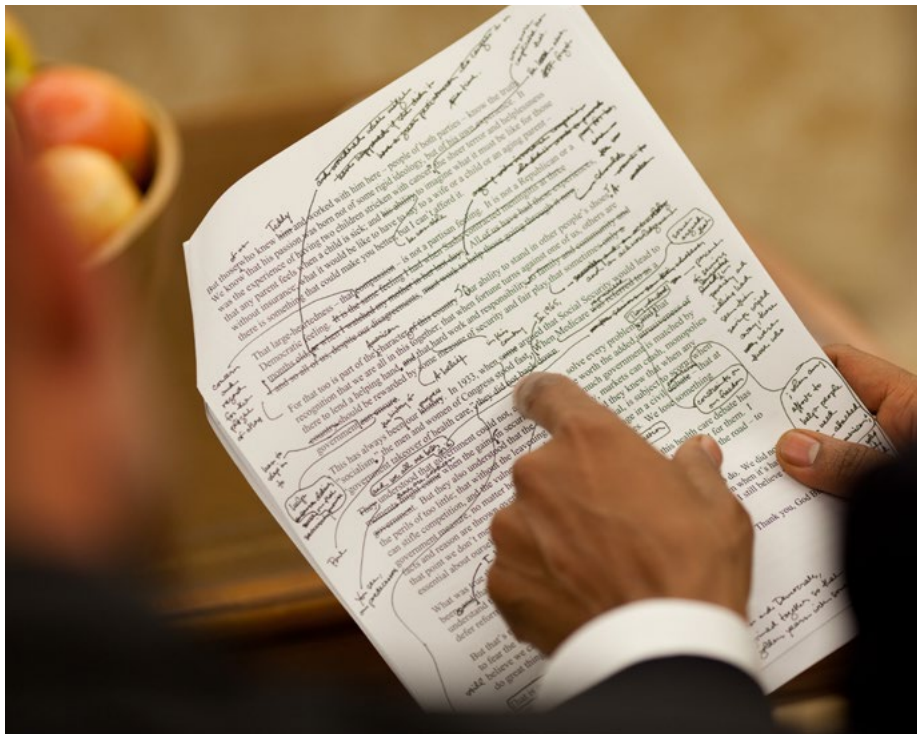

Estabilización físico-química de suelos arcillosos con aditivos elaborados con precursores nano-métricos (Parte I: Evaluación mecánica)

2011 Pan-Am CGS Geotechnical Conference

ABSTRACT

RESUMEN

1 INTRODUCCIÓN



high quality figures and tables that support the arguments of the piece. Please note that well-written does not mean flowery or convoluted language. If the paper is written with coherent English, written as simply as possible and well organized, it has much better chance of being accepted. No reviewer enjoys working through difficult language, explanations, or organization. Even important new finding might not be accepted if written poorly.

The subject of the paper must be of interest to the audience. In the case of NCEJ this means noise control engineers and researchers. Therefore, I reject papers on electrical circuit noise immediately. If you want to be sure the topic is relevant, search the past issues to see what has been published previously this is a good guide.

An important part of your paper is the abstract. I have seen too many authors do this as an after thought when the paper has been completed. Take the time to prepare a quality abstract that provides a good preview and captures potential readers' interest. The first item I read for every paper submitted is the abstract. If I come away from this confused or skeptical about the quality of the work, I am less likely to approve the paper to go to an Associate Editor.

It is vitally important that the paper you submit is your FINAL version. It should be your best effort. It should not be a rough draft for which you hope to get feedback from the reviewers to finalize it. I guarantee such a paper will receive highly negative reviews if not be rejected immediately. Everything in the paper should follow our guidelines and be as perfect as you can make them. This includes equations, figures, tables, references, and citations.

Paper Review Process

We seek to have three good reviews of each paper. In some cases, we make go with two if there is strong consensus between the two reviewers and the Associate Editor. Sometimes we will go to four reviews if there are strong disagreements among the reviewers.

It is important the reviewers are selected by the Associate Editors based on the subject classifications in which they have

asked to receive papers and the Associate Editor's knowledge of the individuals and their past performance. Generally, our reviewers are professionally qualified, highly motivated, and do an excellent job. They are not compensated for their hard work in any way. As noted, before, they receive blinded manuscripts – they do not know the authors' names or organizations.

We allow two months for the first review and reviewers usually meet this time frame. Of course there are exceptions, but these are the minority.

Once the reviews are completed, you will be informed of the results along with the Associate Editor's decision. I review these reviews and decision before send the results to you but find that I agree with the Associate Editors in 99% of the cases. There are a few decisions or recommendations the Associate Editor can make. Please see the list below.

- Reject – the paper is not considered appropriate in quality or material for the journal.

- Major Modifications – the paper is judged to have potential to be a significant contribution, but there are major issues that need to be addressed. The author is requested to make these modifications and resubmit the paper. It will then be reviewed again to see that the necessary changes and corrections have been made.

- Minor Modifications – the paper is judged to need only minor changed to be acceptable for publication. The author will be asked to make the necessary revisions and submit the revised version for review. If the changes are small the Associate Editor may accept the revised paper without the need to send it back out for review.

- Accept Paper as Is – there are no modifications needed. This rare of the first pass. It has happened, but it is much more likely after the one or more revisions.

If your paper is judged to need major or minor modifications, it is important that the reviewers are trying to help you. I have never seen a paper that was not improved by the review process. You are getting advice from the experts in the field, and you should take advantage of it.

The advice I used to give my team member was this:

1. Take the time to carefully read through the reviewers' comments. Then put it away for a little while.

2. Go have a beer, cuss the reviewers, or do whatever that makes your feel better.

3. After at least three days of not looking at the reviewers' comments read them again. Most people are amazed at how much more helpful and well-reasoned the comments seem this second time through.

4. Now carefully go through and make the corrections. It is also go practice to document what you have done. This will help the reviewers during the next round of review.

My advice is to make the corrections and resubmit as soon as possible. I have seen too many papers lost because the changes and corrections did not get priority, or the author moved on to the next topic and forgot to resubmit.

It is important to remember the reviewers are not enemies. The majority of recommendations only serve to make your paper stronger. You should take advantage of them. The most illustrative example of the process at its best is when a mediocre paper is submitted and through multiple reviews with good input from the reviewers it becomes an outstanding paper. Too many authors try to do the minimum possible to satisfy reviewers hoping they can get by with the minimum number of changes. Taking full advantage of the input from reviewers can lead to a much-improved paper that you will be proud of years later.

The last thing you want to do is get in a conflict with a reviewer. There editor will almost always side with the reviewer if the input was reasonable. Certainly, you should not back down if you feel the reviewers' input is in error or somehow misguided but be confident of your position.

It is helpful to everyone involved if you document the changes you have made in response to the reviewers. A simple list is often sufficient. If you feel a short explanation or two is useful that is fine as well. It will help the reviewers to be more efficient in re-review and make them confident that you have addressed their input. Whatever you do, do not make other changes in the paper that were not requested by the reviewers. This will only lead to confusion and in the extreme cause your paper to go back to square one as a new submission.

Summary

Publishing your work can be positive in multiple ways. It can be helpful in finalizing the work and understanding what you have done. Despite conferences and other means of describing work, a journal publication is still the best means to provide a detailed explanation of your work and findings. Publication can also be an asset for your career and even required by those who have provided funding. It is worth considering whether you should publish your work at a milestone and how you want to publish it.

Ethics in publication is vitally important. Repeating publications or plagiarism of any kind are wrong and will harm your reputation. If you are scrupulously

ethical you will repeat real rewards in the long run with a reputation for genuinely new and quality work.

There is no substitute for new work that is well written. Focusing on these concepts will assure acceptance and positive reaction to your publications. No matter how good a job you have done, you will most likely get input from the paper reviewers. Take this input for what it is: helpful advice from experts in the field. If you embrace this input and make the most of it your paper will be improved.

Finally, I strongly recommend being patient. I get too many emails from authors demanding to know why their paper has not been accepted yet when it was only submitted a month before. Six months is the average period from submission to acceptance for NCEJ. Other journals have even longer times. If you are patient and take advantage of the process the rewards will be worth the wait.

Call For Contributions – Special Issue on Motorcycle Noise

In 2020 the German federal meeting of governments of state (the Bundesrat) adopted far reaching proposals to limit the sound emission of motorcycles. Ultimately the federal government opposed their proposals, but in recent months there has been renewed international focus on motorcycle noise. In New York City, motorcycles frequently place in the top 10 most bothersome noise sources identified by residents. In Vietnam, motor bikes with frequent horn sounds are the most frequent road traffic noise source. And a recent cross-sectional study in the Alps indicated that for the same L_{Aeq} level, motorcycle noise is more annoying than the other sources of road traffic noise.

The March Issue of NNI is going to be a special issue that will examine the specific topic of motorcycle noise, and we would like to hear from you! If you are interested in contributing to the conversation please email your submissions to the editor at: kingea@tcd.ie

Both short form commentaries, and long-form technical articles are welcome, especially those related to major developments in the field, legislation, research gaps, control strategies, etc. Submission should be in written in MS Word, or similar, between 500-3000 words, and graphics are welcome. For consideration, submissions should be received by February 28th.

NOISE/NOTES

Eoin A. King, NNI Editor

NNI is on Facebook and Twitter. We try to keep our readers informed with noise news from all across the globe by highlighting interesting research and projects. Here is a roundup of some of the stories that have been making headlines. Follow @NNIEditor to stay up to date with all noise-related news!

International Year of Sound Award winners

The International Year of Sound 2020-2021 Student Competition Winners have been announced! The students' competition was launched in the framework of the International Year of Sound 2020-2021 aimed at encouraging youth to consider and express the importance of sound in their world. The competition was coordinated by Sergio Luzzi and his team. For more info check out the winners here.

INCE 2021 Honors and Awards Ceremony Student Winners Announced

Keeping with the theme of awards…. INCE-USA recently hosted their annual Honors and Awards ceremony. INCE-USA Honors and Awards Winners are recognized for their outstanding service, research and activity in noise control. Among the Student Honors and Awards Winners was Sunit Girdhar of Michigan Technological University who won both the inaugural INCE Student Scholarship and the Martin Hirschorn IAC Prize – Student Project. INCE recognizes both professional and academic work in noise control, and financially supports most honors and awards winners in their continued noise control research and work. For a full list of award winners please see here.

Exposure to persistent road traffic noise may impact on 'executive function'

Researchers from University College Dublin (UCD) and the Economic and Social Research Institute (ESRI) in Ireland have found evidence suggesting that road traffic noise exposure has a negative impact executive function, a cognitive process that organizes thoughts, decision-making and behaviour among a sample of older adults in Ireland. The paper "Road traffic noise and cognitive function in older adults: a cross-sectional investigation of The Irish Longitudinal Study on Ageing", was recently published in BMC Public Health.

Work on the Product Noise Rating continues

Work is continuing on the development of a simplified Product Noise Rating (PNR) method to provide noise level information on consumer products to the general public. By presenting PNR information in a simple and comprehensible manner, the hope is this will allow the general public to factor noise levels into their decisions and make more informed purchases. In this article Dana Lodico, one of those driving the development of the PNR, describes the idea in more detail.

Why do Cicadas sing at dusk?

Cicadas are a wonderfully diverse and ancient insect. Many common Australian cicadas spend about six or seven years underground and when they emerge live for only a few weeks. The Sydney Morning Herald examines how and why they produce the familiar sound of an Australia summer.

Airport Noise Issues at Schiphol airport

Dutchnews.nl is reporting that Schiphol airport may have to cut flights to meet environmental rules. Without far-reaching measures, the airport may have to cut the number of take-offs and landings by 20%. To address the issue the government may have to buy out farmers working close to the airport and reduce the speed on nearby motorways to 80 km/hr to cut pollution in the vicinity. Read more at DutchNews.nl

Noise Control Engineering Articles in The Bridge Magazine

The Bridge magazine is the flagship publication of the National Academy of Engineering (NAE). Six articles on noise control engineering are published in the summer 2021 issue.

Efforts at the NAE since 2005 to produce a series of reports on noise control engineering are described by Eric W. Wood and George C. Maling, Jr. in the article titled "A decade and a Half of Progress Towards Reducing Noise in the United States".

Other articles published in this issue of *The Bridge* include "Noise Control Engineering and Education" by Adnan Akay, "Trains, Planes, and Automobiles: Transportation Noise in the United States" by Gregg G. Fleming, "Voluntary National and International Noise Standards for Products and Machines" by Robert D Hellweg, Jr., "Acoustic Source Localization Techniques and Their Applications" by Yangfan Liu, J. Stewart Bolton, and Patricia Davies, and "Resources for Noise Control Engineering" by George C. Maling, Jr.

This issue of *The Bridge* is available for free download from the National Academy of Engineering at https://www.nae.edu/255782/Summer-Bridge-on-Noise-Control-Engineering

A series of workshops were conducted with the NAE on various topics on noise control engineering. The following workshop reports have been published and are available from the INCE-USA website under publications and INCE-USA Reports. https://www.inceusa.org/publications/technology-for-a-quieter-america/.

3–4 Oct 2012	Protecting National Park Soundscapes
24 Oct 2012	Noisy Motorcycles—An Environmental Quality of Life Issue
16 Jan 2014	Cost Benefit Analysis – Noise Barriers and Quieter Pavements
19 Feb 2014	Reducing Employee Noise Exposure in Manufacturing: Best Practices, Innovative Techniques, and the Workplace of the Future
6–7 Oct 2015	Engineering a Quieter America: Progress on Consumer and Industrial Product Noise Reduction
11–12 Oct 2016	Engineering Technology Transfer: Research and Development for Engineering a Quieter America
8–9 May 2017	Commercial Aviation: A New Era Overview Report
8–9 May 2017	Commercial Aviation: A New Era
13–14 Dec 2018	UAS and UAV (Drone): Noise Emissions and Noise Control Engineering Technology
12–13 Dec 2019	Noise Control Engineering Education
2–3 Dec 2020	Aerial Mobility: Noise Issues And Technology
19–20 Oct 2021	Advances in Noise Control Engineering

For further information, contact: George C. Maling, Jr.at georgemaling.nae@gmail.com. Or Eric Wood at ewood@acentech.com.

Book Reviews

Optimal Audio and Video Reproduction at Home
Vincent Verdult

CRC Press, (2019), 346 pp., Hardbound, 160 USD, ISBN 9781138335417

Background

Having started my audio career working for a high-end home theater company while studying audio engineering in graduate school, I was drawn to this title to see what a deep-dive, academic take on home audio and video reproduction might look like. Similar to the author, my love for music led me to discover and develop a passion for audio systems while I was in college, and that interest has stayed with me through various iterations of my career since I always have had some kind of high-end listening system at home.

About the Author

In his biography, author Vincent Verdult may not sound like a typical author for an A/V textbook. His background is in systems and control engineering, and he currently works in information security. However, the "Qualified by Experience" designation is fair and valid when one has a passion for a subject and works to study, learn, and ultimately share their knowledge and passion. Also, with a citation provided for nearly every paragraph, the presentation feels a bit like an academic thesis leaving no question that Vincent has done his research.

Target Audience

With that said, it does beg the question: Who might be the target audience for this book? The title says, "At Home" and the first full chapter covers "Audio and Video Basics" which would suggest a home A/V enthusiast as the intended reader, yet the material is presented in a very academic manner. I would say Vincent has made accommodations for a broader audience and that a professional designer, architect, or consultant could find the text just as the useful as an A/V integrator, a student, or an end-user. There is enough detailed information to inform the design of a high-end A/V room in a home, in a commercial business space, and even in a small production house. What is clear throughout is the author's intent to serve those who want to enjoy a high-quality experience from an A/V system, particularly the aficionado who love the arts of music and cinema and who employ technology to honor those art forms in the best way possible.

Presentation Style

Throughout the text, Verdult breaks out details into three layers of information. Each chapter is split into numbered subject headings as might be expected in a reference text, with occasional figures included to illustrate graphic materials like block diagrams, graphs, or other images. At less regular intervals, a numbered "Box" is included to highlight a more mathematical feature such as a specific formula, and the reader is invited to skip these if calculations are not required for their application. The third layer is a series of "Recommendations" which appear primarily in chapters 4 to 8 and provide much more succinct declarations of a decision point, such as when to use a particular type of cable or select a specific option in a menu. For the novice end-user, these will help to peel away the density of the underlying material, although even a seasoned pro likes a quick answer when one is available. One unfortunate decision is that all these layers are independently numbered sequentially and in the same format through each chapter. This can be confusing when, for example, Recommendation 5.21 is followed by chapter heading 5.3.5 which is followed by Box 5.10 all on a single page.

What's Inside

The accommodations for novices begin in chapter 2, "Audio and Video Basics" which would likely be new information for some and a healthy refresher for more experienced readers. Basic terminology and features of audio/video systems are explained along with an introduction to acoustics and light. I particularly appreciate that information about auditory and visual perception is included. When a buyer is trying to understand why the same size and brand of television are available in prices ranging from hundreds to thousands of dollars, understanding how light and sight and vision work may help sway the decision beyond price alone.

Continuing to chapter 3, we enter a discussion of "Optimal Reproduction" which is the central premise of the book and bridges the philosophical with the technical. Video and audio reproductions are each discussed in terms of quality, definition, and accuracy. Acknowledgement is given that perfect reproduction may not be possible outside of a studio control room, yet the home experience can still reference that standard to achieve the best recreation of the original, within reason.

Chapters 4 to 8 form the bulk of the essential information on how to achieve the goal of optimal reproduction, although the order of the chapters and some material within the chapters is curious. Chapter 4 dives into "Room Design" which is a critical consideration for those designing a complete environment from the ground-up and for those working with existing rooms in their home, office, or studio space. The organization is curious with "The Need for Subwoofers" appearing before "Floor Plan," but all the material presented is essential to a strong design.

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Worship Sound Spaces: Architecture, Acoustics and Anthropology

Edited by Christine Guillebaud and Catherine Lavandier Routledge, New York, NY, (2020), 256 pp., Hardbound, 140 USD, ISBN 9780367234225

Worship Sound Spaces is a collection of 11 papers based on work conducted at a 2015 Conference of the same title. The papers are organized into three sections: (1) Sonic architecture: acoustic intentions in worship build.ings, (2) Experiencing the sacred through sound, and (3) Re.storing the sound ambiances of the past. An introduction by the editors and an afterword by Jean-Paul Thibaud are also included.

Since this book is a collection of papers, the reviewer tried to summarize some general thoughts and impressions for each section rather than summarizing each of the papers. The titles do a good job of describing the general topic of each paper, but there is too much information to simply summarize them in a few sentences.

Introduction: Religious listenings: a multidisciplinary approach, by Christine Guillebaud and Catherine Lavandier
Part 1: Sonic architecture: acoustic intentions in wor.ship buildings
Paper 1: Characterizing the acoustics of places of wor.ship: should we believe in acoustic indicators? by Marc Asselineau
Paper 2: Towards a history of architectural acoustics using archaeological evidence: recent research contribu.tions to understanding the use of acoustic pots in the quest for sound quality in 11th to 17th century churches in France, by Jean-Christophe Valière and Bénédicte Palazzo-Bertholon
Paper 3: Temple soundspaces and ancient Hindu ritual texts, by Gérard Colas. This paper provides a brief over.view of the soundspaces within the Hindu temple.

The three papers in this section examine three different worship spaces from a room/environmental acoustics per. spective. Key items include the metrics used to define spaces, what do we believe was the intention of acoustic pots placed in a liturgical space, what are their measured effects on the acoustics in the space, and purpose and function of sound in Hindu Temples. In paper 3, I found it interesting as a noise control engineer that "temples are assessed according to the distance at which the sound of the conch is perceived" as well as other information presented.

Part II: Experiencing the sacred through sound
Paper 4: The worldmaking ways of church bells: three stories about the Cathedral Notre-Dame de Paris, by Gaspard Salatko
Paper 5: What should the reverberation inside a masjid be? A study exploring the demands of Imams, by Ahmed Elkhateeb (defining reverberation times for the performer (Imam) as well as the worshipers; chant not sung — presence of prayer rugs)
Paper 6: Soundwalks in a Shiva temple: a situated ap.proach to perceived ambiance, by Christine Guillebaud (within and around the temple sound acts as a ritual action, timing, etc.)
Paper 7: Bells, auspiciousness and the god of music: reflections on sound in ritual spaces in Nepalese Hindu traditions
Paper 8: Resonant voices and spatial politics: an acous.temolog of citizenship

in a Muslim neighbourhood of the Kenyan coast, by Andrew Eisenberg

Having only studied and worked with catholic con.gregations in the US, I found these papers enlightening. Instead of working on separating the sound inside and outside of a worship space, in other cultures and traditions, there is distinct interaction. This can be highlighted with the sound around and within a Shiva temple, a highly com.plex acoustical space. Bells are not simply tools to call congregants to worship but can be ritually personified. The preferred reverberation time inside a masjid is much longer that I would have expected based on my experi.ences with various vocal performance spaces.

Part III: Restoring the sound ambiances of the past
Paper 9: The church beyond worship: experiencing monumental soundspaces in the Roman Catholic churches of Montréal (Québec, Canada), by Josée Laplace
Paper 10: Sound heterotopia in Cistercian monastery, by Pascal Joanne
Paper 11: The original acoustics of the 17th-century Mughal heritage of Burhanpur, India, by Amit J. Wahurwagh, Akshay P. Patil and Alpana R. Dongre
Afterword: Aworld of attunements, by Jean-Paul Thibaud

The acoustic experience for worshipers in a space ex.tends beyond listening to spoken or musical messages. Perhaps this is perceived by many people during the on.going pandemic where typical worship may not be possi.ble. Within the worship space, we interpret and react to the acoustics of the space on different levels with the added dimensions of quiet and reverberation creating an otherworldly image. Otherworldliness can be extended to the concept of heterotopia, from philosopher Michel Foucault. Using Cistercian abbeys, two case studies are presented. Maintaining the original aesthetics of a space during restoration includes restoring acoustics of the space. This can be a challenge with older spaces having undergone partial restoration. Simulation using period material properties and original geometry makes this possible.

I originally expected more of a textbook covering the acoustical design of various worship spaces. While the text does provide much information on types of worship spaces both common and not common in the United States, it also provides more. I do find myself thinking about sound in my environment, both during leisure and work, and how the role sound plays during these experiences. Hopefully, this review will intrigue some of you, who may have not considered purchase of this text, or who have not read much about soundscapes to give it a read or attend a soundscape sessions or two at an upcoming conference.

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Vibration Problems in Machines: Diagnosis and Resolution, 2nd Ed.

Arthur W. Lees (2021), 361 pp., ISBN 978-0-367-36774-9 (hardback), ISBN 9978-0-429-35137-2 (ebook)

Purpose
As the author notes, turbomachinery is an important feature of many industries. The book discusses both monitoring and diagnostics in rotating systems. It does provide a good overview of turbomachinery and the analysis of issues made apparent by vibration. The best role for this text is to serve as a primer for those familiar with the principles of shaft vibration that want to use this knowledge to prevent and understand turbomachine operational and performance problems.

Summary
The book seems intended to be a textbook. There are problems at the end of each chapter, solutions at the end, and MATLAB solutions available online. The book provides a good overview of the basic principles of shaft vibration but does not deal with any of the topics in typical academic detail. The strength of this book is in describing turbomachine operational characteristics and the vibratory impact of normal and abnormal operation.

For those familiar with shaft vibrations, Chapter 5 forward will be the most valuable. These chapters describe common operational issues and present the means to model such phenomena. While describing the modeling approach, the author utilized actual data or described simple examples. The result is a good discussion of turbomachine problems and their vibrational effects. Whether for the reader who wants to model such phenomena or for that who wishes to understand measured data, the later chapters provide a useful guide.

Discussion
Chapter 1: Introduction
This is a broad introduction to rotating turbomachinery from monitoring to analysis to diagnostics. The author also provides a summary of the content and topics of the following chapters.

Chapter 2: Data Presentation
This chapter attempts to cover the entire area of turbomachinery signal analysis and data presentation in 40 pages. Clearly, this is not possible. The presentation does a comprehensive high-level discussion of the predominant data analysis and presentation techniques. The discussion is specific to the techniques used for turbomachinery. For those familiar with vibration analysis, but not the specific practices applied to turbomachinery, this could be a good introduction. Due to the brief treatment, this chapter presents the basic premise of the analysis methods and the type of inferences that can be drawn from the results. There are no detailed examples or discussions of actual machine issues.

At the end of the chapter, the author provides some perspective on the data analysis considering the presence of noise and error in the measurements being collected. My favorite phrase from the book is the author's note quoting Irons (1987), "Computing is for understanding, not numbers."

Chapter 3: Modeling and Analysis
Somewhere between an introduction to modeling and a discussion of specific turbomachinery cases, this chapter touches on the basic concepts of modeling and turbomachinery vibration. The basic concepts of finite element analysis (FEA) are presented at a high level. As the author notes, this is far from a comprehensive description of FEA.

In a similar vein, the turbomachinery discussion introduces important concepts in rotating shaft vibration. Some simple examples of shaft dynamics are presented to illustrate the basics.

Chapter 4: Faults in Machines (1)
The author begins with a discussion of flexible and rigid shafts and systems. There is a discussion of shaft imbalance and multiple techniques for balancing shafts. This segment includes several basic problems with numerical examples. In the final segment, there is a discussion of recent advancements. The author refers the reader to later chapters for more information on these topics.

This chapter is more an introduction of fundamental concepts than an explanation of turbomachinery faults.

The exception is the discussion of balancing which is more complete with examples.

Chapter 5: Faults in Machines (2)
This is the second segment treating machine faults. The treatment of more realistic problems seems to be where the author is focused. This treatment is more practical with a basic modeling foundation. The effect is to provide a good understanding for the reader of the problems and at least an introduction to possible modeling approaches.

There is a discussion of the sources of misalignment in terms of practical machine arrangements and shaft support. The major types of issues discussed include flexible and solid couplings, the shaft catenary, and the excitations due to couplings.

In the cracked rotors section, the author presents a means to model such problems and discusses the implications. Under torsional excitation, the author discusses the effects of different types of turbomachines including, pumps, turbines, and generators. He also provides the foundation of the impact of gear sets on torsional excitation.

The instability segment discusses oil-whirl and oil-whip in bearings and the impact on shaft vibration. This is followed by a discussion of synchronous and asynchronous excitation.

Chapter 6: Rotor-Stator Interaction
As the author notes, this chapter marks the transition from shaft dynamics to machine effectiveness. Rotor-stator interaction is discussed via the working fluid and through direct interaction. The author moves from basic examples and brief discussions of modeling principles to actual machine characteristics. For those familiar with vibrations or shaft dynamics, this is the first segment to really relate the basic principles to working machines.

The interaction through bearings segment begins with the classic journal bearing phenomena and develops the basic equations for this case. There is also a discussion of rolling element bearings and their characteristics. The final segment in this section provides a brief introduction to other types of bearings.

In the interaction via the working fluid section, the author focuses on pump bushes and seals. Most of this section is devoted to pumps and the effects of the fluid and points of interaction. The interaction through direct stator contact is limited to a few specific cases. These include the Newkirk effect, collision and recoil, and the Morton effect.

Chapter 7: Machine Identification
The stated intent of this chapter is to present the latest developments and techniques in turbomachinery vibration. The current state of modeling segment discusses techniques to align modes with actual performance. Under Primary Components, the discussion is divided into:
• The rotating elements.
• The bearings and other interaction between rotor and stator.
• The stator and its supporting structure

The author notes that the accuracy of shaft models is quite high. The complexity of modeling bearings is highlighted. It is noted that bearings uniquely may contribute to stability or instability at different speeds. Inaccuracies and the difficulties in modeling as-built support structures are discussed in this segment. There is a discussion of these limitations and the errors that result.

The problems with system identification common to many built-up structures are discussed in the System Identification section. Matrix inversion and the resulting errors and limitations are discussed along with regularization to minimize these effects. The use of least squares and the problems of ill-conditioned matrices are also discussed. The use of Kalman filters for modal analysis is discussed, and a more detailed presentation on Kalman filtering is provided.

Chapter 8: Some Further Analysis Methods
Under Standard Approaches, it is noted that critical plant systems require monitors in three categories:
• Detection of a fault
• Diagnosis and localization of a fault
• Corrections or mitigation of the effects of a fault

Major sections of this chapter are devoted to artificial neural networks and singular value decomposition. In the Useful Techniques segment, the discussion touches on:
• Hilbert transforms
• Time-frequency and Wigner-Ville analyses
• Wavelet analysis

• Cepstrum
• Empirical mode decomposition

Chapter 9: Case Studies
This chapter presents five case studies of actual turbo-machine issues. The first is a crack on an alternator rotor. A detailed history of the operation and monitoring of the turbine-alternator train is presented. This is a good illustrative example. This is followed by discussions of modal testing of a cracked rotor, gearbox problems on a boiler feed pump, vibrations of a centrifugal pump, and low-pressure turbine instabilities. The first example is the best illustrated with actual data.

Chapter 10: Overview and Outlook
This chapter discusses a number of possible future solutions and improvements in the field. In most cases, only a paragraph or two is devoted to the topic. One of the longer discussions is on progress in modeling. Current and future capabilities are discussed with practical observations on the potential of some of the techniques. Another topic with a lengthier discussion is shaft modification. Here, the author discusses the potential to respond to faults or to avoid operational issue by modifying the system. Various means to make modifications to shaft dynamics are discussed.

Solutions to Problems
Solutions to the problems at the end of each chapter are presented. While there is some discussion of the methods to be used, these are substantially the final results with minimal explanations. They are not complete solutions to any but the simplest problems.

Recommendations
With the understanding that this is not a comprehensive text in turbomachine vibration, I would recommend this text for those who want to model actual machine vibration or interpret the measured data from machines. It treats several real-world machine issues and provides a high description of what to expect and how to model such cases. To fully utilize this material, one should have a sound understanding of shaft vibration, vibrations, and turbomachine fundamentals.

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NCEJ
Noise Control Engineering Journal
An International Publication
Published by INCE-USA in conjunction with KSNVE

NCEJ Appreciation for the Outstanding Reviewers of 2021

The Noise Control Engineering Journal (NCEJ) thanks the outstanding reviewers for their service in 2021.

These reviewers worked on multiple papers and completed their reviews in a timely fashion to allow the quick and effective review of papers from all aspects of noise control engineering. Without such outstanding reviewers, it would be impossible to produce the world's leading noise control engineering journal.

The input and guidance of these reviewers are essential to generating quality papers for which NCEJ is well known. Their hard work is much appreciated.

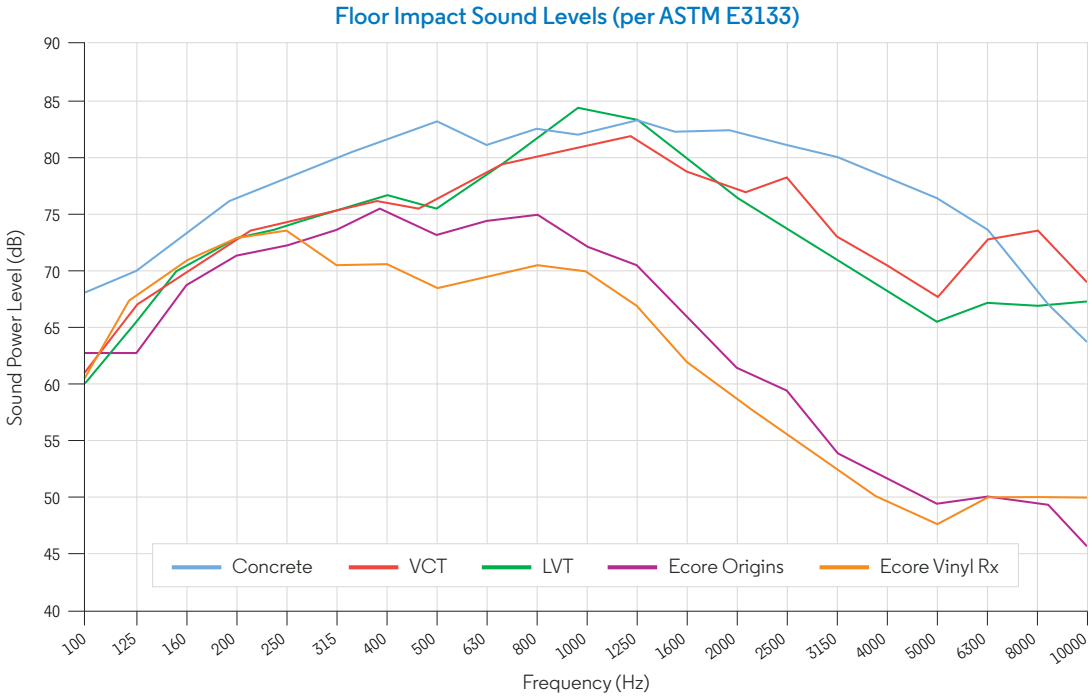
An,Fengyan	Qingdao University of Technology
Bray,Wade	Head Acoustics Inc.
Broner,Norm	Broner Consulting Pty Ltd
Cao,Rui	Purdue University
Dande,Himanshu	Gulfstream Aerospace Corporation
Herrin,David	University of Kentucky
Long,Guo	University of Cincinnati
Mooney,Jon	JW Mooney LLC
Niu,Yaying	Siemens Energy Inc
Ozgen,Gokhan	Orta Dogu Teknik Universitesi
Ranjbar,Mostafa	Ankara Yildirim Beyazit University
Ruan,Kangping	University of Kentucky
Shi,Tongyang	3M Company
Tickell,Colin	Recognition Research Pty Ltd
Venkatesham,B.	IIT Hyderabad
Wang,Peng	Tesla, Inc.
Wang,Yawen	University of Texas at Arlington
Wu,Tim	University of Kentucky

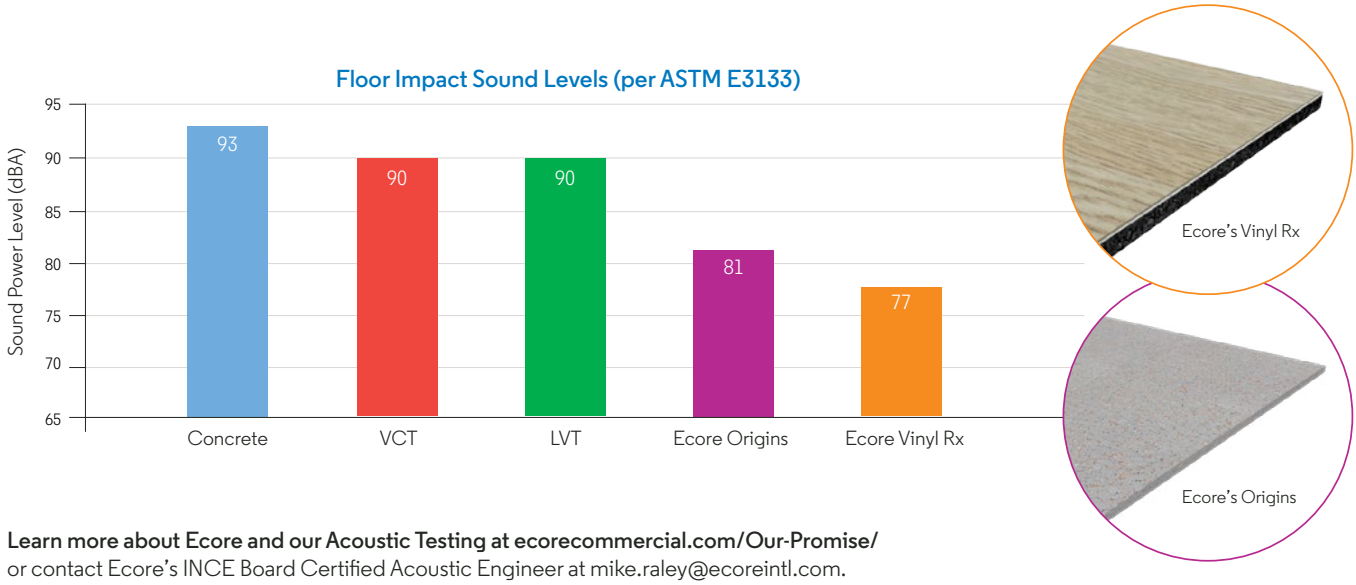
ecore™

New Floor Impact Sound Test Data available from Ecore

PERFORMED BY INTERTEK INDEPENDENT IAS-CERTIFIED LAB IN YORK, PA

Floor impact sound levels from Ecore's Vinyl Rx were 13dB lower than those from generic VCT and LVT. This makes Vinyl Rx an excellent choice for uses like hospitals where the standard flooring choice to reduce noise, carpet, presents many maintenance and health issues.





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Public concern and measurements of noise in the city

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Introduction

This article on historical facts in acoustics, centered on the subject of noise and health, is the final in the series that began with the article of the first anti-noise groups in 1895 and the first international anti-noise convention of 1908 (Montano, 2021-a), and goes up to 1950 when the first urban zoning ordinances were published which established noise limits with numerical values in decibels. These articles have been prepared to contribute to both the 50th anniversary of International Institute of Noise Control Engineering and to the International Year of Sound, and are intended to rescue from history events and circumstances in relation to noise and sound. They are based on published content from newspapers, magazines, journals, and pamphlets. This is a good way to see and study human behavior in the face of technological and scientific advances in acoustics and gain an impression of what society considered were the effects of noise on the daily lives of people in cities and in their workplaces.

As discussed below, an important milestone year for acoustics was 1937 when in June-July the Première Conférence Internationale de l'Acoustique took place at Paris. This meeting was organized by the International Federation of National Standards Associations, also known as 'International Standards Associations-ISA' (now known as ISO). In this article is transcribed a summary because it is important to rescue what was discussed in the technical committees. It took some time following this meeting before noise limits in decibels were first included in a noise ordinance; this was in Chicago in 1950 and even octave-band frequency limits were included.

In this article, some of the historical events leading up to the creation of this noise ordinance will be discussed as well as some activities that could be considered in the coming years.

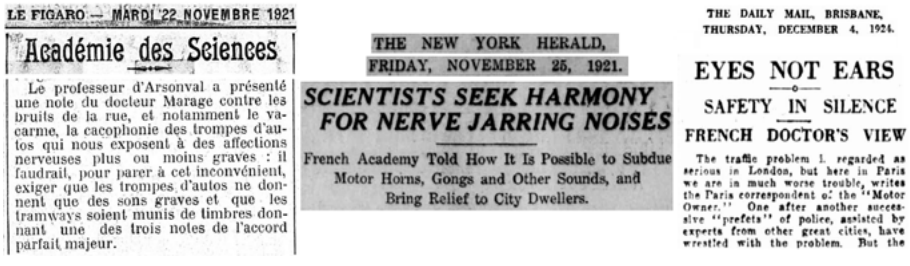
Actions Regarding Concern About Health Effects of Noise

There are some publications of the 19th century which prescribed having a 'silence week' for mental rest and religious pamphlets which recommended of having a 'week of silence' to communicate with God, but it was not until the 20th century that the problem of noise on people's health was taken into account by medicine and engineering, The previous articles published in NNI (Montano, 2021-a; 2021-b; 2021-c) discuss the process by which different individual actions developed into movements that proposed ongoing actions. This chapter presents the actions that, in the author's opinion, stand out from the rest and especially the proposal for an "anti-noise day" each year, in order to reflect on the health problems derived from ongoing noise exposure.

The Académie des Sciences and its fight against noise problems in 1921

At a meeting of the French Academy of Sciences November 1921, a lecture was presented by Dr. Georges René Marage (1859-1930) in which he warned of the brain and mental problems derived from street noise, and that the ear consequently shows a loss of sensitivity. Dr. Marage was an otologist and a prolific inventor; he presented in 1901 the first synthetic talking machine (Marage, 1901).

Many newspapers around the world (see Figure 1) replicated his lecture, and The Boston Sunday Globe of December



LE FIGARO — MARDI 22 NOVEMBRE 1921

Académie des Sciences

Le professeur d'Arsonval a présenté une note du docteur Marage contre les bruits de la rue, et notamment le vacarme, la cacophonie des trompes d'autos qui nous exposent à des affections nerveuses plus ou moins graves : il faudrait, pour parer à cet inconvénient, exiger que les trompes d'autos ne donnent que des sons graves et que les tramways soient munis de timbres donnant une des trois notes de l'accord parfait majeur.

THE NEW YORK HERALD, FRIDAY, NOVEMBER 25, 1921.

SCIENTISTS SEEK HARMONY FOR NERVE JARRING NOISES

French Academy Told How It Is Possible to Subdue Motor Horns, Gongs and Other Sounds, and Bring Relief to City Dwellers.

THE DAILY MAIL, BRISBANE, THURSDAY, DECEMBER 4, 1924.

EYES NOT EARS

SAFETY IN SILENCE

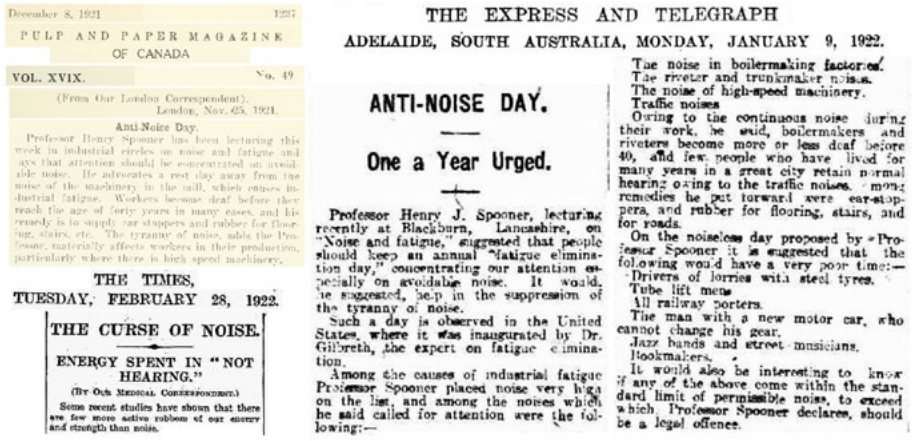
FRENCH DOCTOR'S VIEW

The traffic problem is regarded as serious in London, but here in Paris we are in much worse trouble, writes the Paris correspondent of the "Motor Owner." One after another successive "prefets" of police, assisted by experts from other great cities, have wrestled with the problem. But the

Fig. 1: Some mentions on media about the French Academy of Sciences statements on noise

18, 1921, published a large article explained the Dr. Marage's statements: As a countermeasure to the effects of the noise. Dr. Marage said that *"a small, low-toned electric motor, placed inside a box within one's room should be set going the moment the disturbing noises commence. The low vibrations thus sent out, do not injure the tympanum of the ear, and do prevent the other noises from accomplishing their destruction."*

For the first time not only were the health problems from home/urban noises identified, but also an acoustic design for a solution. Finally, Dr. Marage suggested that *"it was the duty of the Government, out of regard to future generations, to introduce restrictive measures before the nerves of parents are finally ruined."* This is an important political argument, considering the year in which it was written, because if governments are the ones who decide that there should be more vehicles and more household appliances, it is also their responsibility that these decisions do not make people sick and deaf.



December 8, 1921 1237

PULP AND PAPER MAGAZINE OF CANADA

VOL. XVIX. No. 49

(From Our London Correspondent).
London, Nov. 25, 1921.

Anti-Noise Day.

Professor Henry Spooner has been lecturing this week in industrial circles on noise and fatigue and says that attention should be concentrated on avoidable noise. He advocates a rest day away from the noise of the machinery in the mill, which causes industrial fatigue. Workers become deaf before they reach the age of forty years in many cases, and his remedy is to supply ear stoppers and rubber for flooring, stairs, etc. The tyranny of noise, adds the Professor, materially affects workers in their production, particularly where there is high speed machinery.

THE TIMES,
TUESDAY, FEBRUARY 28, 1922.

THE CURSE OF NOISE.

ENERGY SPENT IN "NOT HEARING."

(By Our Medical Correspondent.)

Some recent studies have shown that there are few more active robbers of our energy and strength than noise.

THE EXPRESS AND TELEGRAPH
ADELAIDE, SOUTH AUSTRALIA, MONDAY, JANUARY 9, 1922.

ANTI-NOISE DAY.

One a Year Urged.

Professor Henry J. Spooner, lecturing recently at Blackburn, Lancashire, on "Noise and fatigue," suggested that people should keep an annual "fatigue elimination day," concentrating our attention especially on avoidable noise. It would, he suggested, help in the suppression of the tyranny of noise.

Such a day is observed in the United States, where it was inaugurated by Dr. Gilbreth, the expert on fatigue elimination.

Among the causes of industrial fatigue Professor Spooner placed noise very high on the list, and among the noises which he said called for attention were the following:—

The noise in boilermaking factories.
The riveter and trunkmaker noises.
The noise of high-speed machinery.
Traffic noises.

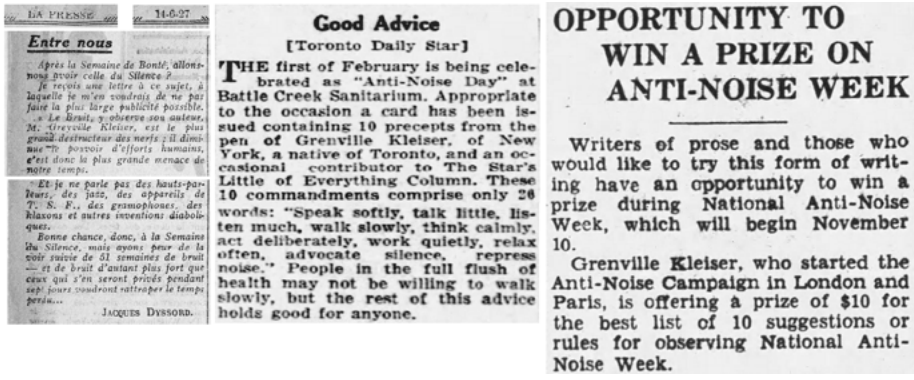
Owing to the continuous noise during their work, he said, boilermakers and riveters become more or less deaf before 40, and few people who have lived for many years in a great city retain normal hearing owing to the traffic noises. Among remedies he put forward were ear-stoppers, and rubber for flooring, stairs, and for roads.

On the noiseless day proposed by Professor Spooner it is suggested that the following would have a very poor time:—

Drivers of lorries with steel tyres.
Tube lift men.
All railway porters.
The man with a new motor car, who cannot change his gear.
Jazz bands and street musicians.
Bookmakers.

It would also be interesting to know if any of the above come within the standard limit of permissible noise, to exceed which Professor Spooner declares, should be a legal offence.

Fig. 2: Press reactions to Spooner's proposal of having an "Anti-noise day"



LA PRESSE 14-6-27

Entre nous

Après la Semaine de Bonté, allons-nous avoir celle du Silence ?...

Je reçois une lettre à ce sujet, à laquelle je m'en voudrais de ne pas faire la plus large publicité possible. « Le Bruit, y observe son auteur, M. Gréyville Kleiser, est le plus grand destructeur des nerfs ; il diminue le pouvoir d'efforts humains, c'est donc le plus grande menace de notre temps.

Et je ne parle pas des hauts-parleurs, des jazz, des appareils de T. S. F., des gramophones, des klaxons et autres inventions diaboliques.

Bonne chance, donc, à la Semaine du Silence, mais ayons peur de la voir suivie de 51 semaines de bruit — et de bruit d'autant plus fort que ceux qui s'en seront privés pendant sept jours voudront rattraper le temps perdu...

JACQUES DYSSORD.

Good Advice

[Toronto Daily Star]

THE first of February is being celebrated as "Anti-Noise Day" at Battle Creek Sanitarium. Appropriate to the occasion a card has been issued containing 10 precepts from the pen of Grenville Kleiser, of New York, a native of Toronto, and an occasional contributor to The Star's Little of Everything Column. These 10 commandments comprise only 26 words: "Speak softly, talk little, listen much, walk slowly, think calmly, act deliberately, work quietly, relax often, advocate silence, repress noise." People in the full flush of health may not be willing to walk slowly, but the rest of this advice holds good for anyone.

OPPORTUNITY TO WIN A PRIZE ON ANTI-NOISE WEEK

Writers of prose and those who would like to try this form of writing have an opportunity to win a prize during National Anti-Noise Week, which will begin November 10.

Grenville Kleiser, who started the Anti-Noise Campaign in London and Paris, is offering a prize of $10 for the best list of 10 suggestions or rules for observing National Anti-Noise Week.

Fig. 3: Some media reaction on Kleiser proposal (France, 1927) (Toronto, 1928) (Bangor Daily News-Maine, 1935)

Henry Spooner and his proposal of 1921

The first suggestion of a "Day of Silence" or "Anti-noise Day" or similar activity, was in November 1921 by Henry John Spooner (1856-1940), a prominent industrial engineer from England who was dedicated to promoting awareness of the problems of noise in industries. Spooner took the idea from the "Day of Elimination of Fatigue" that was celebrated every December 5 since 1916 in several US Colleges (Spooner, 1922). His idea of a day for reflection on noise problems being held annually on a specific date caused great impact in the media for industrial issues (see Figure 2). It is possible to find many references to having an "Anti-noise Day" at workplaces based on his suggestion. Spooner was a Member of the International Committee on Industrial Fatigue and in all his speeches he asked for such a day to be declared.

His influential lecture *"Health problems involved in noise and fatigue. Rhythms, cadences, periodicities regulate human activities, but noise lessens the aptitude for work"* delivered at the Public Hall, Blackburn, Lancashire, England, on November 21, 1921, is available on the Internet (Spooner, 1922). Some background on Spooner was presented, by the author in NNI magazine of October 2021 (Montano, 2021-c).

The author has found a very curious coincidence, which on November 21, 1921, René Marage in France, and Henry Spooner in England, both presented lectures on the health problems of noise, although approached from different points of view. So far, the author has found no references that they had personal contact.

Grenville Kleiser and his proposition for anti-noise week

Grenville Kleiser (1868-1935) a Canadian Methodist preacher suggested an "Anti-Noise Week" which he presented in a manifesto entitled "The power of silence." Kleiser sent letters in June 1927 to the mayors and media editors of the world's largest cities asking for practical cooperation in generating a movement of *"An Anti-Noise Week held once a year will mean to the community an economic gain in thought, feeling, energy, health, etc.,"* ending his suggestion with *"The elimination of unnecessary noise does not imply absolute silence or inertia, but greater poise and power to do more*

efficient work. A crusade against noise is one of the greatest needs of our time" (Editor, 1927). Today the original Kleiser pamphlet could not be found, but references are given in the "Methodist Protestant Herald" (Editor, 1927).

Early efforts to have an "Anti-noise week"

Given the vast information that exists in US, Australasian, and European newspapers of those years, here we only list the countries and the corresponding year in which they implemented the annual "Day of Silence". These were based on the suggestions by Kleiser for an anti-noise week. In 1927 the London and Paris media 'voiced' the implementation of Kleiser's idea but only for one day, and there is no mention of the actual implementation of this proposal.

In Australia, in 1928, the "Melbourne Noise Abatement League" (MANL), within the "Health Week" organized by the municipality every year, for the first time presented the problems of noise in school children. In the 1930s, other cities in Australia held an activity with the theme of the "Week of silence" (Montano, 2020). For the case of the rest of Australasian cities, dozens of references are found in the search engines of newspapers of those, but full access to those articles is not yet available.

There is a report published in the magazine of the "North Central Association of Colleges and Schools" (North, 1929), in which mention is made of a proposal for an "Anti-noise Week" as an extracurricular educational activity for educational institutions in nineteen US States. This is interesting because in that year the only reference found about the anti-noise week is that of Kleiser, so it could be speculated that they were aware of the movement initiated by him.

During the 1930s many French cities organized their own "Week of Silence" (under Kleiser's idea), and these were also replicated in Asian and African cities where France had its colonial enclaves. In Germany and Italy in the 1930s some cities adopted a "Day of Silence" or "Week of Silence," for which the foreign press of the time claimed was due more to political reasons than to concern over public health.

"Anti-noise" campaigns around the world

After New York City's 1930 campaign against urban noise −a complete explanation of this campaign is presented in Thompson (2002) −, similar actions were replicated in major cities around the world as anthropogenic noise became more prevalent. In part this is because listening to music became the only source of free entertainment available to people, due to the 1930's worldwide economic crisis. The second source of annoying noise was identified as the abusive use of car horns. If we consider that in the 1920s and 1930s newspapers were the main source of information for people, journalists were interested in keeping the attention of readers, so reproducing strange news transmitted by press agencies was routine. So it was possible to read about anti-noise campaigns in distant cities in those years. Since it is always assured that "anti-noise actions were carried out all over the world," the author transcribes some 'curious news' that he could find in newspapers, as examples of the reactions of the media to this issue:

• January 25, 1928, the Bakersfield Californian (California, US): *"Santiago Proclaims War Against Noise" − "Chile. War has been declared on noise here. An ordinance passed by the city authorities provides fines and jail sentences for those who conduct their activities without due regard for peace and quiet."*

• November 3, 1929, the Jopling Globe (Missouri, US): *"No practice toots on Havana cornets" − "The anti-noise crusade, inaugurated several weeks ago, has proved troublesome to purchasers of musical instruments of the wind variety... The ordinance is applied also to tin horns and penny whistles for children."*

• November 27, 1929, the Portsmouth herald (New Hampshire, US): *"Copenhagen. Burgomaster Kaper has followed the example of executives of other large cities and started an anti-noise crusade. He has asked the city council to ban phonographs, radio loud-speakers and yelling street vendors."*

• July 31, 1930, the Altoona Mirror (Philadelphia, US): *"Moving to quiet Istanbul noises" − "The campaign against noise has Just been launched with the Istanbul that the municipality's street peddlers suggestion use mellow musical instruments, instead of their one thousand and one deafening cries."*

• November 23, 1930, The Sunday Star (Washington DC): *"Ban street noises. Advertising loud-speakers are forbidden in Brussels. Burgomasters of the localities situated on the outskirts of the Belgian capital decided to recommend the general application of a Brussels police regulation against street noises."*

• February 19, 1931, The Evening Star (Washington DC): *"Traffic noises scored Mexico City" − "The League for the Defense of Pedestrians today requested to head of the District Traffic Department, to establish a 'dictatorship' against noise, as a public health measure. The league asserted that traffic noise is responsible for deafness and cerebral disorders. Impedes concentration of thought and retards mental development of children."*

• October 18, 1932, Indianapolis Times (Indiana, US): *"Noise Budapest Citizens Form League to Obtain Lots of Quiet. Prominent citizens have decided to rid the city of noise caused by loudspeakers and street traffic ... and the first step in their campaign has been to secure the co-operation of all inhabitants."*

• October 4, 1934, The Singapore Free Press and Mercantile Advertiser *"Penang street noises" – "Penang police are waging a campaign of their own towards the silencing of street noises. Specially selected men are stationed at strategic points and take the numbers of offending cars. The owners receive a traffic notice."*

• January 20, 1935, the Chattanooga Daily Times (Tennessee, US): *"Noise measurements seen for Stockholm" – "Policemen equipped with machines for measuring traffic din are visualized by a Stockholm professor, who says he will propose a low to limit the amount of permissible noise."*

• July 10, 1935 the Delphi Journal (Indiana, US): *"Finland silenced motor horns, streetcar bells, traffic whistles, hand organs, and the cries o hucksters, newsboys, and sidewalks orators."*

• July 12, 1935, the Nieuwe Schiedamsche Courant (Schiedam, Netherlands): *"Zurich is also going to fight noise. The first experiences. As in other major cities in Europe, the battle against noise has been fought in Zurich. The first week of July was dominated by the anti-noise campaign."*

• September 9, 1935, The Lethbridge Herald (Alberta, Canada): *"Bombay too noisy" – "H. E. Ormerod. President of the Western India Automobile Association has sponsored an 'anti-noise' campaign in Bombay, motorists being asked to restrict the use of horns."*

• February 1, 1936, the Kingston Gleaner (Jamaica): one letter to the editor asked of having *"an aggressive 'anti-noise' campaign, directed against auto horns..."*

• June 14, 1936, The Charleston Gazette (West Virginia, US): *"Riga Rests in Silence Week: Much refreshed after peaceful slumbers during the city's 'Noiseless Traffic week,' officials of Riga make the plan permanent. During the seven days auto horns, streetcar bells and other sound signals were forbidden completely night or day."*


DAGBLAD DE LOCOMOTIEF 28 November 1934

DE ABONNEMENTSPRIJS van de NIEUWE SCHIEDAMSCHE COURANT

DINSDAG 29 OCTOBER 1935

DE ANTI-LAWAAI-CAMPAGNE.

De „stilte-zône" wordt uitgebreid.

De Hoofd-Commissaris van Politie verzoekt opname van met navolgende: De sedert Maandag 21 October jl. ingezette anti-lawaaicampagne heeft, dank zij een bewonderenswaardige medewerking van het publiek, in de z.g. „stille-zône" (Vierambachtsstraat, 2e Middellandstraat en Middellandplein) succesvol afgeworpen. Deze successen zijn van dien aard,

Woensdag 22 April 1936

Het tweede Anti-lawaai Congres te Delft. Ir. C. Boot tijdens het uitspreken van zijn rede.

Fig. 4: Some mentions about the "anti-noise week" in the Netherlands

Fig. 5: Miss Malley signing the proclamation of the Hartford City Noise Abatement Week, 1940.

• November 23, 1936, the New York Times: *"Lima Forbids Peddlers to Use Noise-Makers – Peru. Lima's anti-noise campaign has resulted in an ordinance forbidding street peddlers to use horns, whistles or bells to draw attention."*

The "Anti-noise week" in the Netherlands

There is a lot of information available about the activities that took place among 1934 and 1937 that has been rescued in recent years by the Dutch Acoustical Society. There is also a large data base at Max Planck Institute for the History of Science website, with some explanatory

Fig. 6: Poster designed by the National Noise Abatement Council (1941)

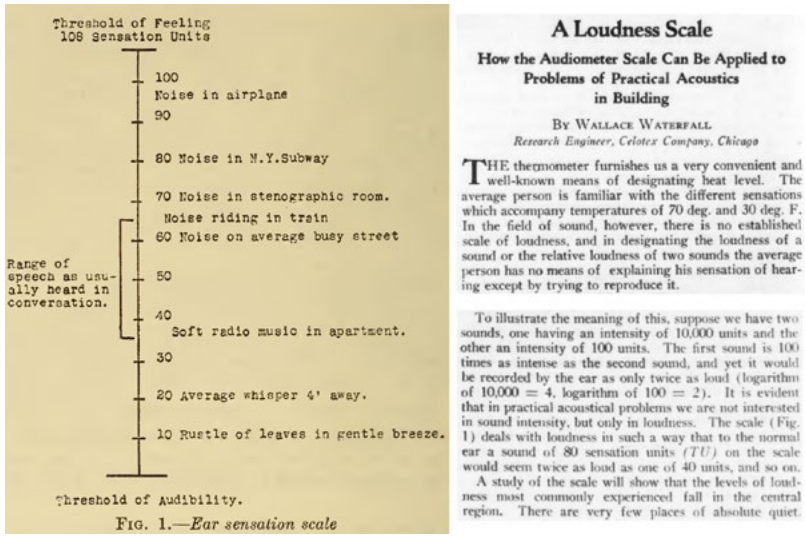


Fig. 7: The unit sensation scale and some significant points (a-1928) (b-1929)

notes in English (Institute, 2018). The author in this article only discusses some media items on the anti-noise actions, because the archives mentioned above only store the valuable documents but not the newspapers that mention them (See Figure 4).

The US "Noise Abatement Week"

In the mid 1940's, a group of professionals from the Acoustical Society of America (ASA) created the "National Noise Abatement Council," with the purpose of making the population aware of the problems of noise on health (among other issues). Several activities then promoted a "Noise Abatement Week," suggested to be held once a year (Little & McGee, 1942). The first edition had a modest beginning on 21-28 October, 1940, but achieved prominence with the large number of mentions in the press.

One interesting feature in the US media occurred in Hartford City (capital of Connecticut) and published in the Hartford Courant newspaper of September 27, 1940 (see Figure 5). As the mayor was absent due to health problems, Lillian L. Malley (1910-1999) took office, becoming the first woman mayor of that city and she had the honorable task of signing the proclamation in which the city adhered to the "Noise Abatement Week" from October 21−26, 1940, thus becoming the first US city to officially join the initiative.

The "Noise Abatement Week" was adopted in many US cities, spreading the publicity with a very famous poster at national level (see Figure 6), designed by the National Noise Abatement Council, which was displayed in more than 200 US cities from June 1 to 7, 1941.

Measuring The Noise in City Streets

It was not until the manufacture of audiometers which measure in 'sound units' based on decibel levels, that there begins to be information about measurements of urban sound, and these measurements began in 1925.

A 'thermometer scale-type' to gauge the noise level

Representing the scale of sound pressure levels as 'if it were a thermometer' is a very useful pedagogical tool since it can be visualized through an ordered numerical scale. There are countless mentions of when this analogy was adopted; and by hunting through the media the author believes the first time that the sound level was published like a thermometer, with the intention of showing a 'Sensation Units' scale, was presented as a part of a Research Paper (see Figure 7-a) published by the US Bureau of Standard in 1928 (Chrisler & Snyder, 1928). So, in this way that representation of the sound levels like a thermometer, has been among us for more than ninety years.

According to this paper "*Wallace Waterfall, in a private communication, has suggested a way of illustrating the values of sensation units in familiar terms. We may call it an ear sensation scale*" (Chrisler & Snyder, 1928). Waterfall explained this numerical scale in an article published in the Engineering News Record journal (see Figure 7-b), closing his article by stating that "*The writer claims no originality in the development of this scale. It has been made possible by the very fine work of Dr. Harvey Fletcher and his colleagues at the Bell Telephone Laboratories and by the experiments of Dr. Vern O. Knudsen at the University of California at Los Angeles*" (Waterfall, 1929).

Automobile-noise measurements in 1925 by H. C. Snook

In the 1925 summer convention of the Society of Automotive Engineers, Homer Clyde Snook (1878-1942) of the Bell Laboratories presented before the Noise Research Session of the Society of Automotive Engineers (on 16 June in White Sulphur Springs, Virginia), a whole set of instruments to measure the noise levels from cars, and a complete article titled "Automobile-Noise Measurement" describing his work (Snook, 1925). This is considered to be the first time that acoustic instruments were technically used to record, analyze and measure the noise emitted by devices, in this case from cars (See Figure 8).

From the Snook article it is clear that engineers in 1925 were thinking outside just the mechanical details, in their quest for the solution of their problems, because they considered psychological and physiological factors relative to the driving of cars. They propose that the problem of noise is not merely a problem in physics, but also a problem in the physiology of hearing and probably also a psychological problem. It is important to note that two thirds of the Snook article is devoted to explaining how sounds are perceived by the auditory system, and how in terms of loudness sound waves can be measured, thus leading readers to understand that acoustic measurements have to be related to how the auditory system 'hears' the sound waves.

We found a commentary on its presentation in Bell's journal, which summarizes it:

Using an audiometer, extra amplifier, and cone loudspeaker, Mr. Snook gave his large audience a rough test of their own hearing. He first caused the tone from the audiometer to vary continuously from a volume easily audible to one completely inaudible to the normal ear. As each of his listeners reached the limit of his own hearing, he raised his hand to indicate that fact; and the way in which hands shot up in the audience, first one and then another, was a striking demonstration of the variations between individuals of acuity of hearing. He also used simultaneously two cone -type loudspeakers to demonstrate the masking effect of a tone or noise and how it could obscure another tone which it was desired to hear. After giving his audience such fundamental ideas as to hearing and the measurement of musical tones and noises, Mr. Snook applied these principles to the problems of reducing noise in an automobile. (Bell, 1925)

From what one can read in the article written by Snook (1925), that set of acoustic instruments was developed to be used indoors, since in some paragraphs it deals with the effect of room reverberation on the measurements.

Fig. 8: Picture of equipment used by Snook for his presentation at the SAE Convention (1925)

SEEK NOISE? IT'S NOISIEST AT 6TH AVE. AND 34TH ST.

Answering the question "How Noisy Is New York?" Dr. E. E. Free, scientific editor of the publication Forum, has found that the noisiest spot in the city is at 34th st. and 6th ave., and the quietest is Grove st., in Greenwich Village.

We humans are virtually noiseless. The greatest cause of clamor is the truck. These facts represent the findings of a survey published in the February number of Forum.

Dr. E. E. Free

Contrary to common belief the ill effect of noise on New Yorkers is "not serious," or the damage is "so small as to be negligible," says Dr. Free.

AudiometerShowsBrooklyn Has Quieter Sections Than Manhattan;AlsoNoisySpots

Dr. Free's Instrument Shows Trucks and Flat Wheels on "L" Lines Worst Offenders—Flatbush Has Lowest Noise Level, Boro Hall Highest.

Brooklyn at its noisiest is as noisy as Manhattan, but it also has quiet places where the concentrated hum that makes up a city's sound is below anything in the hurrying community across the bridge. And on the whole the average sound level of Brooklyn is somewhat lower than that in which Manhattanites have to live.

Thus Dr. E. E. Free discovered yesterday after a pilgrimage up and down the main highways and some of the less important byways of the boro, stopping constantly with his audiometer in search of an answer to the question: How noisy is Brooklyn?

Prospect Park More Quiet Than Central.

At the entrance to Prospect Park, adjoining the great arch, a constant flow of automobiles and trucks forced up the reading to 35, considerably above what a residential neighborhood should have.

In the heart of Prospect Park, away from the automobile roadways, a test was taken with a resulting reading of 10, or 5 lower than the quietest part of Central Park and as low as any point tested in Manhattan.

First Experiments of Kind.

Dr. Free's are the first scientific experiments made to record the noises of a city. Their purpose was to discover what effect, if any, these varied noises have on the health of city dwellers. So far as can be determined, Dr. Free said, they probably affect health only slightly. The effect on the orderly thinking of city dwellers may, however, be very great.

That, however, will have to await still further experiments, some of them based on those already made. The noise-map of the city has not yet been completed, even the noise-map of Manhattan and Brooklyn, where the audiometer has already asked and answered its questions.

Fig. 9: Daily News of 15 Jan. The Brooklyn Daily Eagle of 21 Jan. (1926)

Fig. 10: Free with its audiometer (Illustrated Daily News Feb. 7). The Evening Journal (1926)

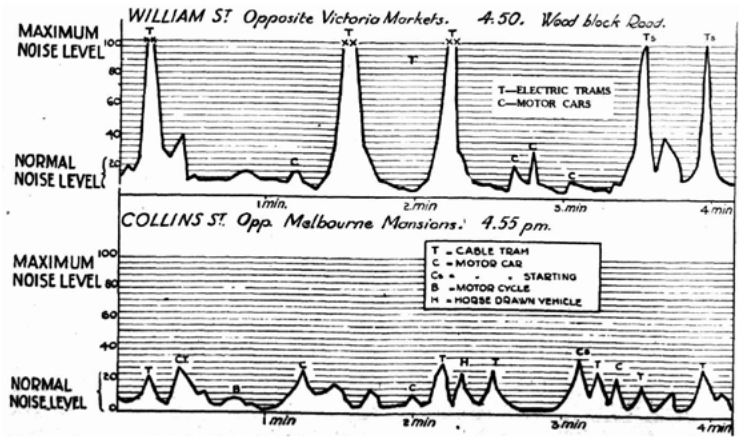


Fig. 11: Noise level chart published in The Herald of Melbourne on May 22, 1928.

Measurement of street noises in several US cities 1926-1927

In December 1925 Edward Elway Free (1883-1939) published the article "Does Noise Injure Health!" in Forum magazine about the health problems caused by noise in cities. This focuses on the need to measure the noise level in order to quantify in some way the damage and danger to the auditory system, and how to solve the noise problems by means of acoustics engineering, pre-announcing the noise measurement campaign that would begin on streets in New York and Brooklyn. During January 1926 he made dozens of measurements under the campaign named "How noisy is New York?", the results of which were published on January 15, 1926 (see Figure 9), but little mention was written of the measurements he made in Brooklyn. Free published a complete article commenting on what he found in The Forum magazine (Free, 1926). As part of the same research, he conducted noise measurements in New York Subways in April.

The Graybar Electric Company was hired to measure the noise levels in some US cities in 1926, with a similar audiometer used for New York measurements; K. P. Royce in February was responsible for the campaign in Washington DC, and in April in Buffalo another survey was done by A. L. Greene (See Figure 10-c).

The Chicago's Health Commissioner Herman K. Bundeson was concerned about health effects of street noise exposure, so the Celotechnic Institute of America started in July 1926 a noise measurement campaign which was conducted by T. B. Munroe, the scientific head of that institution. But the media was worried about the relevance of the findings with one journalist from the South Bend Tribune (Indiana) on July 28th wrote: "*Chicago is to have a noise survey with the object of eliminating unnecessary jarring sounds. When the college boys home on vacation disappear with their fearful and wonderful collegiate automobiles the survey may be superfluous*." Both Graybar's and Celotechnic's measurements are not yet available via the Internet; there are only scattered references in some books and newspapers (See figure 10-c).

Melbourne noise campaign in 1928

On April 30, 1928, under the title of "*Science to investigate electric tram din*," The Herald Melbourne, Australia, announced the beginning of a noise measurement campaign requested by the 3LO radio station. Thomas Howell Laby (1880-1946) a well-known physicist was the head of the investigation and the responsible for devising the instrument to measure the noise levels. In 1928 audiometers were not commercial available equipment, so Laby and his collaborators (Richard Ormond Cherry and R. Fallon) built from scratch the whole chain of devices to record and analyse sound waves.

On May 9th, The Argus evening issue (of Melbourne) described the instrumentation used for the noise measurements: "*The apparatus consists of a microphone for pickuping up noises and a valve amplifier similar to a wireless amplifier, by which the microphone currents are 'boosted up' to sufficient strength to work a delicate stylus tracing a graph on a sheet of squared paper, which is drawn beneath the stylus by clockwork*." One chart obtained by this chain is shown in Figure 11.

Laby, Cherry and Fallon work was a pioneering study as:

(a) They did not use the audiometer for their noise measurements;

THE EVENING STAR, WASHINGTON, D. C.,
WEDNESDAY MAY 20, 1931.

"Noise is any undesired sound," says the Acoustical Society of America, defining the word scientifically for the first time.

Webster may not be quite so scientific, but it has some pretty good definitions:

1. Loud, confused, or senseless shouting or outcry; clamor; din or uproar of persons.

2. General, or common, talk or discussion; rumor; report.

3. Sound or a sound of any sort, whether loud or harsh, or low, pleasant or melodious; also, noises collectively; as, the city and its noise.

The concise Oxford says: Noise—loud outcry, clamor, shouting, din of voices and movements; any sound, especially loud or harsh one.

* * * *

The definition of the Acoustical Society shifts the meaning by putting the definition, in reality, in the hands of the listener.

The greatest symphony orchestra in the world might become a noise, under this definition, to a man who was trying to sleep in a building next door.

A student studying for the bar might easily enough construe the words of a great orator as a noise, pure and simple.

If undesired by him, it would be a noise, according to this definition.

The psychology of the Acoustical Society definition is acute. "Noise is any undesired sound."

The mind of the listener has as much to do with it, then, as his ears, if not more so. Those who do not happen to be sensitive to the particular noise put on looks of loftiness and declare, "You should use will power."

Will power has little, if anything, to do with it. The mind of the listener, having gathered in the sound, or noise, insists on keeping it.

What the critic does not realize is that the mind will build this noise up, for itself, if the noise insists on abating.

* * * *

Man, under civilization, tends to bring in his own personality, until the Acoustical Society boldly and honestly gives the world the definition, "Noise is any undesired sound."

Noise, in other words, is a sound you don't like, don't want to hear. It is an intruder in your symphony of life.

Every man his own lexicographer! Such is the precedent set by the Acoustical Society of America. It is a step forward up the ladder called the rights of man.

Fig. 12: Text extracted from "This and That" column by Charles E. Tracewell (1931)

Fig. 13: The noise map of London published by The Times (1933)

(b) They recorded the sound time-history on paper (not by means of mechanical mirrors/photos);

(c) They broadcast the sound picked up by the microphone simultaneously;

(d) They published the complete work in a newspaper.

An article by the author describing this measurement campaign in Melbourne is being prepared for publication in the journal Acoustics Australia.

'Noise' is scientifically defined by ASA in 1931

In 1929 the Acoustical Society of America created several committees, and one of them was appointed to develop descriptions of acoustical terms to standardize the common words used in acoustics. Dr. Floyd Alburn Firestone (1898–1986), of the University of Michigan, was the chairman of the Committee, and among 160 definitions, the word "noise" was described for the first time in1931 as "*Noise is any undesired sound*." Journalists and critics did not miss the opportunity to take a critical look at the ASA's definition, and one of the most acidic articles was published in The Evening Star newspaper (of Washington DC) on May 20, 1931 (see Figure 12).

"Charles E. Tracewell" was the alter ego of the journalist Templeton Jones, a character he created whose observations on the multitude of everyday things others accepted as routine comprised his popular column "This and That" in The Evening Star newspaper, and He attempts to use philosophical arguments from Schopenhauer and Spencer to criticize the definition; yet, after 90 years, "*Noise is any undesired sound*" is still used worldwide.

The 'noise inspector' and the first London noise map of 1933

In 1933 the London Anti-Noise League launched a major media campaign against noise, and they brought into activity a "noise inspector", a former Army sergeant named John Ilett (Sydney, 1933). On 8 November the League announced that a noise map will be prepared to identify the locations of the higher noise. The Times of London on Friday November 17, 1933, published for the first time a noise map (Times, 1933) as is shown in Figure 13. The map was issued by the Anti-Noise League and is based upon the investigations done by the noise inspector. It concerned only motor traffic, noisy omnibus engines and gears, etc. The worst combination of these noises was identified at the junction of Park Lane and Hamilton Place in Piccadilly. This 1933 and a further 1935 campaign are well documented on Internet.

The "Premiere Conference Internationale De L'acoustique" In 1937

This conference was the first international meeting, under the auspices of the International Electrotechnical Commission (IEC), held in Paris from 30 June to 3 July 1937, with participation by 70 delegates representing 19 countries and international organizations. These included the International Federation of National Standards Associations (the former ISO); the International Union

of Broadcasting; the International Telephone Consultative Committee. Three documents summarizing the work of the commission are available, and the one published in Le Génie Civil is the most complete −other is (G.C., 1937) and another (Akustische, 1937) − of which the English translation of its paragraphs is transcribed here:

The scientific or technical applications of acoustics have developed considerably in recent years. The technical studies required by the development of long-distance telephone communications and the creation of telephone headsets and loudspeakers have led telegraph and electrical engineers to submit entirely new problems to acousticians. The development of traffic in the cities led the municipalities to undertake the fight against noise. Some acoustic measurements required the development of new measurement methods and the definition of special acoustic units. Inside the houses themselves, the fight against noise has required the creation of special insulating materials. Finally, architecture, taking advantage of the numerous works carried out over the last fifteen years, particularly in the United States, has benefited from new calculation methods or experimental results which have allowed the creation of rooms with an excellent acoustic performance. (Dumont, 1937)

These acoustic works have been carried out in the principal civilized countries, but it is in the United States and in England that the most decisive progress has been made. In France, we are still a few years behind, but we must pay tribute to the efforts of a small group of scientists and engineers whose value outweighs their number. The confrontation of all these works had led the specialists of acoustics to deplore a lack of unity in the definition of the terms of the vocabulary used and in the methods of measurement and control. (Dumont, 1937)

Mr. Ch. Duval, President of the French Electrotechnical Committee, was the General Chairman, he was assisted by Messrs. Brylinski, President of the AFNOR; H. Ruf, Secretary General of the ISA, and Le Maistre, Secretary General of the IEC. The IEC General Secretariat divided the congressmen into five committees:

• **Committee N° 1**. Chairman: Jacques Brillouin (France) - responsible for developing the vocabulary.

• **Committee N° 2**. Chairman: Harvey Fletcher (US) - to carry out studies and unify measurement methods, in particular for the use of the sound level meter.

• **Committee N° 3**. Chairman: Martin Grützmacher (Germany) - to study electro-acoustic: recording, transmission and reproduction of sounds; a sub-commission was created there for musical acoustics.

• **Committee N° 4**. Chairman: Dr. George William Clarkson Kaye (England) – to deal with architectural acoustics.

• **Committee N° 5**. Chairman: Dr. Gigli (Italy) – to study noise and vibration reduction.

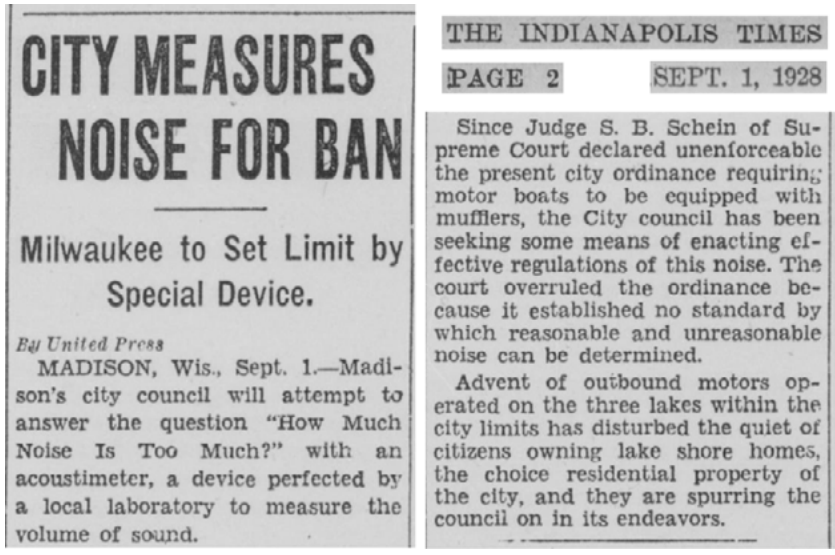
While Fletcher, Kaye and Grützmacher are well-known acousticians, little is known about Jacques Brillouin, although he was a great acoustician whose activity is unfortunately mistaken for that of his brother Leon, who is better known than Jacques. For the author it is important to rescue to the history his work: Jacques Brillouin (1892-1971) was the head of the acoustic services of the laboratories of building and public works of Paris. He wrote several books on acoustics and he signed as 'Ingénieur acoustician.' Jacques designed many theaters (including the Paris Trocadéro) and auditoria, he was lecturer for several institutions and he is a co-founder in 1932 of the journal Revue d'Acoustique and in 1948 of Groupement des Acousticiens de Langue Française, an organization that developed into the Société Francaise d'Acoustique-SFA (SFA, n.d.). Unfortunately the author has yet to find information on Dr. Gigli but presumes he was an otologist.

The following is a summary of the work of each of these committees, written by Augustin Dumont, Ingénieur des Arts et Manufactures (Dumont, 1937).

Committee N° 1: Vocabulary. The Committee examined the draft French vocabulary relating to physical acoustics. The chapters of this subdivision: general terms, vibrating mechanical system, acoustic oscillations in a fluid, were reviewed during the first session. In the second session, the terms relating to electro-acoustic devices and transmission systems were examined by Committee N° 1, which was joined by most of the members of Committee N° 3 (electroacoustics), who were particularly interested in the terms of this subdivision. Some terms were corrected or newly defined; a few definitions were reserved for further study (Dumont, 1937).

Committee N° 2: Unification of measurement methods. The Committee considered questions relating to the fundamental units and methods of measurement of acoustics, especially those relating to the measurement of sound, since significant differences had arisen in various scientific works with respect to the reference sound, the reference zero and the definition of the units of sound intensity. The Committee was of the opinion that "sound intensity, in the case of travelling waves, should be defined as the energy flux per second per unit area (square centimeter) normal to the direction of propagation." However, since this definition applies only to the case of traveling waves, it was considered inappropriate for more general use. The question of the general definition of "loudness" was referred to a subcommittee.

Fig. 14: Advertisement on calibrated sound level meters (Electronics magazine, August 1940)



CITY MEASURES NOISE FOR BAN

Milwaukee to Set Limit by Special Device.

By United Press

MADISON, Wis., Sept. 1.—Madison's city council will attempt to answer the question "How Much Noise Is Too Much?" with an acoustimeter, a device perfected by a local laboratory to measure the volume of sound.

THE INDIANAPOLIS TIMES

PAGE 2 SEPT. 1, 1928

Since Judge S. B. Schein of Supreme Court declared unenforceable the present city ordinance requiring motor boats to be equipped with mufflers, the City council has been seeking some means of enacting effective regulations of this noise. The court overruled the ordinance because it established no standard by which reasonable and unreasonable noise can be determined.

Advent of outbound motors operated on the three lakes within the city limits has disturbed the quiet of citizens owning lake shore homes, the choice residential property of the city, and they are spurring the council on in its endeavors.

Fig. 15: Article comments the Madison City intention to set noise limits (1928)

The committee defined the reference sound to be used as the basis for the unit and scale of measurement of noise as follows:

(1) The sound shall be produced by a plane sine wave, progressive and having a frequency of 1.

(2) The reference zero shall correspond, in round figures, either to an intensity of 10-16 watts or to a sound pressure of 2·10-4 low ryes (dynes per centimeter).

(3) In either case, the scale of intensity or pressure shall be graduated in decibels from the reference zero.

The Committee was of the opinion that the unit for the measurement of noise should be called "phone," the measurement to be made as follows. The reference sound and the sound to be measured should be listened to alternately with both ears. The reference sound shall be adjusted until it is judged by a normal observer to be of the same strength as the sound to be measured. The reference sound and the sound to be measured shall, whenever possible, be listened to for approximately equal durations. In any case, the duration of listening to the reference sound should not be less than one second. When, under these conditions, the intensity level (or pressure level) of the reference sound (pressure being that which exists in the free wave before the operator's head is in the sound field) is n decibels above the reference zero, the sound to be measured is said to have a subjective acoustic intensity of n phones. The Committee then formed a subcommittee to study the specification of an apparatus for the objective measurement of sound; the chairmanship of this subcommittee was given to Dr. Davis (Great Britain). Prior to the Conference, three devices had been tested: a German, an American and a French one. They gave approximately equal results, but for some sounds their indications were considerably inferior to the results of subjective measurements. It seemed premature to the Sub-Committee to draw a conclusion from all these measurements. But the Committee, having thus brought to light the present state of the problem, has made a contribution to the realization of a universally applicable apparatus for the objective measurement of noise (Dumont, 1937).

Note: Fletcher (1938) is a brief article about the work of this committee from the Bell Laboratory Record.

Committee N° 3: Electroacoustics. This Committee has put the following questions on its agenda:

(1) Comparative scheme concerning sound recordings and reproductions.

(2) Calibration of microphones (unification of measurement methods).

(3) Loudspeakers: unification of measurement methods, qualification scheme. Standardization of the number of vibrations of the [musical note] 'A'.

The French delegation had been asked by Mr. Rabaud, member of the Institute, director of the Conservatoire National de Musique et de Déclamation, to standardize the 'A' throughout the world. The various delegations were unanimous in recognizing the necessity of this standardization. However, none of them having been expressly mandated to do so, the delegates were invited to send to the German Secretariat, within one month, the proposals of their national committees. A meeting will be held later in Vienna to try to unify the number of vibrations of the normal 'la' (Dumont, 1937).

Committee N° 4: Architectural acoustics. The Committee discussed the methods adopted in the various countries for: (1) The measurement of sound absorption based on reverberation by materials. (2) The transmission of airborne sound through partitions and walls. (3) The transmission of percussive sound through floors. The Committee considered that it was desirable to standardize absorption methods based on reverberation. It was recalled that a comparison of international results for certain materials was made some years ago by the American Standard Association. Because of the increase in the number of laboratories performing such tests in all countries, it was recognized that new international comparisons should be made again, using two materials, one highly absorbent, the other not very absorbent (Dumont, 1937).

Committee N° 5: Noise and vibration reduction. The Committee decided to collect from the National Committees documentation on the following questions:

(1) Noise and vibration control, regarding measurement methods and the physiological, medical, educational and administrative aspects of the question.

(2) Standardization of audiometers for medical use (Dumont, 1937).

Coordinating Committee: The purpose of this committee was to ensure liaison among the others. It has decided to separate from Committee N° 3 (electroacoustics) the question of the unification of normal 'A', which concerns mainly conductors and manufacturers of musical instruments (Dumont, 1937).

First Zoning Ordinances Quantifying Noise Limits

In this section, the author summarizes the firsts ordinances which set noise limits in decibels. Following the standardization of sound level measurements in 1937, it was not until 1940 (see Figure 14) that methods for calibrating sound level meters were developed. It is from 1944 onwards that street noise measurements used a standardized instrument, when the first Standard for sound level meters Z24.3-1944 was published (ASA, 1944).

Madison, Wisconsin, and its 1928 ordinance to intent to set noise limit

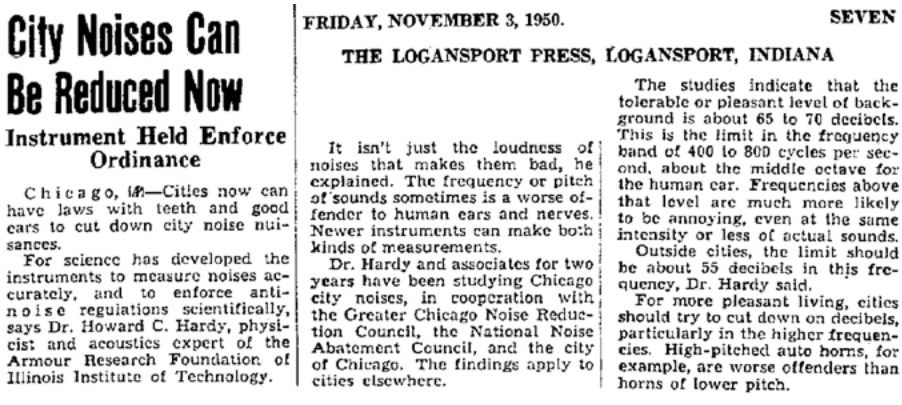
In 1928 in Madison, Wisconsin, the city's council wanted to attempt to answer the question "How much noise is too much?" An acoustimeter was proposed to measure the volume of sound and the level to be regulated within the ordinance (see Figure 15). However the court overruled the ordinance because it established no standard by which unreasonable noise could be determined. This is one of the first mentions in the media about an ordinance setting noise limits, and this same city had to wait for more than 25 years before it could introduce one.

The 1950 noise ordinance of Chicago

Howard C. Hardy (1911-1962) was a leading acoustician from Chicago (working at Armor Research Foundation of Illinois Institute of Technology); during twelve months between 1948 and 1949, he conducted a noise survey at several sites in Greater Chicago. He analyzed the resulting values in order to propose noise limits in terms of decibels. This emblematic research is not available from the Internet yet, but there are dozens of media articles commenting the results (See Figure 16). The author has not been able to find a copy of the original ordinance, but this newspaper article in Figure 16 mentions the existence of noise levels in decibel values for the city of Chicago, and it is clear that the limits were given by frequency in octave-bands. So it is clear that it was in 1950 that the city of Chicago had an ordinance to legislate noise limits in decibel values and these had to be measured using standardized instruments.

The US zoning ordinances with noise limits

On September of 1955 the American Society of Planning Officials published a Report N° 78, a complete work about the Industrial Zoning Standards: "*In this report we discuss in general terms the progress thus far in the use of standards for the control of uses placed in industrial districts. The comments will be based on a detailed analysis of 11 zoning ordinances either adopted or proposed in cities throughout the United States that introduces this concept*" (ASPO, 1955).



City Noises Can Be Reduced Now

Instrument Held Enforce Ordinance

Chicago, (AP)—Cities now can have laws with teeth and good ears to cut down city noise nuisances.

For science has developed the instruments to measure noises accurately, and to enforce anti-noise regulations scientifically, says Dr. Howard C. Hardy, physicist and acoustics expert of the Armour Research Foundation of Illinois Institute of Technology.

FRIDAY, NOVEMBER 3, 1950. SEVEN

THE LOGANSPORT PRESS, LOGANSPORT, INDIANA

It isn't just the loudness of noises that makes them bad, he explained. The frequency or pitch of sounds sometimes is a worse offender to human ears and nerves. Newer instruments can make both kinds of measurements.

Dr. Hardy and associates for two years have been studying Chicago city noises, in cooperation with the Greater Chicago Noise Reduction Council, the National Noise Abatement Council, and the city of Chicago. The findings apply to cities elsewhere.

The studies indicate that the tolerable or pleasant level of background is about 65 to 70 decibels. This is the limit in the frequency band of 400 to 800 cycles per second, about the middle octave for the human ear. Frequencies above that level are much more likely to be annoying, even at the same intensity or less of actual sounds.

Outside cities, the limit should be about 55 decibels in this frequency, Dr. Hardy said.

For more pleasant living, cities should try to cut down on decibels, particularly in the higher frequencies. High-pitched auto horns, for example, are worse offenders than horns of lower pitch.

Fig. 16: The Chicago City noise ordinance published on the media (1950)

STANDARDS FOR NOISE LIMITS

Ordinance	Maximum Noise
Albuquerque	
C-3 Unlimited Commercial	50 sones
M1 Industrial	No maximum
M2 Industrial	No maximum
Anne Arundel County	
Light Industrial	70 decibels
Heavy Industrial	70 decibels at zone boundaries
Center Line	
M1 Industrial	75 db. day; 70 db. night
M2 Industrial	80 db. day; 75 db. night
M3 Industrial	85 db. day; 80 db. night
Chicago (See Table 4)	
Clarkstown (See Table 4)	
Parsippany-Troy Hills Township	
A Industrial	20 sones
B Industrial	40 sones
Penn Township	
Restricted Industrial	20 sones
Rye	
Office-Laboratory	50-70 db. (See Table 5)
Southfield Township	
Technical Education-Research	50-75 db.
Warren Township	
M1 Industrial	60 decibels
M2 Industrial	65 decibels
M3 Industrial	70 decibels
M4 Industrial	75 decibels

Fig. 17: Table summarizing noise limits for various US cities around 1955

Octave Band in Cycles per Second	Maximum Sound Pressure Level in Decibels 0.0002 dynes per square centimeter			
	Chicago		Clarkstown	
	Residence District Boundaries	Business District Boundaries	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
0-75	72	79	___	___
20-75	___	___	74	69
75-150	67	74	59	54
150-300	59	66	52	47
300-600	52	59	46	41
600-1,200	46	53	42	37
1,200-2,400	40	47	39	34
2,400-4,800	34	41	36	31
Above 4,800	32	39	___	___
4,800-10,000	___	___	33	28

Fig. 18: Chicago and Clarkstown zoning ordinances noise limits (ASPO, 1955)

Given that this subject has not been completely studied, the author is struck by the fact that at the beginning, some ordinances used values in sones for their zone noise limit (see Figure 17).

An important fact to highlight is that all ordinances give their limit values in linear decibels, because from what is read in all references they never mention "dBA," but "db" or decibels, and an interesting statement is given in this report:

A noise limit specified only by a single decibel figure with no mention of octave bands, of instrument standards, or of a frequency-weighting network is meaningless under strict interpretation. It is possible that a liberal court might read into the figures a proper adjustment. But in view of the quiet precise nature of the term "decibel" this is doubtful.

The sone is also a clearly (although not easily) defined term and actually needs no further elaboration in the ordinance. However, because the sone is not directly measurable by simple instruments, it is not the most practical unit to describe noise. (ASPO, 1955)

In the same report is presented the noise ordinances in terms of octave-band noise levels (see Figure 18), for the Chicago City. Hardy was responsible for Chicago, and Bolt, Beranek and Newman Co for Clarkston City (ASPO, 1955).

The author communicated via e-mail with the archives offices of the cities mentioned above, and received responses from all of them, except Chicago. The unanimous response was that there is no copy of those old ordinances among their archived documents.

1955 Zoning ordinance of Barcelona

The author made a surprising finding during his research in that there was an urban zoning ordinance for the city of Barcelona in 1955, which gave the noise limit of 60 decibels for mixed residential areas with industries (See Figure 19).

1957 Zoning ordinance of Madison on noise and vibration

The only complete transcript of a published ordinance in print that the author has found is from 1957 from the city of Madison (see Figure 20), the same city that attempted to legislate noise levels in 1928. This city is 237 km (147 mi) from Chicago, so perhaps they were strongly influenced by the ordinance of that city. As can be read in the text, to apply the ordinance, a sound level meter analyzer had to be used, with the latest standardization requirements, i.e., instruments designed after 1953 had to be used (See Figure 20).

Conclusion

As a result of World War II, all international actions against noise that began in the 1930s were interrupted and the acoustic community had to wait decades to coordinate global activities. It is important to promote Henry Spooner and Greenville Kleiser as the pioneers in proposing a day to reflect on the health problems of noise.

The author wrote this article based on media published in English and using the automatic translators for some sources in Belgian, Dutch, German, and French. There is a vast amount of data that can be accessed so the author encourages other acousticians to investigate the first anti-noise actions using in their own language.

Until new information is found it appears that Chicago was the first city to have a noise ordinance in 1950.

The author suggests that the acoustics community consider commemorating the centenary of the first noise measurements using instruments developed for that purpose and undertaken by H.C. Snook, and that the International Congress on Acoustics ICA2025 include an appropriate commemoration of this achievement.

Acknowledgements

The author wishes to thank to Andrea Bauerdorff of Umweltbundesamt from Germany to providing the Akustische Zeitschrift journal; also, to Marion Burgess for assisting with the English expression, and to Eoin A. King and the Board of NNI magazine for the opportunity to publish.

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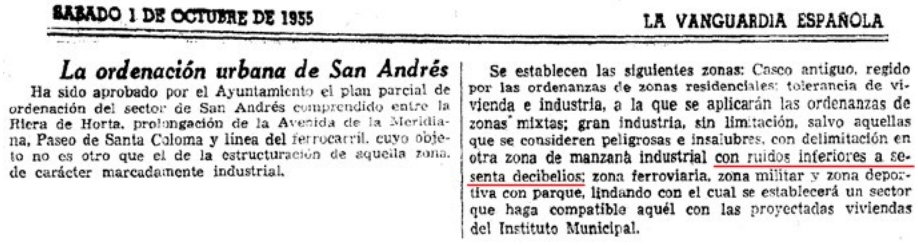


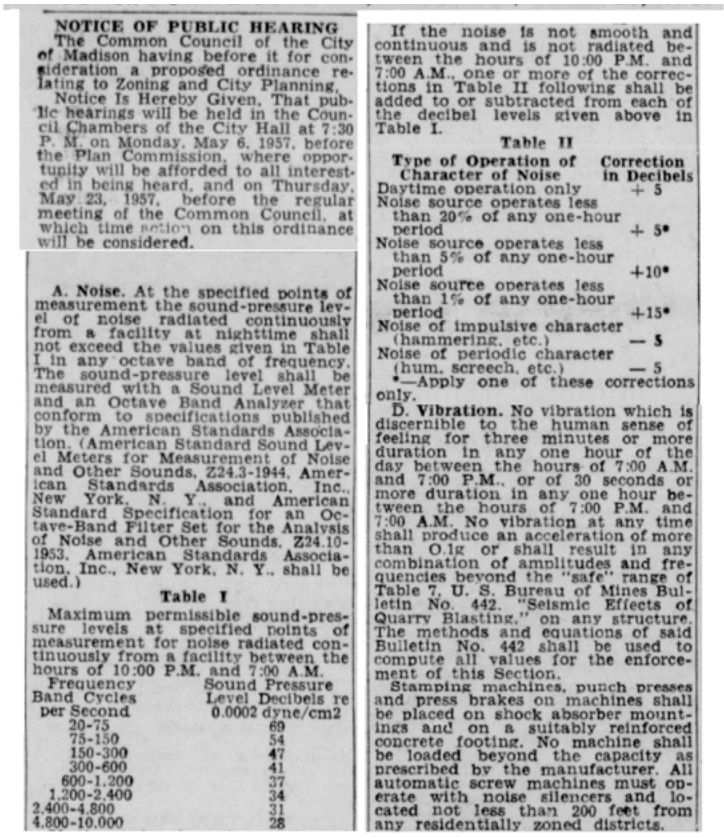
SABADO 1 DE OCTUBRE DE 1955 — LA VANGUARDIA ESPAÑOLA

La ordenación urbana de San Andrés

Ha sido aprobado por el Ayuntamiento el plan parcial de ordenación del sector de San Andrés comprendido entre la Ribera de Horta, prolongación de la Avenida de la Meridiana, Paseo de Santa Coloma y línea del ferrocarril, cuyo objeto no es otro que el de la estructuración de aquella zona, de carácter marcadamente industrial.

Se establecen las siguientes zonas: Casco antiguo, regido por las ordenanzas de zonas residenciales; tolerancia de vivienda e industria, a la que se aplicarán las ordenanzas de zonas mixtas; gran industria, sin limitación, salvo aquellas que se consideren peligrosas e insalubres, con delimitación en otra zona de manzana industrial con ruidos inferiores a sesenta decibelios; zona ferroviaria, zona militar y zona deportiva con parque, lindando con el cual se establecerá un sector que haga compatible aquél con las proyectadas viviendas del Instituto Municipal.

Fig. 19: Noise limit for mixing urban zones in San Andres, a Barcelona City district (1955)



NOTICE OF PUBLIC HEARING

The Common Council of the City of Madison having before it for consideration a proposed ordinance relating to Zoning and City Planning,

Notice Is Hereby Given, That public hearings will be held in the Council Chambers of the City Hall at 7:30 P. M. on Monday, May 6, 1957, before the Plan Commission, where opportunity will be afforded to all interested in being heard, and on Thursday, May 23, 1957, before the regular meeting of the Common Council, at which time action on this ordinance will be considered.

A. Noise. At the specified points of measurement the sound-pressure level of noise radiated continuously from a facility at nighttime shall not exceed the values given in Table I in any octave band of frequency. The sound-pressure level shall be measured with a Sound Level Meter and an Octave Band Analyzer that conform to specifications published by the American Standards Association. (American Standard Sound Level Meters for Measurement of Noise and Other Sounds, Z24.3-1944, American Standards Association, Inc., New York, N. Y., and American Standard Specification for an Octave-Band Filter Set for the Analysis of Noise and Other Sounds, Z24.10-1953, American Standards Association, Inc., New York, N. Y., shall be used.)

Table I

Maximum permissible sound-pressure levels at specified points of measurement for noise radiated continuously from a facility between the hours of 10:00 P.M. and 7:00 A.M.

Frequency Band Cycles per Second	Sound Pressure Level Decibels re 0.0002 dyne/cm2
20-75	69
75-150	54
150-300	47
300-600	41
600-1,200	37
1,200-2,400	34
2,400-4,800	31
4,800-10,000	28

If the noise is not smooth and continuous and is not radiated between the hours of 10:00 P.M. and 7:00 A.M., one or more of the corrections in Table II following shall be added to or subtracted from each of the decibel levels given above in Table I.

Table II

Type of Operation or Character of Noise	Correction in Decibels
Daytime operation only	+ 5
Noise source operates less than 20% of any one-hour period	+ 5*
Noise source operates less than 5% of any one-hour period	+10*
Noise source operates less than 1% of any one-hour period	+15*
Noise of impulsive character (hammering, etc.)	— 5
Noise of periodic character (hum, screech, etc.)	— 5

*—Apply one of these corrections only.

D. Vibration. No vibration which is discernible to the human sense of feeling for three minutes or more duration in any one hour of the day between the hours of 7:00 A.M. and 7:00 P.M., or of 30 seconds or more duration in any one hour between the hours of 7:00 P.M. and 7:00 A.M. No vibration at any time shall produce an acceleration of more than 0.1g or shall result in any combination of amplitudes and frequencies beyond the "safe" range of Table 7, U. S. Bureau of Mines Bulletin No. 442, "Seismic Effects of Quarry Blasting," on any structure. The methods and equations of said Bulletin No. 442 shall be used to compute all values for the enforcement of this Section.

Stamping machines, punch presses and press brakes on machines shall be placed on shock absorber mountings and on a suitably reinforced concrete footing. No machine shall be loaded beyond the capacity as prescribed by the manufacturer. All automatic screw machines must operate with noise silencers and located not less than 200 feet from any residentially zoned districts.

Fig. 20: Noise ordinance for Madison City (Wisconsin) in 1957

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Conference

Below is a list of congresses and conferences sponsored by International INCE and INCE-USA. A list of all known conferences related to noise can be found by going to the International INCE website (www.i-ince.org/).

June 13–15, 2022
Noise-Con 2022
Lexington KY, USA

August 21–24, 2022
Inter-Noise 2022
Scottish Event Campus
Glasgow

October 24–28, 2022
International Congress on Acoustics (2022)
Gyeongju, Korea

Directory of Noise Control Services

Information on listings in the Directory of Noise Control Services is available from the INCE-USA Business Office, 11130 Sunrise Valley Dr., Suite 350, Reston, VA 20191-4371 Telephone: +1.703.437.4073 email: ibo@inceusa.org.

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Books Available

Noise and Vibration Control, edited by Leo L. Beranek

Noise Control in Buildings, by Cyril M. Harris