

**AZIMUTHAL LOCALIZATION AND DETECTION OF VEHICULAR BACKUP ALARMS
UNDER ELECTRONIC AND NON-ELECTRONIC HEARING PROTECTION DEVICES
IN NOISY AND QUIET ENVIRONMENTS**

by

Khaled A. Alali

Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Industrial and Systems Engineering

John G. Casali, Chair
Ricardo A. Burdisso
Brian M. Kleiner
Tonya L. Smith-Jackson

March 29, 2011
Blacksburg, Virginia

Keywords: Hearing protector, electronic earmuff, musician's earplug, flat attenuation, backup alarm, reverse alarm, alarm spectrum, sound localization, auditory warning signal localization, detection distance, broadband backup alarm, Combat Arms earplug

Permission Letters for Figures 1 & 2, and Table 2

That is fine as long as the source is properly referenced.
thanks for asking,
Noah

Khaled Alali wrote:

>
> Hi Dr. Seixas,
>
> I am a PhD student at Virginia Tech and I am using some of the figures
> from the attached report in my dissertation. Before submitting my
> dissertation to Virginia Tech, I need to get a permission from you to
> do so. I appreciate if you can email me back with your permission.
>
>
>
> Khaled Alali
>
> PhD Candidate
>
> Grado Department of Industrial and Systems Engineering
>
> Auditory Systems Laboratory
>
> Virginia Tech
>
>
>

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Noah S. Seixas, PhD, Professor
Department of Environmental and Occupational Health Sciences University of Washington,
School of Public Health and Community Medicine
4225 Roosevelt Way NE
Seattle, WA 98105-6099
phone: 206-685-7189
fax:206-616-6240
email: nseixas@u.washington.edu

**Permission Letters for Figures 3, 4, 6, 13, 15, 16,
17, 29, & 34, and Table 3**

Permission is granted from me on the following figures noted herein.

JGC

Dr. Casali,

I need to get a permission from you, in the form of email, to use any figure from the following references:

1. Casali, J. G. (2005). Advancements in hearing protection: Technology, applications, and challenges for performance testing and product labeling (pp. 2097-2118). Presented at the International Congress and Exposition on Noise Control Engineering, Rio de Janeiro, Brazil.
2. Casali, J. G., & Alali, K. (2009). Vehicle backup alarm localization (or not): Effects of passive and electronic hearing protectors, ambient noise level, and backup alarm spectral content (Vol. 53, pp. 1617-1621). Presented at the Human Factors and Ergonomics Society Annual Meeting, San Antonio, Texas.
3. Casali, J. G., & Berger, E. H. (1996). Technology advancements in hearing protection circa 1995: Active noise reduction, frequency/amplitude-sensitivity, and uniform attenuation. *American Industrial Hygiene Association Journal*, 57, 175-185.
4. Casali, J. G., & Lancaster, J. A. (2008). *Quantification of and solutions to the impediments to speech communication and signal detection in the construction industry: Final report* (No. VTSP 4/15/08-3-HP). Blacksburg, VA: Virginia Polytechnic Institute and State University, Auditory Systems Laboratory.

By the way, I already contacted the AIHA journal to get their permission to use some of the figures in reference#3.

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech

--

John G. Casali, Ph.D., CPE

John Grado Professor

Grado Dept. of Industrial and Systems Engineering

Director, Auditory Systems Laboratory

Past-President, National Hearing Conservation Association

www.hearingconservation.org

| 519G Whittemore Hall, ISE Department
| Virginia Tech, Blacksburg, VA 24061
| Office Phone: (540) 231-5073
| FAX Phone: (540) 231-3322
| Dept. Office phone: (540) 231-9081
| e-mail address: icasali@vt.edu
| Web Page-Short Vita: http://filebox.vt.edu/users/jcasali/John_Casali_short_vita.pdf
| Web Page-Laboratory: http://filebox.vt.edu/users/jcasali/VT_Auditory_Systems_Lab_Overview.pdf
| Web Filebox: <http://filebox.vt.edu/users/jcasali/>

\\
V/ECH



Our Ref: P041911-05

19 April 2011

Khaled Alali
PhD Candidate
Grado Department of Industrial and Systems Engineering
Auditory Systems Laboratory
Virginia Tech
alalikh@vt.edu

Dear Khaled,

Thank you for your correspondence requesting permission to reproduce **Figure 11** from Casali, John G. and Berger, Elliott H. "Technology Advancements in Hearing Protection Circa 1995: Active Noise Reduction, Frequency/Amplitude-Sensitivity, and Uniform Attenuation." *American Industrial Hygiene Association Journal* 57: (2) 175-185 in your forthcoming dissertation.

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A handwritten signature in cursive script that reads "Casey Jackson".

Casey Jackson
Permissions Coordinator

Dear John and Khaled

As the Internoise2005 president permission is granted for:

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Material to be reproduced:

Figures#4, 5, and 6 on pages 2105 and 2106.

Regards
SAMIR

Prof. Samir N. Y. Gerges, Ph.D. - Past President ICA <www.icacommission.org>
Vice President I-INCE for Development and Vice president FIA.
Laboratory of Acoustics and Vibration (LVA)
Mechanical Engineering Department (EMC)
Federal University of Santa Catarina (UFSC)
University Campus - Trindade.
Florianopolis, Santa Catarina, Brazil
88040-900

Tel: (+55)-48-3234.4074 / Tel-Cel. (48)9980.7484 / fax: (+55) -48-3232.0826
E-mail: samir@emc.ufsc.br
Homepage: www.gva.ufsc.br / www.ruido.ufsc.br / www.lari.ufsc.br

De: John Casali [mailto:jcasali@vt.edu]
Enviada em: quarta-feira, 27 de abril de 2011 19:52
Para: samir@emc.ufsc.br
Cc: alalikh@vt.edu
Assunto: Fwd: Copyright Permission For Khaled Alali
Prioridade: Alta

Samir,

I should have written you first to ask for this request (see below). Khaled, my PhD student, is just trying to get everything in place for graduation this week, so if you could grant the permission from the Congress's standpoint as soon as possible by return email, that would be great. The permission is for using the figure in his dissertation.

I enjoyed seeing you and your son at NHCA. I wish we had more time together. Perhaps next time you can visit me here.

All the best,

John

Dr. Casali,
Here is the detail of my permission request:

Title of selection:

Casali, J. G. (2005). Advancements in hearing protection: Technology, applications, and challenges for performance testing and product labeling (pp. 2097-2118). Presented at the International Congress and Exposition on Noise Control Engineering, Rio de Janeiro, Brazil.

Material to be reproduced:

Figures#4, 5, and 6 on pages 2105 and 2106.

--

Khaled Alali
PhD Candidate
Grado Department of Industrial and Systems Engineering
Auditory Systems Laboratory
Virginia Tech

--

John G. Casali, Ph.D., CPE

John Grado Professor
Grado Dept. of Industrial and Systems Engineering
Director, Auditory Systems Laboratory
Past-President, National Hearing Conservation Association
www.hearingconservation.org

| 519G Whittemore Hall, ISE Department
| Virginia Tech, Blacksburg, VA 24061
| Office Phone: (540) 231-5073
| FAX Phone: (540) 231-3322
| Dept. Office phone: (540) 231-9081
| e-mail address: jcasali@vt.edu
| Web Page-Short Vita: http://filebox.vt.edu/users/jcasali/John_Casali_short_vita.pdf
| Web Page-Laboratory: http://filebox.vt.edu/users/jcasali/VT_Auditory_Systems_Lab_Overview.pdf
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\ //
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Permission Letters for Figure 5

Khaled,

You may need to seek permission from Lawrence Erlbaum Associates (now CRC Press). I think there may be an online form. I'm fine with you using figures (as long as there attribution is given to the chapter it appears) but that might not be technically enough and that's the reason I mention asking the publisher. They should give you permission at no charge because you are using it in a research document and are not making money in doing it.

Good luck!

Sincerely,
Mike Wogalter

On Wed, Mar 30, 2011 at 6:06 PM, Khaled Alali <alalikh@vt.edu> wrote:

Hi Dr. Wogalter,

I am a PhD student at Virginia Tech and I want to paste some of the figures from your book (Handbook of Warnings) on my dissertation. Before submitting my dissertation to Virginia Tech, I need to get a permission from you to paste these figures. I appreciate if you can email me back with your permission.

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech

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**Permission Letters for Figures 7, 8, 9, 10, 11, 12,
& 14**

There should be no problem, but please be more specific and also please contact me at elliott.berger@mmm.com

Thank you and good writing.

Elliott

At 10:16 PM 3/20/2011, you wrote:

Hi Dr. Berger,

I am a PhD student at Virginia Tech and I am using some of the figures from your chapter (Hearing Protection Devices) in the Noise Manual in my dissertation. Before submitting my dissertation to Virginia Tech, I need to get a permission from you to do so. I appreciate if you can email me back with your permission.

Khaled Alali
PhD Candidate
Grado Department of Industrial and Systems Engineering
Auditory Systems Laboratory
Virginia Tech

Elliott H. Berger
221 Olde Mill Cove
Indianapolis, IN 46260-2381
317-752-0614 h/c
317-692-3031 w

Good morning Khaled,

Attached is the letter granting you permission to use the figures from *The Noise Manual*, 5th edition. If you have any questions, let me know.

Thanks,
Katie

Katie Robert

Manager, Product Development
AIHA^(R)

Protecting Worker Health^(R)

+1 703-846-0738 direct / +1 703-207-3561 fax / www.aiha.org

From: Khaled Alali [<mailto:alalikh@vt.edu>]

Sent: Wednesday, April 13, 2011 1:50 PM

To: Katharine Robert

Subject: Permission to use copyrighted materials

Hi Katie,

According to our phone conversation, this is the publication that I need to copy and paste some of the figures from:

Berger, E. H. (2003). Hearing protection devices. In E. H. Berger, L. H. Royster, J. D. Royster, D. P. Driscoll, & M. Layne (Eds.), *The noise manual* (5th ed., pp. 379-454). Fairfax, VA: American Industrial Hygiene Association.

The Figures are:

Figures 10.1, 10.5a,b,c, 10.6, and 10.23.

Please email me back to confirm that you received this email.

Regards,

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech



April 14, 2011

Khaled Alali
PhD Candidate
Grado department of Industrial and Systems Engineering
Auditory Systems Laboratory
Virginia Tech

Dear Khaled,

This letter is in response to your request to copy and paste several figures from the AIHA® publication, *The Noise Manual*, 5th edition, into your PhD dissertation. The images you would like to use are below:

- **Figure 10.1** – Personal hearing protection devices.
- **Figure 10.5 (a,b,c)** – (a) Block diagram of the four sound pathways to the occluded ear; (b) Sound pathways for an earplug; (c) Sound pathways for an earmuff.
- **Figure 10.6** – Bone-conduction limits to HPD attenuation and an example of the attenuation provided by an earplug, an earmuff, and the two devices work together.
- **Figure 10.23** – Comparison of the real-ear attenuation of two flat- and moderate-attenuation earplugs [custom-molded ER-15 and premolded ER-20 (also called UltraTech®12 earplug)] to conventional earplugs. The premolded and foam plugs illustrate the typical attenuation plateau from 125–2000 Hz that is representative of conventional earplugs that provide an acoustical seal.

AIHA grants this request provided the figures are not modified in any way.

If you have any further questions, please don't hesitate to give me a call.

Sincerely,

Katie Robert
Manager, Product Development
American Industrial Hygiene Association

Permission Letters for Figures 19, 21, & 23

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>>> "Khaled Alali" <[alalikh@vt.edu](mailto:alalikh@vt.edu)> 4:49 PM 4/4/2011 >>>  
Hi,

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2. Shaw, E. A. G. (1974). Transformation of sound pressure level from the free field to the eardrum in the horizontal plane. *The Journal of the Acoustical Society of America*, 56(6), 1848-1861.

I appreciate if you can reply as soon as possible.

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech

NOTE: I phoned Susann Brailey, the one who granted me the permission to use the copyrighted materials, and she mentioned that I can use a copyright notice other than the one mentioned in point#3 above if this will keep a consistent copyright notices along the whole document and still inform the reader about the source of the granted permission and the author, year, article title, journal title, volume, and pages of the journal article. Also, she informed me to do my best to contact the articles' authors and if I was unable to reach them then mention the permission from the acoustical society of America will be suffice.

## **Permission Letters for Figures 64 & 65**

Here are a few images. Let us know if you need anything else.  
Gail

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The attached figure works for me.

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech

**From:** [Gudhear@aol.com](mailto:Gudhear@aol.com) [<mailto:Gudhear@aol.com>]

**Sent:** Thursday, April 14, 2011 5:43 PM

**To:** [alalikh@vt.edu](mailto:alalikh@vt.edu)

**Cc:** [d\\_bayro@etymotic.com](mailto:d_bayro@etymotic.com)

**Subject:** Re: Permission for using a Copyrighted Material

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Gail

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Gail,

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Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

Virginia Tech

**From:** [Gudhear@aol.com](mailto:Gudhear@aol.com) [<mailto:Gudhear@aol.com>]

**Sent:** Thursday, April 14, 2011 4:46 PM

**To:** [alalikh@vt.edu](mailto:alalikh@vt.edu)

**Cc:** [g\\_gudmundsen@etymotic.com](mailto:g_gudmundsen@etymotic.com)

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Regards,

Gail Gudmundsen, Au.D.  
Managing Director, Audiology Products Division  
Etymotic Research, Inc.  
61 Martin Lane  
Elk Grove Village, IL 60007  
[g\\_gudmundsen@etymotic.com](mailto:g_gudmundsen@etymotic.com)  
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Hi Gail,

I am a graduate student at Virginia Tech and I want to copy and paste some of the figures from the attached manual to my dissertation. Can I get a permission for this. I appreciate if you can email me back as soon as possible since I need to submit my dissertation tomorrow.

Regards,

Khaled Alali

PhD Candidate

Grado Department of Industrial and Systems Engineering

Auditory Systems Laboratory

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