A uniformly accurate description of finite amplitude sound radiation from a harmonically vibrating planar boundary

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dosimeter approximated the frequency-dependent pressure transformation required to equate in-ear measured levels to free field conditions. Individual subject Leg's ranging from 73 to 100 dBA were noted. Pre/post shift audiometry was performed and is briefly summarized. The effect on measured levels of traffic, atmospheric, and operating conditions is discussed to form a background upon which mitigating measures can be based. Specific recommendations for acoustical treatment and proposals for modifications to radio equipment are discussed.

11:10

II7. Area noise monitor measurement to predict newspaper pressroom employee exposure. William J. Hanson and Gary A. Hampel (Liberty Mutual Research Center, 71 Frankland Road, Hopkinton, MA 01748)

The information obtained in this study would be most helpful in designing a newspaper pressroom and should benefit those with existing pressrooms wishing to avoid costly engineering controls. This may be accomplished by properly locating operating consoles, work stations, and product conveyor access areas. The intent is simply to minimize employee penetration time in the relatively high noise risk areas. Pressroom noise was monitored for more than 600 hours to establish production trends. Dosimeters were employed to determine personnel exposure patterns for various locations, specific jobs, production rates, and types of product. An area monitor was used to obtain a time history and develop a correlation with audio dosimeter measurements. From this data we hope to develop a universal measurement procedure which will allow one to predict employee noise exposure from area monitor measurements. Pressroom material absorption characteristics were determined from reverberation time and sound propagation from loss due to distance measurements. These parameters may be incorporated in the proposed measurement procedure. Specific dominant noise sources were verified with contour plotting, which also provided information on personnel exposure—position patterns. This was particularly applicable where employees' jobs required fairly regular patterns, allowing one to assess noise level zones most frequently encountered.

11:25

II8. The incorporation of digital noise correction into an environmental noise monitor. J. E. Coulter (Barman Coulter Swallow Associates, Suite 401, 1 Greensboro Drive, Rexdale, Ontario, Canada, M9W 1C8) and H. W. Hardenbergh (Digital Acoustics Inc., 1415E McFadden, Suite F, Santa Ana, CA 92705)

Digital Noise Correction as applied to sound level measurement is based on adjusting the sound level readings to account for the instrument's electronic noise floor. DNC's application to a digital environmental noise monitor has lowered by 10 dB, the sound levels at which ±1-dB accuracy measurements can be taken. This paper details the manner in which DNC has been implemented in a commercially available instrument to account for instrument to instrument variation in electronic noise and to compensate for noise floor drift with temperature.

11:40

II9. Errors in workplace noise measurement. Kenneth McK. Eldred (Bolt Beranek and Newman Inc., 50 Moulton Street, Cambridge, MA 02238)

There are many types of errors inherent in workplace noise measurement. They result from limitations of both the measurement instrument and the measurement procedure with respect to the spatial and temporal properties of the sound field in the vicinity of the worker. These errors can increase the cost of compliance with workplace noise standards and/or reduce the protection of the workers, depending on the nature and direction of the total error. This paper explores the potential magnitude and causes of some of the most significant errors, and proposes ways in which they might be reduced in the future.

THURSDAY MORNING, 21 MAY 1981 SALLE RICHELIEU, 9:00 A.M. TO 12:00 NOON

Session JJ. Physical Acoustics V: Nonlinear Acoustics

M. Breazeale, Chairman

Department of Physics, University of Tennessee, Knoxville, Tennessee 37916

Contributed Papers

9:00

JJ1. A uniformly accurate description of finite amplitude sound radiation from a harmonically vibrating planar boundary. Jerry H. Ginsberg (School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332)

The velocity potential for the two-dimensional, finite amplitude acoustic waves induced by harmonic excitation on a region in an infinite baffle was obtained recently [J. H. Ginsberg, J. Acoust. Soc. Am. Suppl. 1 **68**, S47 (1980)]. The analysis, which represented the response in terms of a continuous spectrum of wavenumbers parallel to the boundary, was valid only for limited distances from the boundary. The current analysis employs the perturbation method of renormalization to derive expressions for the pressure and particle velocity that are uniformly accurate up to the location where a shock forms. The response consists of radiative and evanescent waves, with nonlinearity being significant only for the former. The solution is described as inversions of Fourier cosine transforms featuring a straining transformation of the space–time coordinates which is also dependent on the wavenumber. A quantitative example for the case of an intense high-frequency excitation is shown to lead to a sound beam in which the nonlinear distortion is asymmetrical between the compression and rarefraction phases. [Work partially supported by NSF grant No. ENG 7824602.]

9:15

JJ2. Propagation of nonlinear acoustic waves in a stratified atmosphere. D. G. Crighton and I. Lee-Bapty (University of Leeds, Leeds, England, LS2 9JT)

We derive a generalized Burgers equation for the propagation of spherical nonlinear waves in a viscous atmosphere with constant temperature and exponential density stratification. The wave