NOISE MEASUREMENTS IN A NEWSPAPER PRESS

T H E S I S
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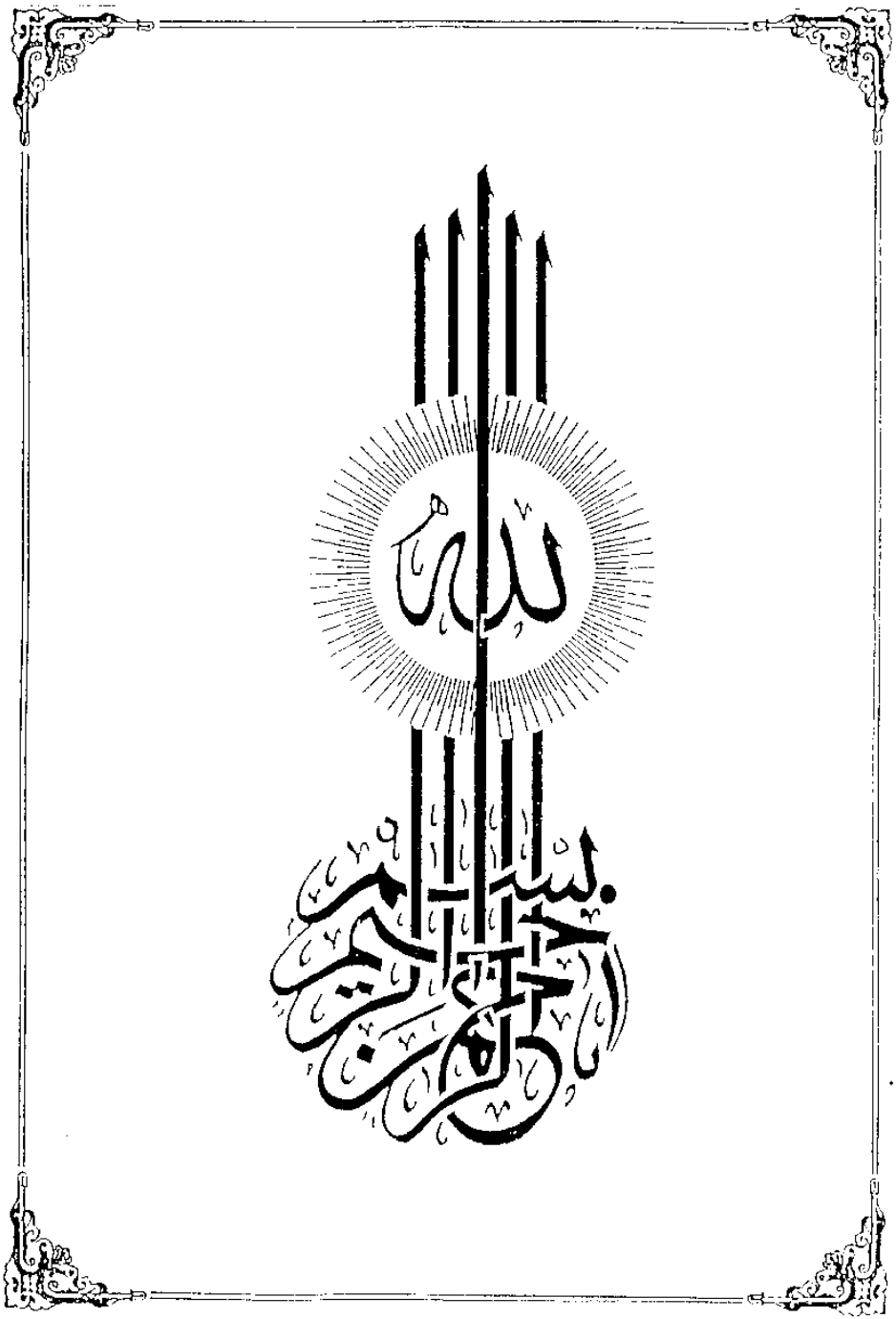

This work is dedicated
to my Mother and Father,
my first teachers in life
and to
my husband and brother
for their great help
and encouragement

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INTRODUCTION AND RATIONALE

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Noise is any undesired sound. By extension, noise is any unwanted disturbance within a useful frequency band. Noise has physical, physiological and psychological connotations. Physically, it is a complex sound having little or no periodicity. However, it can be measured and its characteristics analysed. Physiologically, noise is defined as a signal that bears no information and whose intensity varies randomly in time. Psychologically, noise is any sound irrespective of its wave form which is unpleasant or unwanted ***(Alberti, 1987)***.

Community noise control has 2 basic objectives. The first is to provide the necessary protection against noise intrusions which are annoying and disrupting to the daily activities. The second, is to provide the protection against future increase in noise levels that would further reduce the quality of the envioronment ***(Bruel and Kjaer, 1977)***.

As the extent of noise and its effects on people have become measurable, private and governmental efforts have increased the environmental noise control to protect those people who are exposed ***(Kryter, 1985)***.

Sound measurement establishes the levels of sound

present in specific locations at various times during an activity period. The measurement procedure incorporates a sampling process with the assumption that the sampling is representative of sound conditions in the environment. Measured sound level is meaningless alone. In qualifying areas as to their potential for hearing impairment hazard, exposure analysis is essential *(Lipscomb, 1988)*.

Recent newspaper presses use different types of machines e.g. gathering, printing and photography that produce different grades of noise levels. Such noises are potentially hazardous to those working in its vicinity. To the author's knowledge, noise measurements in newspaper presses was not sufficiently studied and analysed especially in Egypt. Therefore, the hearing sensitivity of the workers in such noisy environments, is potentially vulnerable to the damaging effects of such press machine noise, especially if they exceed the known "Damage-Risk Creteria".

This study will be undertaken to determine the extent and level of such noisy working environment.

REVIEW OF THE LITERATURE

HISTORICAL REVIEW

"Civilisation is noise". So said *Dan McKenzie (1916)*, and man's progress through the ages has been accompanied by activities involving ever-increasing noise intensity.

It has been suggested that occupational hearing loss due to noise, dates at least from the Bronze Age *(Hinchcliffe, 1967)*. Certainly,man's discovery of the use of metals, first bronze, later iron, with the attendant noises of beating, hammering and forging these materials to fashion useful implements and weapons, occasioned perhaps the first situation in which human hearing was at risk from occupational noise.

About 1300 A.D. appeared the second danger, gunpowder. The next threat was associated with the Industrial Revolution and the mechanization of factories, followed closely by the development of railroads, the international combustion engine, power-driven Ships and aircraft. Finally the world of today, with jet engines and space rockets generating high outputs of intense acoustic energy, is beginning to recognize the hazards of noise pollution."

The site and nature of the lesion caused by noise exposure was first described by Habermann (1890), in a man

75 years old who had worked as a blacksmith for 20 years and whose occupation had exposed him to high intensity noise during his working life. Partial disappearance of the organ of Corti was found with destruction of the hair cells, the most extensive damage being in the lower basal Coil. There was resultant atrophy of the auditory nerve, with complete degeneration of the spiral ganglion and the nerves in the osseous spiral lamina.

Soon after the introduction of audiometry, Fowler (1929), observed dips at 4 KHZ and Bunch (1937), Published the first audiometric data demonstrating the typical high frequency loss acquired by those exposed to noise. Dickson, Ewing and Littler (1939), described the aviator's notch at 4 KHZ in Pilots of Piston-engined aircraft. Subsequently, efforts to correlate industrial noise levels and frequency spectra with the hearing levels of employees have been the subject of numerous reports.

WHAT IS MEANT BY THE WORD NOISE?

In the field of electronics, neurophysiology and communication theory, "noise" means signals that bear no information and whose intensities usually vary randomly over time *(Kryter, 1985)*.

The word "noise" is sometimes defined as an audible acoustic energy that adversely affects the physiological and psychological well being of people. This is consistent with the usual definition of noise as being "unwanted sound". Indeed, sounds can be wanted at one moment such as when they contain information that is either of aesthetic or practical interest to a person, whereas in other context or for other people, the same sounds may be considered as noise because they interfere with hearing or other wanted sounds. For example, the sounds of an engine can convey useful information to a mechanic, whereas the sound is noise to another person attempting to talk in its presence *(Kryter, 1985)*.

The qualitative measuring of sound requires the knowledge of three dimensions as regards the intensity of overall noise level in decibels, its spectrum of frequency contents in Hz, its duration in terms of time or the distribution *(Burns, 1973)*.

TYPES OF NOISE:

According to *Johnstone and Miller (1961)*, noise may be classified into the following:

1. Steady State White-Band Noise:

In which the energy is spread over a wide range of frequencies whether these frequencies are at the same intensity level or not. Example of this noise is the sound which is emitted from continuously operating motors or machines.

2. Steady State Narrow-Band Noise:

Where the spectrum of frequencies is centered around a central frequency in a few bands of the audible range of frequencies. An example of this type of noise is noise from saws and pneumatic hand tools.

3. White Noise:

It is a random sound with a spectrum containing a mixture of all frequencies and such a spectral density that all frequencies are equally represented.

4. Pink Noise:

It is a sound containing a constant power per octave. It has a relatively more energy in the lower frequencies than in the higher ones.

5. Impact Noise or Impulse Noise:

Is a special type of noise, occurring in a sudden, intermittent nature lasting less than 0.1 of a second *(Johnstone and Miller, 1961)*. It occurs mostly in industry, in hammering, drilling ... etc. Also it is produced by explosion or by gunfire or by an airplane crossing the sound barrier.

Combining steady-state and impulse noise exposure:

The work place may contain a combination of sounds, both steady-state and impulse. In that case, it is not possible with a single sampling to obtain an accurate indication of the total exposure resulting from the combined effects of sound types. One should consider steady-state noise exposure conditions and impulse noise exposure separately, then combine them to determine if a worker's daily noise dose is within allowable limits. Since impulse or impact noise is quite frequently incorporated into the total exposure of a subject worker, attention must be given to that condition as well. To the extent possible, repetition rates for impulses should be determined and the total number of repetitions per work day can then be estimated. According to the 1981 version of the OSHA guidelines, the allowable repetitions of impulse noise and

its level were recorded **(Table 1)**. Using this schedule, one can determine the risk factor of employee exposure to impulse noise.

Table (1)

Allowable Repetitions of Impulse Noise Exposure According to Peak Level of Impulses (in dB)

Range of impulse peaks (dB-SPL)	Allowable repetitions/pay
> 140	0
140	100
130-139	1000
120-129	10,000
110-119	100,000
100-109	1,000,000