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NOISE LEVELS IN UK DISCOTHEQUES and the 1989 Noise at Work Regulations

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INTRODUCTION

When it became clear that entertainment is to be included within the scope of the new Noise at Work Regulations (1) it was realised that no reliable data on noise levels in discotheques was available since the studies by Bickerdike and Gregory in 1979 (2). To address this problem the British Entertainment and Dancing Association commissioned The Sound Practice to carry out a survey of their member's premises and, based on the data thus obtained, investigate the feasibility of compliance with the regulatory requirements within that industry sector. Consequent upon this appointment the author was seconded by BEDA as their representative on the CBI Noise Working Party in its deliberations on the Draft Regulations, and was invited to represent that industry sector on the Entertainment Noise Working Party of the Noise Council. This paper provides a brief overview of the survey itself, the results obtained, the conclusions drawn, and the proposals now being put forward for compliance.

ACQUIESCENCE

Understandably, the first reaction of the industry was that there was absolutely no way that discotheques or rock music venues could be operated within the constraints of the two Action Level proposals and the justification for the inclusion of "music" within the general term "noise" was questioned. The Shorter Oxford Dictionary gives the following definitions:

Noise: "Loud outcry, clamour or shouting, din or disturbance... loud or harsh sound of any kind..."

Music: "Art of combining sounds with a view to beauty of form and expression of emotion...pleasant sounds..."

Clearly these two definitions are mutually exclusive, yet it seems, for the purpose of the Regulations, they are one and the same. Because of the distinction between music - which is itself the end product of the entertainment industry, and noise - which is the undesirable by-product of some other process, a study of the available research into noise induced hearing loss due to exposure to amplified music was carried out by the author (3) and presented at the IoA Reprodeuced Sound 4 conference in 1988. Following a study of no less than 38 referenced papers it was concluded that:

"...for each study that might be cited to support the case for the inclusion of "music" within the scope of the Burns and Robinson and Robinson and Shipton criteria, there is another which will suggest otherwise with equal conviction..."

And goes on to suggest that current DRC values cannot be justified

on present evidence and that new research is needed to arrive at a more representative DRC assessment to be applied to music.

This however is seen as a longer term objective. Meanwhile, and following the results of the UK Discotheque Noise Survey, BEDA have put in hand the preparation of a Code of Practice to assist venue operators in complying with the Regulations as these now stand.

SURVEY OBJECTS

To provide up to date knowledge of the discotheque working environment as follows:-

i) Typical dance floor volume levels and spectra
ii) Typical workstation volume levels and spectra
iii) Typical employee exposure levels in those occupations likely to be at or above the 1st Action Level criteria.
iv) Typical working paterns, working hours, periods of exposure and length of service data.
v) Some indications of the size of the industry.

SCOPE

The survey was confined to professionally operated, purpose built venues having their own payroll. Twelve different types of operation were selected ranging in size between 200 and 2000 capacity in geographical locations from Aberdeen to Portsmouth and Preston to Folkstone. The staff sample was 75.

THE VENUES

Although very different in individual arrangement, a common layout theme applied to all but one venue. Typically, the dance floor is a central feature with bar serveries and lounge areas arranged around the perimeter. In many instances the accommodation was arranged in a multi-level format with bars and lounge seating in split level terracing overlooking the dance floor and stage. Restaurants are usually screened off.

It is usual to find acoustically absorbent suspended ceiling systems over large sections of the club interior, especially over the bar serveries, restaurants and lounge areas, and for the floors to be extensively carpeted. This in conjunction with the widespread use of upholstered fitted seating generally results in a high level of perimeter absorbtion and short RT60s, typically less than 0.5 seconds at 1KHz when empty.

The loudspeaker system usually surrounds the dance floor so that the sound is concentrated where much of the energy is absorbed by patrons dancing. Because of the high level of perimeter absorption provided in most venues this results in significantly reduced sound levels over the more remote bar serveries, restaurants and lounge areas thus providing the patron with a choice of aural environment.

In the majority of venues visited a quiet staff room is provided well away from the scene of activity.

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STAFFING & WORK PATTERNS

From a sound exposure viewpoint staffing at these venues can be divided into three categories:-

i) Staff who remain outside the entertainment area at all times - ie security personnel, office staff, cashiers, cloakroom attendants, kitchen staff. These employees are not considered to be at risk.

ii) Staff who move around the premises and are thus exposed at varying levels - ie management, security, glass collectors, waitresses, supervisors.

iii) Staff whose principal duties are in and around the dance floor area and are thus exposed to sound at continuously high levels - ie certain bar staff, DJs and technical operators.

In most venues staff report for duty at 2030Hrs, take 30 minutes to dress, prepare tills, set up bars and restaurants, unlock emergency exit doors, set up any special promotion, etc and are ready for opening at 2100Hrs.

At 2100Hrs music is played at relatively low volume, typically below 85dB(A). By 2200Hrs there is some level of activity and by 2300Hrs sound levels are approaching their Lmax values. It was however found that a stage act or a "'60s Special" would generally be played at a lower volume level than current Dance, Hip-hop or House favourites and by 0145Hrs it is usual to find the tempo and volume levels winding down towards the 0200Hrs finishing time. Venues had been cleared up and all staff left by 0230Hrs.

Thus, the typical working hours are 2030Hrs to 0230Hrs, or 6 hours in all. of which only five hours are spent in a noisy environment. Thus, the 1st Action Level proposed under the Draft Regulations becomes in effect 87.25dB and the 2nd Action Level 92.25dB, LAeq.

PROCEDURE

Each venue was visited by prior arrangement at 2030Hrs as staff were reporting for work. Under guidance from the unit manager, 6No responsible staff in jobs considered to be at risk were selected on the spot as subjects for dosimetry. The composition of the sample varied according to circumstances but always included the Duty Manager, Disc Jockey, bar staff, waitresses and security personnel.

The dosimetry subjects were then assembled for briefing and were unaware that a survey was being undertaken until this time. Staff were informed of the object and purpose of the survey and asked to go about their jobs normally.

6No dosemeters were used at each venue, calibrated on the spot at the time of issue and in front of the participating staff. Lapel microphones were clipped to collars as close as practicable to the ear as dictated by wearing apparel. The instrument was carried in pockets, or in a belt pouch. Microphone cables were concealed under

wearing apparel to avoid risk of tanglement in tills, glass washing machines, etc and the apparatus generally arranged so as to maintain a minimum profile to the operation. The dosemeters were started as near to 2100Hrs, and collected in as near to 0200Hrs as circumstances allowed.

Before leaving each subject was asked to help with a simple questionnaire designed to provide an indication of the likely noise history of the participant, hours of work and typical lengths of service in the industry. The questions were put verbally and the questionnaire used is reproduced in Appendix #1.

SPL measurements and 1/3rd octave spectra were recorded at or about 2330Hrs, 0030Hrs, and 0130Hrs at the centre of the dance floor, in the DJ Console, behind bar serveries, in lounge areas and in the Restaurant as appropriate.

EQUIPMENT USED

The dosimetry programme was carried out using Metrosonics data logging noise dosemeters type DT-301A. These were set for an operating range of 60-123dB(A) and for a short Leq integration of 1 minute. At the end of each session each logger was downloaded into the Metroreader type DT-390 collector unit for subsequent print-out and for permanent storage on floppy disc thus facilitating future processing and interrogation. Each Metrologger was calibrated on site using a Cirrus Research CRL 5:11 calibrator. A typical time history plot from this apparatus is shown in Appendix #2.

SPL measurements and real time spectrum analysis was performed using an Ivie IE-30A precision grade SPL/RTA on the basis of visually estimated L10 values. Hard copy plots were obtained by downloading the internal memories of the IE-30A into an IE-17A processor controlling a Hewlet Packard type 7010B XY plotter. A typical 1/3rd octave plot is shown in Appendix #3.

SURVEY RESULTS

In an attempt to give some perspective to the foregoing, the number of professionally operated discotheques in the UK has recently been estimated at 1500 (4). Further, those employers participating in this study estimate the average level of staffing in a discotheque operation at 35/40. Thus, between 52,500 and 60,000 staff are directly engaged in the operation of such venues.

The survey results comprise a seperate time history print-out for each dosimetry subject, seperete A-weighted SPL measurements in the principal workstations and public areas of the venue and typical 1/3rd octave real-time frequency analysis plots. It is not proposed to present the entire data file here, but appendix #4 gives a simple analysis, by job description, of the results obtained.

It can be seen from Table #2 that all staff participating in the survey are shown to be exposed above the adjusted 1st Action Level. With the exeption of Disc Jockies, all other staff are exposed at or around the 5 hour adjusted 2nd Action Level. Only DJs are shown to be exposed significantly above the adjusted 2nd Action Level.

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It should be noted that the results do not confirm the widely held view that music is played at excessive volume levels in discotheque venues and that in fact, exposure levels are generally only marginally above the hours adjusted 2nd Action Level. Thus, given the commitment on the part of employers, compliance should not present any insurmountable difficulties.

MEANS OF COMPLIANCE

It is expected that the requirements of Sections 6 & 7 of the Draft Regulations can be met by a combination of volume regulation (5), by staff rostering and in the longer term by changes to the layout and design of the venues. It is expected that this action will reduce the exposure associated with most jobs to below the adjusted 2nd Action Level, but others, particularly DJs and other performers, may remain above the adjusted 2nd Action Level.

Clearly, however, it is not acceptable or practicable for a DJ or other performer, or for scantily clad female bar staff to wear hearing protection. The externally worn type are not aesthetically acceptable in what is in effect a theatre environment, whilst any form of hearing attenuation would hinder, and in some cases prevent, the performance of the duty.

THE CASE FOR SPECIAL PROVISIONS

Having regard to the high level of staff turnover within the industry, as shown in Appendix #4, Table #4, the keeping of records in the form required under Section 5 of the Draft Regulations will not be practicable. It is therefore suggested that such records should relate to the particular workstation or job description and be applied to any employee doing that job.

Table #3 shows that employees in this industry are working only half the standard 40 hour week and it is considered that a case is thus made for the weekly averaging provision of Section 12 (b)(1) of the Draft Regulations to be allowed as an exemption of the duty required under Section 8. It is considered that the case is further strengthened by the results of Table #4 showing an average length of service of just eleven months.

SUMMARY

It has been suggested that the DRC values upon which the Action Levels are based have little or no relevance to the nature of the "noise" produced by the entertainment industry. It has been shown elsewhere (3) that there is contradictory evidence to show that exposure to music played at volume levels well above the proposed 2nd Action Level may not necessarily lead to hearing impairment.

Notwithstanding the foregoing, given acceptance by the industry of its duty to comply with the principal requirements of the Draft Regulations and to agreement by the HSC on the 5-hour adjusted Action Levels and to allow the weekly averaging exemption, the Survey suggests that most discotheque venues would be able to operate broadly within the proposed Regulations.

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Whilst the industry is responding positively to the requirements of the new Regulations and is conscious of its responsibilities to regulate employee exposure to high sound levels, the Health and Safety Executive have been requested to allow a reasonable period of time for full compliance. Much can be done to reduce the level of exposure by the design and layout of buildings, but given the very high costs of venue refurbishment this is not going to happen overnight on December 31 1989!

It has been stated that the entertainment industry is unique among employers in that the "noise" is its actual product. Thus without the "noise" there is no industry. It has been shown that were the industry to disappear tens of thousands of jobs, mainly employing young people, would be lost. There would be major repercussions in the building industry, in the many high-tech supporting industries such as lighting, video, lasers and sound system engineering, and would lead to a significant downturn in the brewing and catering industries.

The interview results suggest that the majority of employees work in this industry because they want to - because the exposure to music is part of the enjoyment of the job. Most are young, active, fashionable and atractive people to whom music is an integral part of life. Once the age is reached where this form of music ceases to be attractive, they move on to other types of employment. Thus the accumulative effect over the working life will be minimal in terms of the statistics upon which the exposure limits have been set.

A full report of the survey, its results, and the implications of the various means available for compliance (6), has been submitted to the Health and Safety Commission with copies to the major operators within the BEDA membership. It is intended that this will form the basis of a formally endorsed Code of Practice agreement on the implementation of the Noise at Work Regulations within the entertainment industry.

References:

1) Health & Safety Commission, "Prevention of Damage to Hearing from Noise at Work - Draft Proposals for Regulations and Guidance", HMSO, 1987.

2) Bickerdike J & Gregory A, "An Evaluation of Hearing Damage Risk to Attendees at Discotheques", DoE Project Report by Leeds Polytechnic, 1979.

3) Dibble K, "Disco Deafness - The Myth?" Proc IoA Vol 10, Pt 7, pp 247-256, 1988.

4) Estimate by Phonographic Performance Ltd, 1988.

5) Dibble K, "Sound Level Limiting - An Overview of the Means For Effective Control", Proc IoA Vol 10, Pt 7, pp 263-274, 1988.

6) Dibble K, "BEDA Response to HSC Consultative Document on Proposed Noise at Work Regulations arising from EEC Directive 86/188". BEDA/The Sound Practice, report No CF390141, 1988. Unpublished.

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APPENDIX 1

BEDA SURVEY MARCH/APRIL 1988

PARTICIPATING STAFF QUESTIONAIRE

VENUE: ..... DATE: .....

NAME: ..... LOGGER: .....

JOB TITLE: ..... AGE: .....

PERIOD IN THIS JOB: .....

HOURS WORKED: .....

.....

.....

IS THIS YOUR FULL TIME OCCUPATION? YES/NO

IF NOT, WHAT OTHER JOBS DO YOU HAVE? .....

.....

.....

IMMEDIATE PREVIOUS JOB: .....

HOURS WORKED: .....

PREVIOUS JOBS: .....

.....

DO YOU ATTEND DISCOS OUTSIDE WORK? YES/NO HOW OFTEN? .....

DO YOU ATTEND ROCK CONCERTS? YES/NO HOW OFTEN? .....

DO YOU ENGAGE IN OTHER NOISY PURSUITS? YES NO

DETAILS (1) ..... HOW OFTEN? .....

DETAILS (2) ..... HOW OFTEN? .....

OTHER COMMENTS .....

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INTERVIEWED BY: .....

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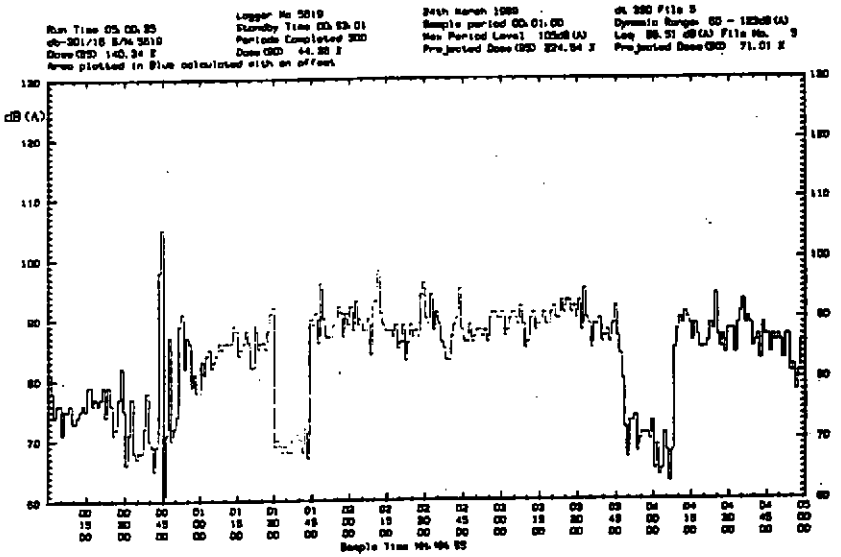
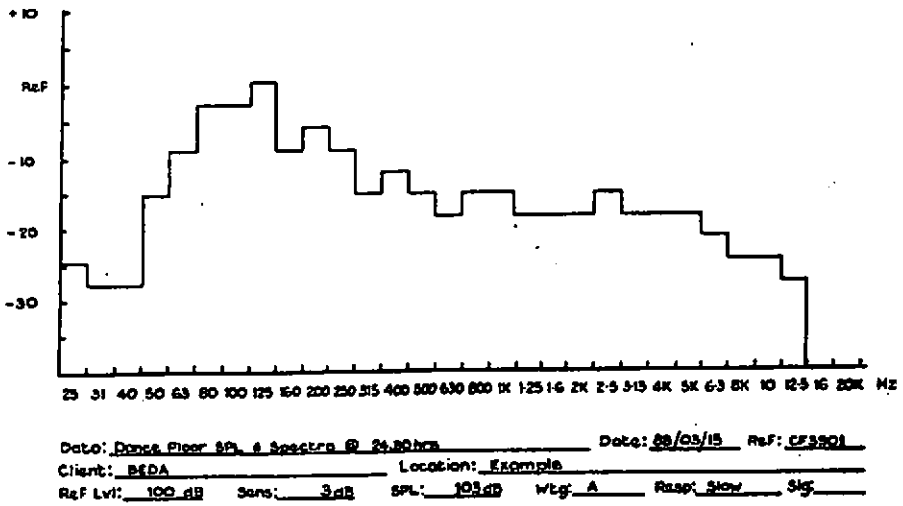
APPENDIX 2



APPENDIX 3



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APPENDIX 4

TABLE 1: Venue Volume Levels

Measurement Location	Mean SPL	Mean Devn	Max SPL	Min SPL	No Smpls
Dance Floor:	103dB(A)	1.5	107	99	12
DJ Console:	98dB(A)	1.6	104	98	12
Bar Serveries:	90dB(A)	4.2	100	73	36
Lounges:	90dB(A)	4.5	98	75	32
Restaurants:	84dB(A)	6.1	89	70	10

TABLE 2: Personal Noise Exposure

Job Title	Mean Lep,d	Mean Devn	Max Lep,d	Min Lep,d	No Smpls
Disc Jockey:	99.4dB	1.6	103	96	9
Duty Manager:	92.1dB	3.3	97.5	88	7
Bar Staff:	92.2dB	2.7	98.6	86.4	24
Floor Staff:	93.3dB	2.3	97	88	10
Int. Security:	93.6dB	2.3	99.2	91	5

TABLE 3: Averaged Working Hours in Noisy Environment

Job Title	Avg period per Session	Avg Sessions per week	Avg Hours per week	No Smpls
Disc Jockey:	5Hrs	4.0	20	8
Duty Manager:	5Hrs	4.5	22.5	6
Bar Staff:	5Hrs	3.5	17.5	21
Floor Staff:	5Hrs	3.5	17.5	9
Security:	5Hrs	4.0	20	5

TABLE 4: Averaged Length of Service and Employee Age

Job Title	Avg Length of Service	Avg Age of Employee	No Smpls
Disc Jockey:	14.5mths	26yrs	8
Duty Manager:	15mths	28yrs	6
Bar Staff:	9.5mths	21yrs	21
Floor Staff:	6mths	21yrs	9
Security:	8.5mths	25yrs	5