

# Proceedings of the Institute of Acoustics

## THE BEDA NOISE AT WORK METHOD FOR DISCOTHEQUES, NIGHTCLUBS AND SIMILAR WORKING ENVIRONMENTS

A Follow-up to "Noise Levels in UK Discotheques and the 1989 Noise at Work Regulations", given at the IoA Industrial Noise Conference, Windermere, 1989.

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### 1. INTRODUCTION

The 1989 paper (1) presented the results of a nation wide survey of noise levels in discotheques and noise exposure by employees working in that environment. The results are summarised in Fig. #1. All employees monitored were found to be exposed above the hours-adjusted 1st Action Level and with the exception of DJs, all other staff considered to be "at risk" were found to be exposed at or around the hours adjusted 2nd Action Level. Notwithstanding the concerns expressed in the original paper, because a relatively small adjustment to working conditions would clearly bring most employees inside the 2nd Action Level criterion, and recognising that the race to provide ever larger sound systems was in no one's best interests, it was decided to embark upon a programme of compliance with the new legislation. The original survey brief was thus extended to include the development of a procedure which would simplify the compliance requirements to enable the normal calibre of manager employed in such venues to accommodate the new Regulations as part of his everyday management duties.

### 2. PRECEPTS

Compliance with the 1st Action Level requirements was not seen as presenting any great difficulty, nor were the requirements of Regulation 7 seen as unreasonable, but the concept of issuing ear protection to DJs and artistes, to bar staff and management is not practicable in what is, in effect, a theatre environment. The policy therefore emerged that full compliance with the 1st Action Level requirements would be recommended as a matter of course in every venue, that whether or not the 2nd Action Level was being exceeded, Regulation 7 would be taken on board, but that a means would be devised so that  $L_{eq,d}$  would be kept below the hours adjusted 2nd Action Level, with the weekly average procedure provided for under Regulation 13 being used to deal with individual problems involving DJ exposure.

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### 3. THE BEDA GUIDELINES FOR MANAGEMENT ON NOISE AT WORK

This document was published in October 1990 (2). It is priced at £10 including a plastic exposure calculator disc. It provides guidance under the following principal headings:-

#### Section 3: Summary of the Regulatory Requirements

This section lists a simplified summary of the statutory requirements. It draws attention to the general duty to reduce the risk of hearing impairment to the lowest practicable level, identifies the two Action Levels and in recognition that most such venues are open for appreciably less than the normal 8 hour "working day", provides the following table as Appendix #1:-

#### Correction Table when Noise Exposure is Other Than 8 Hours

<u>Period</u>	<u>1st Action Level</u>	<u>2nd Action Level</u>
12 Hours	83.0dB(A)	88.0dB(A)
10 Hours	84.0dB(A)	89.0dB(A)
8 Hours	85.0dB(A)	90.0dB(A)
7 Hours	85.7dB(A)	90.7dB(A)
6 Hours	86.5dB(A)	91.5dB(A)
5 Hours	87.3dB(A)	92.3dB(A)
4 Hours	88.0dB(A)	93.0dB(A)
3 Hours	89.5dB(A)	94.5dB(A)
2 Hours	91.0dB(A)	96.0dB(A)
1 Hour	94.0dB(A)	99.0dB(A)
½ Hour	97.0dB(A)	102.0dB(A)

It goes on to point out the need for an assessment, the specific obligation above 2nd Action Level to reduce levels by means other than protection, explains the duty to make hearing protection available on request between the two Action Levels, outlines the need to keep apparatus in good condition and summarises the training and information requirements.

#### Section 4: Training & Information

This section spells out the training and information requirements and provides a brief explanation of the background to the Regulations in order to assist managers in understanding the

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object of the matter and includes a passing reference to the question of the inclusion of "music" within the scope of regulations primarily directed at industrial working environments as an aside (3). A specimen Training Record Sheet is provided to enable a permanent record of the training given to be kept and reference is made to planned BEDA training courses designed to fill out the understanding of the problem at managerial level.

#### Section 5: The Noise Assessment

The concept of the assessment is explained and the manager is warned to expect that volume limits may well be set as part of the assessment procedure. It is recommended that the results are transferred onto a "dB contour map" of the premises, to be displayed in the operations office, so that the sound levels at each workstation can be seen at a glance.

#### Section 6: Means of Compliance

This section provides the main thrust of the guidance. It explains the policy that the use of ear muffs and similar means of hearing protection will not be feasible in the majority of employments and that for this reason compliance policy is geared to reducing the actual noise levels in the workplace and to reducing the time spent in those areas, so that individual Lep,d is brought below the hours adjusted 2nd Action Level. It points out the need to make hearing protection available upon request and provides a specimen Hearing Protection Issue Record Sheet. The following specific matters are then addressed in more detail:-

- i) The provision of an effective sound level limiting device with appropriate security against unauthorised tampering as an essential pre-requisite to the working of the method (4).
- ii) A degree of self policing is imposed using an in-house low cost sound level meter as a means of checking that the assessment levels continue to be met, each workstation being checked on a 30 day rota. A specimen Monthly Noise Level Monitoring Record sheet is provided.
- iii) The need for DJ and other artistes contracts to include acceptance of the "house" noise policy is identified and guidance on the form such contract terms should take are provided in Appendix #5 of the document.

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- iv) Staff rostering is identified as the principal means of reducing overall exposure once the workstation sound levels are regulated and charted. The BEDA Colour Band Method has been devised to simplify this procedure to a routine venue management task. The Method is fully explained in Appendix #2 of the document and is reproduced verbatim in Section #4 of this paper.
- v) The need for a quiet staff rest room is identified.
- vi) The particular difficulty in compliance associated with DJs is raised and reference made to the exemption provisions contained in clause 13(a) and 13(b)(i) of the Regulations and a summary of the exemption provisions extracted from HSE Noise Guide #8 (5) is provided as Appendix #3.

#### Section 7: Record Keeping

This section simply explains the record keeping requirements and provides a number of specimen sheets designed to simplify the process and ensure that adequate records are maintained.

#### 4. THE COLOUR BAND METHOD

Colour Banding has been devised as a means of simplifying the onerous task of working out which member of staff can spend what period of time in what noise level and what combinations of time/noise will remain within the total noise exposure limits, whilst considerably reducing the amount of data necessary to comply with the record keeping requirements.

The method assumes that all staff will be exposed at or above the 1st Action Level and that all measures necessary to comply with the 1st Action Level requirements will have been implemented. Given these conditions the method has been designed to keep exposure levels below the 2nd Action level, thus avoiding the need for the mandatory issue of hearing protection.

The procedure is as follows:-

1. The noise level "contour map" should be colour banded according to the following table, each colour band being allocated the Noise Index figure shown:-

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Noise Range	Colour Band	Noise Index
<89dB(A)	Uncoloured	0
89 - 90dB(A)	Green	12
91 - 92dB(A)	Blue	20
93 - 94dB(A)	Amber	33
95 - 96dB(A)	Yellow	50
97 - 99dB(A)	Pink	100
100 - 102dB(A)	Red	150

It is recommended that Pink and Red areas be marked as Ear Protection Zones and that staff are discouraged from entering these areas unless absolutely necessary, or unless exposure at this level has been included in the roster calculation.

- Using the noise contour map in conjunction with the table above, staff are placed in a combination of areas and the Noise Index numbers multiplied by the duration of exposure, to give an accumulated index number. For example:-

2 hours in an Amber zone gives  $2 \times 33 = 66$   
1 hour in a Blue zone gives  $1 \times 20 = 20$   
1 hour in a Green zone gives  $1 \times 12 = 12$

- The accumulated indexes for all zones worked are then added together to achieve a total of 100. Where the total is less than 100, the total noise exposure will be less than the 2nd Action Level. Where the total is over 100, the 2nd Action Level may be exceeded and it will be necessary to revise the roster, using uncoloured or "zero index" areas to make up as necessary.

- Taking the example given in (2) the total accumulated index is:-

$$66 + 20 + 12 = 98$$

This is less than 100 so we are OK on the noise side, but it only allows for a working period of 4 hours. Therefore, any additional time must be spent in an uncoloured or "zero index" working environment. In a typical 5 hour club session,

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this would require one hour, or in a normal 8-hour working day, 4 hours. This particular combination would result in a worst case overall noise exposure of 91.6dB/5 hours or 89.75dB/8 hours, both being just within the 2nd Action Level requirements.

#### 5. By way of further examples:-

$$\begin{aligned} \text{i)} \quad & 3 \text{ hours} \times \text{Blue} = 3 \times 20 = 60 \\ & 2 \text{ hours} \times \text{Green} = 2 \times 12 = 24 \\ & = 5 \text{ hours @ accumulated index } 84 = \text{OK} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad & 1 \text{ hour} \times \text{Yellow} = 1 \times 50 = 50 \\ & 1 \text{ hour} \times \text{Blue} = 1 \times 20 = 20 \\ & 3 \text{ hours} \times \text{Green} = 3 \times 12 = 36 \\ & = 5 \text{ hours @ accumulated index } 106 = \text{No Go!} \end{aligned}$$

Change to:-

$$\begin{aligned} & 1 \text{ hour} \times \text{Yellow} = 1 \times 50 = 50 \\ & 1 \text{ hour} \times \text{Blue} = 1 \times 20 = 20 \\ & 2 \text{ hours} \times \text{Green} = 2 \times 12 = 24 \\ & 1 \text{ hour} \times \text{Uncoloured} = 0 \\ & = 5 \text{ hours @ accumulated index } 94 = \text{OK} \end{aligned}$$

6. It can be seen from Appendix 1 that where it is necessary that staff work in a Pink or Red zone, only short working periods can be permitted. Therefore it will be necessary to move them to a Green or even an uncoloured zone for the remainder of the session, in order to keep the accumulated total below 100. For example:-

$$\begin{aligned} & \frac{1}{2} \text{ hour} \times \text{Red} = 0.5 \times 150 = 75 \\ & 2 \text{ hours} \times \text{Green} = 2 \times 12 = 24 \\ & 2\frac{1}{2} \text{ hours} \times \text{Uncoloured} = 0 \\ & = 5 \text{ hours @ accumulated index } 99 = \text{OK} \end{aligned}$$

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7. Specimen Record Sheet #5 (shown here as Fig. 2) shows a work rostering record sheet based on this Colour Band method of calculation. Simply work out a combination of duties which will provide a total accumulated index of less than 100 and enter the time (in hours) and the accumulated index number, under the appropriate colour band heading and show the total accumulated index in the right hand column. It is as simple as that.
8. Because all the approximations made in developing this method err on the safety side, if none of the totals exceed 100 there is no possibility of exceeding the hours adjusted 2nd Action Level requirements. Also, if there is the occasional small over-run, say to 101 or 102, it is still 99% probable that the 2nd Action Level will not have been exceeded. For example:-

$$\begin{aligned} 2 \text{ hours} \times \text{Amber} &= 2 \times 33 = 66 \\ 3 \text{ hours} \times \text{Green} &= 3 \times 12 = 36 \\ &= 5 \text{ hours @ accumulated index } 102 \end{aligned}$$

However, the calculated equivalent noise exposure is only 91.6dB(A), which is marginally under the 5-hour adjusted 2nd Action Level. So although flagrant breaching of the 100 total is not recommended, the occasional unavoidable over-run will not be a major catastrophe, and should always be recorded on the record sheet for subsequent checking if necessary.

A plastic exposure calculator with the exposure window coloured according to the Colour Band Method and listing the Colour Band Index on the reverse side, is included with each issue of the BEDA guidance document.

#### 5. BEDA POLICY

It is intended that what at first appeared as a major trading handicap, yet another tier of bureaucracy which the venue manager must deal, will be turned into a positive issue in the marketing of the participating venue. Those successfully completing the BEDA training course will receive a certificate of competence in noise management and those venues adopting the scheme to the satisfaction of the local authority Environmental Health Dept will display the BEDA plaque, in a prominent position, in the

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main entrance lobby. It is also envisaged that training courses will be provided to artistes and DJs to promote awareness of the problem and the means implemented to address the Regulations.

The position adopted is that conventional demarcation of Ear Protection Zones as set out in Regulation 9, when applied to a discotheque dance floor or theatre auditorium, would be likely to cause unnecessary confusion amongst patrons and is therefore not practicable. Compliance with Regulation 9 will therefore take the form of the BEDA certification plaque displayed in the main foyer, stating that these premises have been assessed and that the BEDA noise policy is in operation. Other signing within the premises will be confined to staff rooms, behind bar serveries, inside the DJ console, etc, where it is not in view of the general public.

The point is made that in the long term a positive approach to the control of noise levels within such premises will eventually bring about a change in public attitude to excessive sound levels in places of entertainment - as for example with smoking and the drink-drive laws, thus relieving the pressure for ever higher sound pressure levels on the dance floor as an element in the competition to attract patrons.

#### References:-

- (1) Dibble K, "Noise Levels in UK Discotheques and the 1989 Noise at Work Regulations". Proc. IoA, Vol. 11, Part 9, pp 45 thru 53, 1989.
- (2) Dibble K, Gill T, Williams G, "Guidelines for Management on Noise at Work", British Entertainment and Discotheque Association, Nottingham, 1990.
- (3) Dibble K, "Disco Deafness - The Myth?" Proc IoA, Vol. 10, Part 7, pp 247 thru 261, 1988.
- (4) Dibble K, "Sound Level Limiting - An Overview of the Means for Effective Control", Proc. IoA, Vol. 10, Part 7, pp 263 thru 274, 1988.
- (5) Health & Safety Executive, "Noise at Work - Assessment, Information and Control - Noise Guides 3 to 8", Noise Guide No 8: "Exemption from Certain Requirements of the Noise at Work Regulations 1989" pp 43 thru 45, HMSO, London, 1990.



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Fig. 1: Results Tables from 1988 BEDA Survey (1)

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

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**Fig. 2: Specimen Record Sheet #5**

## WORK ROSTERING RECORD SHEET

[illegible]

**NB. PINK AND RED AREAS = AN EAR PROTECTION ZONE.**

..... Day Date .....