

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

M E Fillery

University of Derby

1. INTRODUCTION

The original theme for this paper was a critical review of the existing Codes of Practice that relate to motorised leisure activities. In reading through several of these Codes of Practice it became obvious that a detailed critique would be rather long since they all differ in style and content. It was also clear that often the Codes of Practice were the result of many unpaid hours by teams of enthusiastic supporters and it would be unfair and rather negative to specifically criticise any particular Code of Practice or part of. Instead this paper will attempt a positive approach by discussing the role of a Code of Practice for motorsport and thereby identify what ought to appear in such a Code of Practice. It will suggest a generic framework for motorsport Code of Practice and try to identify gaps in current knowledge that should be investigated if the Codes of Practice are to be effective in the future.

'Motorised leisure activities' is an unwieldy phrase and so the term Motorsport will be used instead where the term Motorsport is taken to include all leisure activities that involve the use of high powered internal combustion engines with the exception of flying activities. Thus the main activities that are included are motor car sport, motorcycle sport, power boat racing, jet skis and water skiing. The noise problems of all these sports are similar: same primary noise source, similar events, rural locations and often local opposition. Thus a common form of Code of Practice would be a sensible objective and a pooling of expertise between the different sports could be of great benefit.

2. THE ROLE OF THE CODE OF PRACTICE

In 1974 the Control of Pollution Act gave powers to the Secretary of State to prepare and approve Codes of Practice giving guidance of how best to minimise or reduce noise from specific noise sources. This process was re-enacted in the Environmental Protection Act of 1990. Since that time many sports have worked towards developing Codes of Practice for their particular sport.

The appearance of Codes of Practice that cover these activities is a welcome development that should be appreciated by all those involved in Motorsports. There is a need for Motorsport to improve noise control if it is to continue to operate within a society that is increasingly aware and sensitive to noise in the environment. There are significant numbers in the population that are opposed to motorsport in all forms and this opposition is often focused around the issue of noise. The difficulties in conveying an understanding of the various indices used to quantify noise to the general public is an area that is often

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

exploited by opposition groups. Frequently objective scientific evidence gathered by noise consultants or local authorities is regarded with suspicion and a lack of trust. In this climate of scepticism, any Code of Practice developed by an individual sport will be seen as an example of special pleading and bias. Codes of Practice need to be comprehensible and authoritative if it are to convince the world outside of Motorsport that noise control is an issue that the sport takes seriously and therefore can be trusted to introduce a Code of Practice.

The Code of Practice should be a source of guidance on controlling the noise impact of the motorsport upon the local community in the area around the motorsport event. It should be a guide for both those within the sport; governing bodies, event organisers and venue owners and for those responsible for monitoring and controlling the noise for the community at large. As a guide it needs to be presented in a form accessible to all those wishing to use it; written in clear simple language avoiding as far as possible technical jargon.

Whilst not having the force of statutory regulations Codes of Practice are regarded as being guidance to the use of best practical means (BPM) for noise control. They are a source of reference as to BPM in Magistrates Courts (Sheriffs Courts in Scotland). For commercial activities, Best Practical Means is a defence against Noise Abatement Notices issued under the EPA of 1990 therefore the Code of Practice can have a vital role in the continued operations of a Motorsport venue threaten by closure or a reduction in hours. Any Code of Practice that is to be used in this way can expect to be challenged vigorously in the courts and must represent the absolute best possible means of noise control for that Motorsport based upon the current state of technical knowledge.

3. AIMS

For a general policy statement, the Strategy laid out in the document 'Guidance Notes on Noise Control at Motor Sports Circuits' produced by the Association of Motor Racing Circuit Owners and the RAC Motor Sports Association (1) encapsulates the overall aims for all motor sports. It states *' That Motorsport exercises the appropriate control which ensures that noise is contained to levels which are acceptable to local enforcing authorities , the spectating public and neighbours living within the vicinity of the event location.'*

From the above discussion of the role of a Code of Practice, a motorsport Code of Practice should aim to do the following;

1. be a clear and comprehensive guide to noise control for the sport
2. be an indicator of Best Practical Means of noise control for the courts.

It needs to do these in an objective and authoritative way taking account of the best available knowledge and all shades of opinion.

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

4. OBJECTIVES

With these aims in mind it is possible to set out specific objectives for the foundations for a generic Code of Practice.

The Code of Practice should;

1. set out a **general approach to noise control** that all events should work toward
2. give advice on how this general approach should be converted into a **noise policy statement** that is specific to an individual event or venue.
3. advise on how the specific noise policy statement can be part of a wider **environmental policy statement** for the event or venue.
4. advise on how the noise policy statement can be implemented as a **noise control programme**.

The noise control programme will require specific instruction on the following

- a. suitable **management systems** to ensure the deliver and the quality assurance of the noise control programme
- b. appropriate **instrumentation** for the measurement of noise from vehicles and circuits
- c. appropriate **methodologies for measurement and assessment** of noise for the typical range of situations and events likely to be found in UK venues.
- d. practical methods of **noise control**, including noise control of source and propagation.
- e. **training of staff** in the measurement techniques and suitable record systems.

This advice must draw imaginatively and sensibly upon current knowledge and technologies of noise control and assessment so that it presents a robust framework that will stand critical examination from both supporters and opponents of motorsport. It must look to the future and take account of further development of environmental standards that are built in the EC legislative programme.

This advice must be accessible to all. It should set out as clearly as possible in a logical manner the necessary steps to implement a noise control programme at a circuit. It should give technical guidance and where necessary it should point to sources of more detailed information.

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

Taking each of the structural components in turn

1. The general approach to noise control

Apart from the rationale for the need for the guidelines, there needs to be a clear statement of achievable noise targets for the sports and a strategy and a timetable for achieving those targets. At the moment the motor sports are reactionary, only changing under coercion. Each sport needs to set out a programme for a reduction in noise levels. Without a firm commitment to change the message that noise levels from the sport will and must reduce will not be taken on board by the die-hards within the sport and progress will be slow. Pressure from environmental protection groups will not decrease and motor sport must be prepared for the challenge.

The guidelines should clearly set out the agenda for noise control. Each circuit will adapt this to their individual circumstances.

2. A noise policy statement

Each event or venue needs to adapt the overall approach of the sport to formulate its own specific noise policy statement. This should be divided into policy and operational sections. The policy section should clearly state the commitment of the operators to the continuing reduction of noise levels. The operational section should set out the methods by which the management of the noise reduction programme will be carried out.

3 An environmental policy statement

Increasingly businesses are being expected to prepare environmental policy statements; often these are part of new or revised planning permissions. Such statements included all possible sources of pollution and the means of control of that pollution. Noise is one of these pollutants and therefore an organisers noise policy should be a subset of their more general environmental policy. A detailed explanation of making an environmental policy statement is probably beyond the scope of a Code of Practice but an outline of the idea and sources of further information should be included.

4 A Noise Control Programme

a) **Management systems.** The Code of Practice needs to emphasise the need for a robust management system especially for quality assurance procedures to ensure the delivery of the noise control programme.

b) **Instrumentation.** In the current climate of rapid change in instrumentation the guidelines might sensibly wish to avoid giving specific instrument types. However the current British and International Standards for environmental measurements should be included as a minimum standard; for example BS7445:1991 "Description and Measurement of Environmental Noise"(2).

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

The need for maintenance and regular calibration of equipment should be emphasised and form part of the management system.

c) **The methodologies for measurement and assessment.** Most existing guide lines lacked any conviction in this most important area. To be of any use the Code of Practice must give authoritative advice to both operators and to local authorities on the best methods to evaluate the noise impact of an event on the surrounding communities. There are many factors that affect an individual's response to noise and it is very difficult to relate objective measurements to individual subject response. Most Codes of Practice avoid this difficult area of individual annoyance and opt instead for some means of assessment based upon a comparison of the event generated noise level with existing ambient and background noise.

This approach is can be both contentious and ambiguous. Any ambiguity is removed if the Code of Practice advocates the use of a recognised methodology such as that contained in BS4142:1997 "Method of Rating Industrial Noise affecting Mixed Residential and Industrial Areas"(5). Some Codes of Practice obviously incline towards this Standard and its use would at least give a controlled measurement methodology and a method of assessment. However the use of BS4142 in the context of motorsport noise is far from clear cut. BS4142 is aimed at industrial noise in an urban content. The character of Motor sport noise is unlike most industrial noise and most motorsport venues are not in urban locations but are predominately rural. These mean that the use of BS4142 is inappropriate for motorsports events.

A more reliable noise index would involve the use of Equivalent Continuous Noise Level, L_{Aeq} ; the time integration used is a well established method for continuous or quasi continuous environmental noise. The $L_{Aeq,T}$ is the recommended unit for many environmental indices following the general methodology of BS7445:1991 "Description and Measurement of Environmental Noise"(2). However the suitability of time averaged noise levels for the assessment of motorsport is highly debatable. The annoyance caused by motorsport is not a simple function of the increase in the time averaged noise level but there are a number of other factors that may be significant at any one time. This paper is not the place to engage in a lengthy debate over the most suitable method or methods for the assessment of annoyance from motorsport but the issue must be addressed somewhere. Possible assessment methods can be drawn from International and British Standards, Codes of Practice, other sports and leisure activities. These assessment procedures should be given a critical analysis and suitable candidates for motorsport should be evaluated in the field using recognised experimental methodologies. Until this process is completed and robust assessment methods are established, the guidelines should present the range of assessment procedures available with an indication as to the best choice for different circumstances.

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

d. Practical methods of Noise Control

Noise Control at Source: This involves all methods of limiting the noise emitted by individual vehicle.

Static Testing. This the most popular form of noise control advocated for cars, motorcycles and boats. The engine of the stationary vehicle is run at a steady speed and the noise level (L_{Max}) is measured a short distance from the exhaust pipe. The Codes of Practice are reasonable good in this area giving details of the procedures to be followed and referring the reader to other information where necessary.

Although simple the test is seriously flawed. It is time consuming, frequently cheated, unreliable, inaccurate and does not assess the noise emission levels that the vehicle will produce in action. At best it indicates the presence of a functioning silencer.

Standardised Silencer System. With sports that have restrictions on the design and type of engines the use of a standardised silencer system could be an effective means of noise control. It would always require the back up of direct monitoring as all silencers will deteriorate with age or may suffer damage.

Drive-by Monitoring. This form of noise control monitors the emission levels of the vehicle whilst it is moving at speed. This could be a pre event check but the most consistent results are achieved by measuring drive-by levels during an event. In both cases the noise levels emitted into the environment are monitored and so this method offers the most direct indication of the noise impact of the event. In a series of studies (3) over the last two seasons on racing cars it has been shown that drive-by monitoring is fast, accurate, difficult to cheat and very consistent. It also provides the direct data for the prediction of community noise levels. (4).

This form of monitoring ought to be possible for all forms of motorsport.

Assessment by Observers. Some Codes of Practice suggest that in some cases it may be sufficient to exercise control by the judgement of officials without the need for noise measurements. Individual subjective estimation of noise levels is grossly unreliable. For any degree of consistent control there must be accurate measurement and recording of noise levels.

Public Address Systems. These often are greater sources of noise than the individual vehicles especially when the PA provides a race commentary that has to be heard over the noise of the race. Codes of Practice should flag this important area and should indicate means of controlling the PA output by good design and alternative system such as event specific radio links. The Code of Practice should indicate source of information and expertise on PA systems.

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

Venue and Event Planning: Sensible planning of the event timetable so that noisy events are balanced by quieter periods can diminish the noise impact of the sport. General advice on this form of control plus examples of good practice in event planning would be a useful addition to all motorsport Codes of Practice.

Noise Propagation: ground attenuation. This can be significant in some situations and give reductions on a par with barrier attenuation.

Whilst the Codes of Practice do recognise the important role that distance and barriers may play in reducing the noise from an event, the matter is generally poorly developed. The design of barrier and landscaping for maximum sound reduction is a difficult task due to the complex layout and surface topography found at most motorsport venues. The Codes of Practice should emphasise this and give some indication where advice on design can be found. Some consultancies have detailed knowledge and computer packages for the prediction of noise over complex terrain topographies. This is also an area worthy of serious research investigation.

e. **Training.** The training of noise inspectors is taken seriously by some motorsports but the Codes of Practice often fail to recognise the importance of this aspect of noise control. The Codes of Practice should give specific indications of the learning outcomes of the training programme for a qualified noise inspector. Noise inspectors should be given regular up-dates and also be subjected to assessment and appraisal.

5. SUMMARY

The appearance of the Codes of Practice for motorsports is a significant step forward. The existence of these documents provides a useful starting point for development but comparing these documents with the proposed criteria given above there are a number of significant points that need attention.

These are

1. **Structure.** The Codes of Practice should be revised along the structural outline given in the criteria above. Many Codes of Practice miss out important sections and so are incomplete.
2. Insufficient information is given of assessment procedures and measurement systems.
3. There is a general lack of attention paid to record keeping of noise testing and maintenance of noise testing equipment and hence the credibility of the noise control system will be open to question.

Proceedings of the Institute of Acoustics

CODES OF PRACTICE FOR MOTORISED RECREATIONAL ACTIVITIES

4. Insufficient information is given of useful sources of reference material and sources of expert help.

5. Many Codes of Practice used non-standard nomenclature.

6. THE WAY FORWARD

So far the different Codes of Practice have been produced by working parties of the different branches of motor sport. It would be sensible to form a joint working party to work towards unification of the different Codes within a single methodology. A single generic Code with application section for each different sport would carry far greater weight and would form a single source of guidance for all regulating authorities and litigation actions.

Such a working party would have a primary goal the establishment of robust forms of noise assessment and noise impact prediction methods. Without credible assessment and monitoring methods the idea of noise control of motor sports flounders. This area is a fundamental weakness of the current Codes of Practice. A critical review of this area should be carried out by the working party a view to establishing a programme of evaluation and testing. Serious planning is required to gain the maximum information from the test programme.

Setting up such working party could perhaps be the result of a joint workshop of all the interested parties. Perhaps the Environmental Group of the Institute of Acoustics could act as the instigator of such a meeting?

Once such a working party was established part of its remit should be a regular re-appraisal of the Code of Practice say every five years to that the Code remains up to date and the re-appraisal process should act as a spring board for launching new research programmes.

In the long term, the motorsports industry should look into sponsorship of research into the area of annoyance from motorsport noise. There is a strong argument in favour of adopting general environmental annoyance criteria so achieving comparability with other leisure activities but equally there may be a need for a specific index for motorsport. This not a problem that is easily resolved but would require a commitment over a period of time. Without the information that such research would provide motorsport will find it difficult to resist the increasing pressure to reduce its activities

7. REFERENCES

1. 'Guidance Notes on Noise Control at Motor Sports Circuits' Association of Motor Racing Circuit Owners and the RAC Motor Sports Association, 1996.
2. BS7445:1991 "Description and Measurement of Environmental Noise"
3. Lawson M., "An Assessment of the Drive-by Test for Motor Racing Cars", M.Sc project report, University of Derby, 1997.
4. Fillery M & Thorpe A., "Prediction of the equivalent continuous noise level of a motorsport race from drive-by measurements." Proc. Autumn Conference, Inst Acoustics, 1997.
5. BS4142:1997 "Method of Rating Industrial Noise affecting Mixed Residential and Industrial Areas"