MODEL AERONAUTICAL ASSOCIATION OF AUSTRALIA

NOISE POLICY AND GUIDELINES

MOP062

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Table of Contents

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1. INTRODUCTION

The sport of flying model aircraft provides enjoyment for many. It can also create noise, some of it unavoidable, which may annoy or disturb others. The purpose of this Policy is to define the terms associated with the measurement of noise and to describe how annoyance or disturbance caused by model aircraft noise may be minimised so that the sport may be pursued in a reasonable and considerate manner which coexists peacefully with other pursuits. A successful approach to the noise issue demands an integrated set of solutions, with the flying site, flying habits, potential complainants and the emissions from models all being addressed.

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British Model Flying Association – Handbook

2. DEFINITIONS

Acoustics……..The science or study of sound; its production, transmission and effects.

Attenuation…… The reduction of sound energy as a function of distance travelled.

A-Weighted Sound Level…….. A measure of sound pressure level designed to model the response of the human ear, which does not respond equally to all frequencies. The ear is less efficient at low and high frequencies than at medium or speech-range frequencies. To describe sound in a manner representative of the human ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to the medium frequencies. The resultant sound level is said to be A-weighted, and the units are dB(A). The A-weighted sound level is also called the noise level. Sound level meters have an A-weighting network for measuring A-weighted sound levels. Most measurements of occupational, industrial and environmental noise are taken using A-weighting.

Background Noise Level…….. The noise level in the acoustic environment, usually excluding the noise source of interest (in this case - model aircraft).

dB(A)…….A-weighted unit of sound pressure level.

Decibel (dB)…….. A unit of sound level implying 10 multiplied by a logarithmic ratio of power or some quantity proportional to power. The logarithm is to the base 10. Sound intensity is described in decibels. For example: breathing, 5 dB; office activity 50 dB; jet aircraft during takeoff at 300' distance, 130 dB.

Frequency (f)…… The number of oscillations or cycles per unit of time. Acoustical frequency is usually expressed in units of Hertz (Hz) where one Hz is equal to one cycle per second. Frequency is interpreted subjectively as pitch. Humans can hear sounds having frequencies between 20 and 20,000 Hz.

Hertz (Hz)……Frequency of sound expressed by cycles per second.

L_{10} Parameter…….. Noise level exceeded for 10% of the measurement period. This represents the upper intrusive noise level and is the most appropriate measurement parameter for model aircraft.

Noise…… ……. Unwanted sound.

Noise Sensitive Area……. An area with residences and the like. The amenity value of the area will usually be adversely affected if the unwanted noise is easily perceived by an average person engaged in an activity appropriate to the location e.g. conversation on an outdoor deck. 'Easily perceived' means that the noise is perceived during the normal course of the appropriate activity while the listener is making no special effort to hear the noise.

Noise Measurement…….. … Measurements of model aircraft are to be undertaken in accordance with ISO 7574-2 1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – part 2; methods for stated values for individual equipment* and also, where these noise events occur in a club environment, then the noise levels are to be measured and reported in accordance with ISO 1996: 1982 - Parts 1, 2 and 3, *Description and Measurement of Environmental Noise*.

Measuring Equipment……. AS 1259 sound level meters.

Pitch…… The perceived auditory sensation of sounds expressed in terms of high or low frequency stimulus of the sound.

Receptor…… Sensitive receiving environment or receptor: any portion of land in a Residential Area or an Emerging Community Area e.g. a residing person, a site used for education purposes, aged care accommodation, a house, a multi–unit dwelling or a caravan park.

Sound Level Meter…… Device that converts sound pressure variations in air into corresponding electronic signals. The signals are filtered to exclude signals outside frequencies desired.

3. METHOD OF USE OF THIS POLICY

This Policy contains guidelines which, if followed, should ensure that undue disturbance is avoided in most circumstances. These are not intended as hard-and-fast rules to be applied to every site. State and local circumstances differ, and more stringent or less stringent controls may be appropriate in individual cases or on the same site over the years, as described in the following scenarios:

(a) Where a site has been used for some years without causing complaint, there will normally be no need to require the pattern of use to be modified, unless external circumstances or the character of use alters significantly and disturbance is caused as a result.

(b) Where complaints have been received about existing sites, the Policy is intended to guide model flyers and others on the ways in which intensity and manner of use may be adapted to allow the use to continue, if possible, without causing further disturbance.

(c) Where the use of a new site is contemplated, the Policy may be used to determine, before use starts, what constraints may be necessary to avoid a nuisance.

In both the case of a new site and that of an existing site which has caused complaints, it is recommended that the model flyers, the local authority and the near neighbours of the site should discuss any limits which might be necessary to prevent undue disturbance being caused by noise. Clubs can often exert very effective control over the type and manner of operation of model aircraft on a site. New clubs should also be given every encouragement to concentrate their activities on the most suitable sites.

4. MINIMISING NOISE DISTURBANCE

When most pilots talk about noise reduction, they refer solely to reducing the amount of noise emitted by their models. This is an important component of minimising noise disturbance, but is by no means the whole answer.

The following factors are relevant:

(a) the amount and quality of noise emitted by the aircraft
(b) separation distance
(c) times of operation
(d) numbers of model aircraft in operation simultaneously
(e) barriers between flying site and noise-sensitive premises
(f) major model flying events

4.1 Aircraft Noise

The amount and quality of noise emitted by a model aircraft is amenable to a degree of modification. However, because of the technical limitations on controlling noise emitted from individual model aircraft, in that it cannot be eliminated, additional precautions may be necessary to limit the model-flying noise heard by neighbours.

4.2 Separation Distance

Even when muffled, a model aircraft may still sound noisy, and should not be flown too close to noise-sensitive premises. The minimum distance from such premises

at which a model aircraft should be flown depends on the exact nature of the premises and the surrounding noise environment.

4.3 Times of Operation

The hours of flying have an important bearing on the likelihood of disturbance. The type of model is less important, since it is the existence of the noise rather than its intensity, or degree of continuity, which causes disturbance, if the hours of operation are unreasonable. Generally the points of launch and closest approach of model aircraft should not be as near to noise-sensitive premises at the times of day and days in the week when people consider that they have a particular right to peace and quiet in and around their homes. Special problems may arise at weekends when noise from model flying may conflict with other quieter pastimes.

The times of day and days of the week when any model flying noise is unacceptable will differ between areas and are a matter for local determination. In general however, it is recommended that where control of numbers and separation distances is not possible, or is inadequate to avoid substantial disturbance at the more sensitive times, flying should not be allowed outside the hours of 9 am to 7 pm (or sunset – whichever is earlier) on weekdays and 10 am to 7 pm (or sunset – whichever is earlier) on Sundays and Public Holidays.

4.4 Number of Model Aircraft in Operation Simultaneously

Two model aircraft each emitting the same level of noise may, if flown together, produce an overall noise level which can be up to 3 dB(A) above that of the individual aircraft. The disturbance caused may be greater than is apparent from this simple change, owing to increased variations in sound level. If a flying area is close to noise-sensitive premises, consideration should be given to limiting the number of aircraft emitting noise that is near the maximum acceptable being flown together.

4.5 Barriers Between Flying Sites and Noise Sensitive Premises

Topographical features such as hills can afford protection against sound, as can large buildings. Where it is possible, and on balance likely to lessen disturbance, flying sites should be chosen to take advantage of these, and less stringent minimum distances may then be practicable without risking undue disturbance. It should be noted however that belts of trees, unless dense and wide, have little attenuating effect on noise.

4.6 Major Model Flying Events

From time to time major model flying events or displays are held, which are of interest to larger than usual numbers of participants and spectators. It is likely that such an event will result in a temporary intensification of use of the site. In considering the desirable scale and frequency of such events at any site, the organisers should consider the potential for noise disturbance from such events and any actions that may be required to minimise the impact.

5. ASSESSING NOISE IMPACTS

5.1 General Noise Impact Considerations

It is important to be aware that general annoyance, or more specifically the recognition of a noise source, occurs when the general noise from the source measured at a receptor (eg a residential dwelling) is greater than 3 dB(A) above the background noise level. It should be noted that model aircraft engines can

produce modulated or impulsive noise, and respectively these require 5dB and 10dB lower levels.

While identifying a noise impact level associated with model aircraft at a set distance such as 3 metres provides a comparison between individual aircraft, it does not consider specific site considerations or how the frequency affects the attenuation over distance. The important thing to remember is that the noise meter is a tool. Reducing the decibel reading on the meter is not the end goal of noise reduction, but is a useful step along the way.

When considering the noise impacts associated with a Model Flying Club, the closest possible location of sensitive receptors should be identified and should be used to complete Noise Impact Assessments of the operations of the club. This is a general practice endorsed by Town Planning provisions.

5.2 Noise Assessment

An acoustic report is required to be provided with all planning applications in accordance with State and Federal regulations. In any case, when clubs are intending to establish a new facility, noise emission from the site and its impact on the local environment should be considered. Where this is considered to be critical, an AAAC registered acoustic consultant may be required to be commissioned to provide advice.

5.3 Normal Procedure Used for Compiling an Acoustic Report

The process that would normally be followed by an acoustic consultant to ensure that the Model Flying Club is generally not going to impact on nearby sensitive receptors is as follows:

1. Establish the background noise impact levels through an ambient noise level survey (without models flying).
2. Determine the minimum separation distance possible from the aerial flying area to the closest possible sensitive receptor.
3. Identify appropriate tonal and impulsiveness factors to be applied. (Generally +5 dB (A)).
4. Calculate minimum noise reduction over the identified separation distance. The potential noise loss over this separation distance, which is determined mathematically, is added to the background noise level without the model club in operation. Then the correction for tonality (+5) or impulsiveness (+2) is applied together with the +3 dB(A), which provides a generally appropriate noise level that a model aircraft can emit without causing annoyance to the receptor.
5. Conduct calculations of maximum appropriate noise levels at the source (model aircraft) by applying corrections (tonality and/or impulsiveness factors), ambient noise level in the appropriate parameter and separation distance reduction.
6. As a general cross assessment, conduct spot checks of aircraft using the L_{10} parameter.

This methodology is called *Comparison of Like Parameters or Descriptors* - the chosen parameter assessing the impact of the activities of the Model Flying Club does not exceed the same parameter describing the ambient noise by more than 3 dB(A).

5.4 Suggested Procedure for Establishing Field Noise Limits

Where there is no legal requirement for the use of an independent consultant to obtain noise measurements and a club decides that the cost of employing one is not economically justified, it may decide to undertake its own measurements. Whilst likely to be less rigorous than a professional study it will give the club good guidance on the noise footprint that they are creating and how to control it.

A procedure that a club may follow to establish a noise footprint around the perimeter of their flying area using a noise meter is as follows:

- Record the sound levels at locations around the boundary of the field, paying particular attention to areas where there may be sensitivity. These measurements should be conducted with all types of aircraft that use the field, in terms of size and power plant, and over several days and varying weather conditions. The normal flying area for these aircraft should be used.
- Obtain background noise figures at the same locations.
- Noise levels obtained should then be compared to the levels required by the State legislation, Local Council or an acceptable level depending on the local circumstances.
- Once it is known what the acceptable noise levels and the aircraft that conform to them are, these aircraft should then be measured on the ground at a set distance. Either 3 metres or 7 metres are commonly used distances and the choice of either should remain constant for all future measurements. The measurements should be taken from in front, to the side, and behind the model. Normally the noise level is taken as the average of these three readings unless one direction is particularly noisy.

On the basis of these results the club can determine a general noise limit, or an individual limit, at the set distance on the ground. If an individual limit is set for different types of engines including 2 strokes, 4 strokes, glow, petrol and turbines then there will be justification available for these. The club would then be expected to ensure that all aircraft flying are within these limits. If any exceed it then it is also expected that the club would work with the owner to assist in lowering the noise through actions such as improved muffling or a larger propeller.

Measurements on the ground do not automatically correspond with the noise levels received at a distance. In most cases however this process will give a result which in practical terms will be representative.

6. STATE REFERENCES

State and Territory Authorities have their own mechanisms for management of noise levels and the appropriate departments should be consulted for guidelines on external noise emissions.

7. COMMON ACOUSTIC TERMS

Absorption…….. The product of absorption coefficient and surface area of a material, in units of sabins, used to designate the amount of sound absorbed by that material. The properties of a material's composition to convert sound energy into heat thereby reducing the amount of energy that can be reflected.

Diffraction…… The act of sound waves travelling around barriers especially pronounced when the sound wavelength size is comparable to or greater than the dimensions of the barriers.

Direct Field…… Area where the sound measured can be attributed to the source alone without effects of reflections off walls or obstructions.

Echo…… Reflected sound producing a distinct repetition of the original sound. The perception of two distinct sounds resulting from the difference in arrival times of sound waves travelling over different paths but originating from a single source.

Inverse Square Law..... Sound levels fall off with distance travelled. Sound level drops off 6 dB from the source point for every doubling of distance.

Leq…… Energy averaged noise level over the measurement period. This measure is used for comparison with relevant standards for ambient noise.

Octave Bands…….. Sounds that contain energy over a wide range of frequencies are divided into sections called bands. A common standard division is in 10 octave bands identified by their centre frequencies 31.5, 63, 250, 500, 1000, 2000, and 4000 Hz.

Reflection…… The amount of sound wave energy (sound) that is reflected off a smooth, hard surface. Some sound reflection can enhance the quality of the signal of speech and music.

Refraction…….. The act of sound waves bending or changing propagation direction as they travel from one medium or medium condition (such as temperature, density, humidity, or wind current) into another.

Spectrum…….. Graphic representation of sound level vs. frequency.

Time-varying noise……. Noise emissions are emitted over varying length in time. (ie Leq is the continuous equivalent average sound level, L_{10} is the sound pressure level equalled or exceeded for 10% of the time interval considered, L_{90} is the sound pressure level equalled or exceeded for 90% of the time interval considered).

Wavelength…….. Distance between two identical positions in the cycle or wave. Sound that passes through air produces a wavelike motion of compression and refraction. Length of sound wave varies with frequency. Low frequency equals longer wavelengths.