Model aircraft engine noise. Is it an important issue?

How many of you are concerned with the amount of noise your airplane makes?

Every year flying fields are lost because people living near them don't like the noise created by powered model airplanes. These people end up going to their local government and cause an uproar at meetings. Before you know it another flying site bites the dust. So it has become very important for flying clubs to be good neighbors and keep model aircraft noise to a minimum.

Keeping your flying field is an important reason to be aware of model airplane engine noise; however it is not the focus of this article. We're going to look at something more readily lost to excessive noise and that would be hearing. Have you ever had a ringing in your ears after spending some time tuning an engine? This ringing, my friends, is the undeniable sign that irreversible damage has occurred to your hearing. Experts call this; Noise Induced Hearing Loss (NIHL).

At birth, standard equipment for every human baby includes about 16,000 hearing receptor cells in each inner ear and ringing means you're at least one cell closer to total deafness.

NIHL is dependent on two things; noise level (loudness) and the length of time exposed to it. The first part of that equation, 'level' is what we'll concentrate on. You've likely heard the term decibels (dB) which is the measurement level of sound and to fully understand decibels, requires an advanced degree in mathematics. To vastly simplify what dB levels mean to you and I a 10 dB increase is perceived to be twice as loud. In other words 90 dB would sound twice as loud as 80 dB.

When it comes to NIHL the Occupational Safety and Health Administration (OSHA), has quite an extensive set of standards on noise, to protect workers from exposure and prevent hearing damage. Reviewing these standards can be quite daunting so I've boiled down some important facts to give you an idea what various noise levels mean.

OSHA standards say if the average noise level, when measured over time, is above 84 dB, hearing protection must be offered to employees and a hearing testing program implemented. Note that experts agree that sound's louder than 80dB are considered potentially dangerous.

When noise levels reaches 90 dB, hearing protection must be used and employers are required to enforce its use. 90 dB also marks the beginning level of the noise category known as "Extremely loud". An example of a noise maker at this level includes lawnmowers, an electric drill and truck traffic.

120 dB begins the next category and it is listed as "Painful". A typical noisemaker at this level is an emergency vehicle siren. Further up the "Painful" category is a jet engine measured at 100' and a gun blast. Both of those register in at 140 dB. At this level just very short exposure can cause damage.

We've covered what noise is, what excessive noise can do to your hearing and the levels experts say damage occurs. So what the heck does all this mean to aero modelers and really how much noise does a model airplane engine make anyhow? The noise an engine makes all depends on the motor, muffler, and prop combination, as well as the airframe construction. To keep things simple we'll take a maximum noise level published by AMA in the 2011-2012 Competition Regulations for Radio Control Aerobatics. Rule 4.2 simply states the maximum noise level for all AMA classes shall be 96 decibels measured at three (3) meters from the center line of the model.

If we take a model that is producing 93 dB as measured at 3 meters, and then put a modeler's ear at a typical needle tweaking distance of 1/2 meter, its easy to see that noise exposure is far beyond OSHA's "extremely loud" level of 90 dB where workers are "required" to wear hearing protection.

Richard L. Powell, PH.D. Fred H. Bess, PH.D did a study on the hearing hazard from model airplanes and here is a summary of their findings: "An acoustic analysis of model airplane engine noise on hearing indicated that the dB levels exceeded damage risk criteria for short-term exposure… These observations add further support to the recommendation that model airplane fliers should wear ear protection".

A lot has changed since Dr's Powell and Bess released their study in 1972 with advancements in motor and prop design reducing noise levels, however their analysis of wearing ear protection is still valid. Some of you may be thinking these guys did their study using those annoying sounding two-stroke glow engines, while you on the other hand only fly the quieter four-stroke or gasoline engines.

Agreed the four-stroke glow and gasoline engines do have a more pleasing sound but I have news for you… They are often are louder than the two-stroke cousin. Consider for a moment that a four-stroke fire on every other revolution and the "bang" can be louder as the combustion pressure is higher.

The four-stroke simply has a more pleasing "tone" because the Hertz (Hz) is much lower. Measuring a two-stroke at 10,000 rpm gives a pitch of 166 Hertz (Hz), while a four-stroke at the same speed is 83 Hz. The higher Hz of the two-stroke just makes it more annoying, not louder.

Regardless of the motor, muffler and prop, our little power plants are just plain noisy and modelers should use hearing protection when working in close proximity of a running, model airplane engine. Right? HELLO!??? DID YOU HEAR ME!!?

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