

Noise reduction by shut-off

Some thoughts on noise reductions, rules and shut-off systems

By Henning Forbech, 25nd June 2009

Introduction:

In this paper I will look into how the noise load can be reduced by changing the way combat competitions are organised and by the use of shut-off systems in the future. Reduction of the noise load by changes in the specifications for muffler, venturi, engine or propellers is still a possibility but these technical changes are not the issues here. The noise load is here only seen as the time we produce noise.

Different types of noise:

First I would like to split the noise load from combat into three types of noise load: “Good noise”, “Bad noise” and “Necessary noise”. The sum off these three types is the “Total noise”.

“**Good noise**” is the sound that comes when pilots are fighting with model airplanes in a dog fight (air battle).

You could also say that “Good noise” is the sound of combat pilots having fun and spectators enjoying a combat match.

“**Bad noise**” is noise that nobody benefits from.

The noise from models that keep flying after a bout has ended is typical “bad noise”. Everybody – even the pilots – is just waiting for the engines to stop.

“**Necessary noise**” is noise that is necessary for periods with combat flying. Necessary noise is typically engines running before take-off or a model flying solo during a period in bout when the opponent’s model has landed.

“**Total noise**”. Neighbours to a flying field and other people that hear combat without having any interest in the activity will find that all sound from combat activity is just noise. To them it makes no difference whether we make “Good noise” or “Bad noise”. They just want us to make as little noise as possible.

Let’s take a closer look at the three types of noise and see how the noise load can be reduced.

Necessary noise

One type of “Necessary noise” is the noise from test flights before the competition. This noise load could be reduced by advanced shut-off systems that allows pilots to stop their engines as soon as they have checked the setting or the model trim. Test flights are normally done with a flight time of 1-2 minutes. With a shut-off system that allows the pilot to stop his engine this type of flights could easily be reduced to just half a minute.

The necessary noise from the starting period is now typically two engines running for 30 seconds on the ground before launce. This noise could be reduced by a shorter starting period. With 30 seconds starting period the runtime will probably be around 20 seconds and with a 15 seconds starting period the runtime will be 10 seconds. No starting period at all (direct start) will of course eliminate this noise load. A direct start will probably make many pilots do some extra test runs just to ensure that everything is ready for the direct start. The final result would probably be an even higher noise load than what would occur with just a short warm up period.

The necessary noise from two models flying level before the combat starts is normally less than 10 seconds and probably only 5 seconds for a restart of the combat during a bout. This can probably not be reduced due the nature off a combat match.

Good noise

The noise from a dog fight between two models in the air is the “good noise”. This noise load can be reduced by reducing the length of the bout (remember we are only discussing noise reduction as reducing time with noise). A reduction on the flight time has actually been proposed. More on this issue later in this document.

Bad noise

Noise from models flying after a bout is over is just “bad noise”. Nobody benefits from the noise and if it was possible for the pilots to stop the engine nobody would hesitate to do so. This “fly out” time” could be reduced by shut-off systems that allow the pilot to stop the engine. By taking out the “fly out time” the turn around time between bouts could also be reduced, especially on flying fields where the pilots can not move to another area and allow the next teams to enter the circle.

Flying after a sure victory or sure defeat will not benefit anybody. Sometimes an early landing could not only be acceptable but also something we should encourage pilots to do. Imagine a match with 3 to1 in cuts and no streamers left after 2 minutes. The 3 cut pilot is leading with 200 points and could land 1½ minute before the end of the bout and still win. If he makes this early landing his opponent is sure to lose and can also land his model. This is an “early landing”. A “tactical landing” is when a pilot lands with some streamer just to prevent his opponent from making more cuts. Many pilots consider “tactical landing” as bad sportsmanship.

Reduced fight time

As a way to reduce the noise load from combat it has been proposed to cut the flight period from 4 to 3 minutes.

At big competitions such a reduction will of course reduce the noise load per bout but the noise from warm up and fly outs will remain the same. Mainly the “good noise” will be reduced. The “bad noise” and the “necessary noise” will remain the same.

A reduction of the length of the bouts will also have other effects. At small competitions this reduction might lead to competitions where the combat event is flown with three lives per pilot instead of the usual two life system. The reduction in time for each bout and the low number of pilots will make it possible to run a 3 life competition instead of the usual 2 life system. The 3-life system has been used in USA for some years.

If we compare the noise from a “2-life - 4 minute” competition with a “3-life - 3 minute” competition we can see that the total time with combat will go up from $2 \times 4 = 8$ minutes to $3 \times 3 = 9$ minutes. The number of warm ups and fly outs will also go up by 50%.

At small competitions a 3 minutes combat period will probably lead to a higher noise load than what we see today.

Training, trimming models and testing engines between competitions will not be affected by shorter bouts. Pilots will still take the models and engines for the same numbers of test flights and the need for practicing will also be the same as before. This spring I have been asking combat pilots about their activity and mainly based on fuel consumption I will estimate that combat pilots on average spend 10 times more time on practicing than they do on competitions. Shorter bouts will not change the activity between competitions.

In the big picture a reduction in the length of the bouts will probably only reduce the noise load from combat by a few percent. The “cost” of this relatively small noise reduction will be a drastic reduction in the amount of fun at competitions. I already find it amazing how much effort and resources combat pilots are willing to spend for a few minutes activity at competitions. If we start to reduce this “core activity” there is a high chance that many pilots will find the relations between effort and fun too high and will start to look for another hobby or sport.

Vision for a reduction in noise load:

A visionary strategy for noise reduction would be to reduce the unwanted noise – the bad noise and the necessary noise.

Some noise load could be avoided by a shorter starting period. A 15 seconds starting period would reduce the noise load and would also save time at competitions.

The noise from fly outs could be reduced by using shut-off systems to stop the engines right after the match or test flight. At this moment all pilots are struggling just to get some kind of shut-off system working but soon we will have reliable systems. In the near future we will also start to see more advanced shut-off systems that will let the pilot stop the engine during a flight. The first example of this is the electronic shut-off from Alex Prokofiev. Only a few shut-off systems have this feature right now but I think we should encourage this development in the future. It would be an easy way to reduce the noise load without cutting down on our core activity – the dog fights.

The capability to stop the engines will not only reduce the noise. It will also give us some new interesting possibilities for making combat more interesting. A pilot that has lost all streamer, could be rewarded for landing and putting on a new streamer. I will be back with more on this issue later.

These were just some thoughts on noise reductions by shut-offs. There are still a lot of ways to reduce noise by changing the rules for engines, propellers and mufflers.

/Henning Forbech