

## **Genuine engine sounds fitted to scale electric powered models**

Fitting engine sound generation sounds to electric planes is new and it is constantly being improved, but if you wish to find out how to fit it to your model then please read on:-

### **What does it do?**

With added TBS electronic circuitry and conventional loudspeakers fitted to the model, the genuine full size engine sound is emitted from the plane. The engine 'sound speed' is proportional to the throttle position and thus coordinated with the speed of the motor and propeller. It brings the model alive and transforms it to give the impression of a full size plane in the distance. This gives a whole new reality to scale planes - especially in flypasts when the 'Doppler' effect is apparent. Audible gun firing is easily possible using an auxiliary channel on the transmitter which is great fun in dog fights. The full stop/start sequence is also provided to add to the model's realism. So far, the Merlin and DB601 engines are programmed together radial engine sounds and others. The circuitry can be used on single and mutli-engined planes.

### **Weight**

The first thing to consider is the payload that your model can take. This will determine the system you use and the number of loudspeakers. This also sets the sound power output. You should aim for the loudest possible system. The lightest practical system is about 1/2lb (0.25kg) total (including the speaker). If your plane can carry two pounds (1kg) then you will have a very loud system. Most models so far are fitted with systems which weigh about 1lb (0.5kg).

The sound can appear very loud on test, but it will dissipate in flight. We achieve 98dBa @ 1m with the 1/2lb sound and 102dBa with the 2lb sound. This is quieter than a normal I/C engines but very very realistic, and probably a 'scale' sound level!

The speaker(s) can be fitted into the cowl or underneath the fuselage or wing. They need to be fitted into a sound box of sorts, and have a grill to stop propeller air from blowing the speaker cone back into the speaker. We are constantly trying different speakers, but the Visaton R10s (6oz weight) speaker is a good one to start with.

Design the speaker installation so that the speaker(s) can be changed, as they are run at their maximum output.

## **Electronics**

The electronics consist of a Benedini TSB Mini or Micro circuit which have pre-programmed engine sounds. Select from the list that Thomas can provide. If you select a similar engine sound file but not the correct one, it will take a real expert to spot that it is not quite right.

The list is increasing and most WW2 plane engines are catered for, as well as some others. If a sound file cannot be found from the list, then you can provide your own digital file to Thomas for programming. It will need to include the motor running up to speed and also contain the start and stop sequence.

The small TSB Mini or Micro circuit is plugged into the receiver throttle channel and the engine sound is proportional to the throttle stick setting. A full stop/start sequence is also pre-programmed and can be actuated in two ways. If only the throttle channel is used, then the stop start sequence is automatic. If an auxiliary receiver channel is also plugged into the soundunit, and a three position switch is allocated to it from the transmitter, then the stop/start sequence is actuated with this control. Also there is the option of machine gun sound from the other position of the transmitter switch. This is not available on the TBS circuit which only uses the throttle channel.

The power for the soundunit is supplied from the receiver batteries and it is very small. You will probably not need to increase the receiver battery size and it is powered via the servo lead.

## **Amplifiers**

The other Benedini circuit that you will need is the amplifier. This is connected between the soundunit and the speaker(s). This unit does consume power and can be driven from its own battery or the main motor flight pack batteries.

There are two amplifiers to choose from:-

1. 2x40watt amplifier. This runs on anything between 12 and 18 volts and usually has its own separate 4 cell Lipo pack (16v) of about 1500mah to 2000mah. This adds to the weight of the system but divorces it away from the flight pack batteries. The amplifier has two independent outputs and it will drive two speakers, but only one may be used if required. It has an integral volume control adjustment. It is more than powerful enough to drive two Visaton R10s speakers, and if turned up full it will damage the speakers. We normally set the output to 1.4amps.
2. 50v Amplifier. This is like the 30v amplifier but will run at a higher voltage, so it is best to select the one with the right voltage which can be connected to the flight pack.

They have been especially designed and developed for use in model planes and have been kept small and light. All the amplifiers get hot and so need to be given some air-cooling from the propeller.

### **Interference**

We have tested the electronics very carefully on the ground and in the air. To date (winter 06) there have been probably 200 flights with no interference problems. The sound systems have been fitted on very expensive models and this would not have been risked unless we were sure that it would not give us any problems. A Ferrite ring is normally fitted to the receiver throttle lead as a precaution. This is because the combined lengths of the throttle output leads can approach the length of the aerial.

### **View the final results.**

Some examples of the models can be heard on <http://www.putfile.com/jran>

### **Ordering**

You need to decide if you will have the TSB Mini or Micro and choose an amplifier. 4 ohm speakers can be ordered too or can be sourced locally. The setting up instructions are provided with the circuitry.

All settings as well as the loaded enginesound can be changed by the free of charge TBS Flash PC software, available at [www.benedini.de](http://www.benedini.de).

This software allows in addition to create your own enginesound and load it on the soundunit.