Sound Improvements

Electric sound continues to become more powerful and sophisticated. John explains the latest developments

By John Ranson

Test speaker box

Visaton R10s

Blaupunkt ODx 102

Visaton FRS10WP

Over the last year more people have been fitting sound to their scale models. If you have heard it, then you will understand how it brings the plane alive and really can enhance the presence of the model. With the Doppler effect, the engine note can sound just like the real thing and I will not be making a scale plane without it from now on.

The electronics from Thomas Benedini at www.benedini.de have been thoroughly tested and improved over the last couple of years, and this month Thomas has been developing some software to improve the operation of the Micro sound unit so that the start/stop and gun controls are simpler to operate.

Thomas has also sent me a new 45 V amplifier for testing and I can now report back on this.

The main consideration for modellers is really what speaker should they use and where will it (or they) be fitted in the model? The larger the speaker, the louder it will be, and the amplifiers are more than powerful enough to drive them. But the weight can be limiting. So I have just had delivered a box full of speakers to try and test each type for sound output and weight.

Basics

Let's go back to basics to refresh everyone as to what can be done now. With a TSB

Visaton FR13

Take your pick

Micro circuit powered and controlled from a 'Y' lead in the speed controller circuit and pre-programmed digital sound file of the particular real engine that you choose, the true engine sound can be co-ordinated with the throttle position and motor speed. When the output from this tiny TBS Micro circuit is fed into an amplifier powered by separate batteries (or the main flight pack), then one or more speakers can be driven to give out the actual engine sound. This can be a Rolls Royce Merlin or radial engine or similar.

So, it's a TSB Micro with a pre-programmed engine of your choice, and Thomas has quite a few on his website now. Then you need to consider if you want audible guns operated from an auxiliary channel on the transmitter. If you do, then you will need a 'centre off' three-position switch on the transmitter. If you don't then the 'autostart' version is for you. As a safety measure I also fit a ferrite lead into the servo lead of the throttle output. The very low amount of power required for the Micro circuit is supplied from the receiver battery via the servo lead.

The amplifier can be one of three choices. There is an excellent 2 x 40 watt amplifier which can drive one or two 4 ohm speakers. This amplifier needs a separate 12 V to 18 V supply and normally a 4S LiPo will do here of about 1500 mAh capacity. It will work on 3S LiPos, but the amplifier output drops off considerably with lower voltages.

The next amplifier is a mono 18 V to 35 V unit which can be driven directly from the flight pack. This saves the weight and expense of a separate battery and this is the one which was used in my 109 and the 'Half Pound Sound' system with one R10s speaker. I power it with the 6S flight pack LiPo and it works really well at about 24 volts.

New 45 V Mono Amplifier

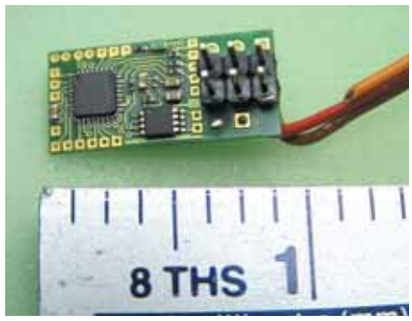
The latest amplifier is a 45 V mono and this has now been tested. It is similar in weight and size to the other two but can have a higher input voltage supply. This will be useful for those who have models with say 8S to 10S LiPo batteries. Once again it is supplied with its own heatsink, but the heat generated can mean that unless you can put it directly behind the propeller air blast, then it is best to remake the heat sink with more fins. Some people just add another heat sink to the outside and this works well.

This amplifier drives an 8 ohm speaker (or two 4 ohm speakers in series) whereas the others require 4 ohm speaker(s). The amplifier chip will self regulate and shut itself down if it gets too hot. This amplifier was tested with the new speakers and I will get onto that next.

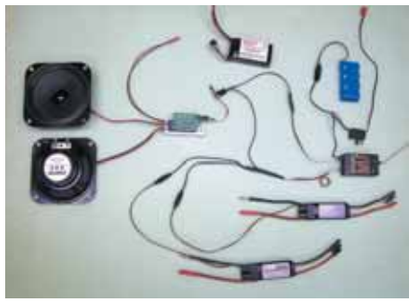
Speakers

We have all been trying different speakers and measuring their comparative outputs. It is difficult to get reasonably accurate definitive results, so the only way was to test them one at a time in similar conditions. Now I do not possess an anechoic chamber, just a garage and a simple sound meter, but I think that the test results are reasonably accurate and repeatable. They were all fitted into a wooden box (yes, the wife's waste paper bin was nicked again) and the

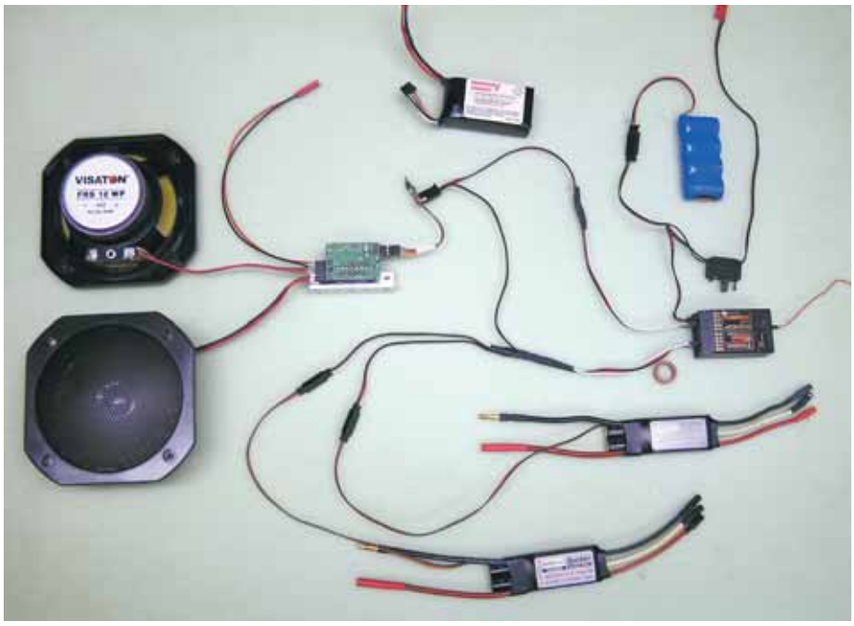
Visaton WS13E



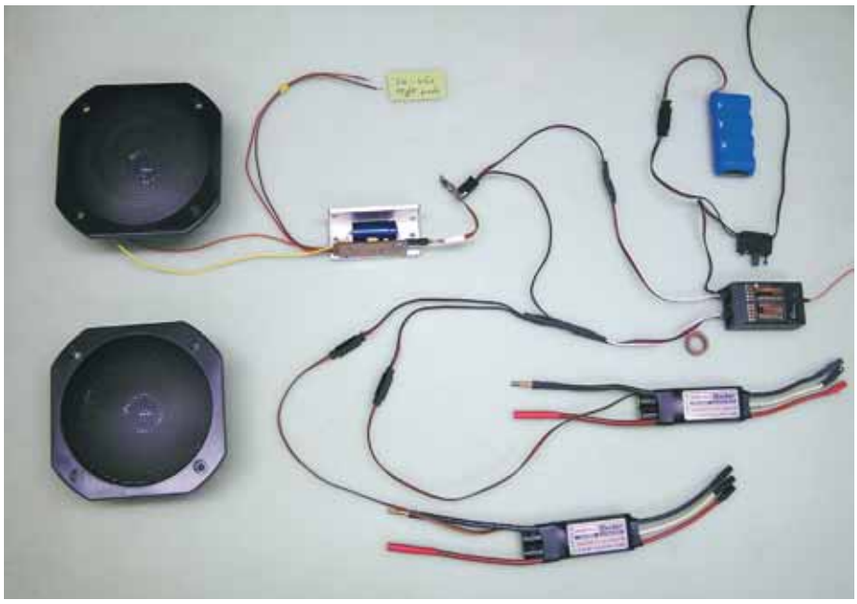
TBS Micro sound circuit



'One Pound Sound' circuit as used in the Beaufighter



Louder 'Two Pound Sound' system



With one speaker this could almost be a 'One Pound Sound' system

measurements were taken in the same conditions inside, at one metre from the speakers.

The speakers which were tested are the old favourite Visaton R10s, the Blaupunkt ODx 102, the Visaton FRS10WP, the Visaton FR13 and the Visaton WR13E.

Visaton R10s

This 4", 4 ohm low-cost speaker is the one we all started with and it still is the lightest by a long way. You can see in the picture that they weigh 152 g which is less than 6 oz each. Under test with the 2 x 40 watt amplifier and 4S LiPos the two speakers generated 99 dBa at 1 m. The voltage was 15 V and the current was 2.5 A. This has been measured before and the speakers can be driven harder but at the expense of life. It is easy to blow these speakers, but if you want two lightweight speakers for a 'One Pound Sound' or one for the 'Half Pound Sound' system then these are still the type to go for. For the 'Half Pound Sound' use one speaker and the output is about 97 dBa.

Blaupunkt ODx 102

This more expensive 4", 4 ohm speaker is a quality product with the potential to produce more output than the R10s. It has a built-in tweeter and a neodymium magnet to keep the weight down. At 212 g (or less than 8 oz) it should be better. In tests however, two speakers only generated 96 dBa at 1 m (2.1 amps) and to get it to produce more, the amplifier output had to be increased (via the integral potentiometer) and still they only produced 98 dBa at 3 amps full volume. The quality of the sound was better at the lower levels and this is probably what it has been designed for. The engine sound was rich, but this is no good to us if it cannot be heard at distance.

Visaton FRS10WP

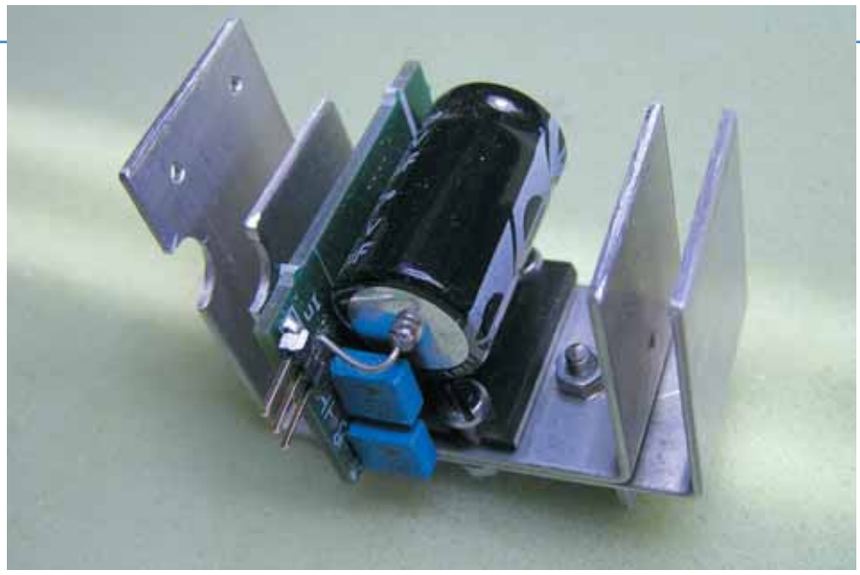
This 4", 4 ohm speaker is designed for marine use and it is much heavier at 375 g or about 13 oz. It is physically deeper than the Visaton R10s but comes with a useful grille to minimise propeller air blast pushing on the speaker cone. It is not as expensive as the Blaupunkt ODx 102 but it has more punch. At 1 m, two of these speakers gave 102 dBa at 1 m (3.0 amps). If the amplifier is turned up then they will give up to 104 dBa at 3.3 amps but the sound is becoming distorted. When you realise that for every three decibels the sound power level is doubled, then it can be seen that this speaker can really perform. Pete Nicholson first tried these speakers in his new P47 and although I was concerned by the increased weight they did sound louder. If your plane can take a couple of these speakers in a 'Two Pound Sound' system then this is the one to go for. I am going to fit these into the Hornet.

Visaton FR13

This 5", 4 ohm speaker has a lot going for it. Is it shallow, not as heavy as the FRS10WP at 306 g, or less than 11 oz. It has an inverted cone and good rubber surround for cone movement so I had high hopes for it. Under test however, two of them could only just get slightly over 102 dBa (102.5) when the amplifier was turned up to full and the current was 3.6 amps. If you want to save a bit of weight and you have a problem with the depth of your speaker chamber then this

New 45 V amplifier

2 x 40 watt amplifier with the volume control on the lower left hand side



2 x 40 watt amplifier with a bigger home made heat sink

could be a useful alternative. It is certainly cheaper than the FRS10WP

Visaton W13E

This 5", 8 ohm speaker was ordered for the 45 volt amplifier. It is heavy at 436 g, that is over 15 oz! However if you only intend fitting one speaker then it could be an alternative. Two were initially connected to the 2 x 40 w amplifier and produced 100 dBa at 2.0 amps. As the impedance did not really match then this was not really a fair trial.

45 V Amplifier and Visaton WS13E

So, one 8 ohm unit was connected to the 45 volt amplifier with 10S Thunderpower LiPo flight pack power (40 V). The output was then 102 dBa for one speaker at 2.7 amps maximum. It was repeated with a 6S Thunderpower flight pack (24 V) and still achieved 100 dBa when the volume control was turned to maximum. So you take your pick. This could be a good single speaker for use with the 45 V amplifier producing 102 dBa for about a 'One and a Quarter Pound Sound' system. The amplifier performed well and it will be a useful addition to the range where you have an 8-10S LiPo flight pack for the motor.

45 V Amplifier and 2 x Visaton FRS10WPs

Two 4 ohm speakers were connected in series, this time to the single output, and the 10S flight pack was connected. Wow! I had to switch off and turn it down. It was over 104 dBa at 1 m. This is a good system and saves the separate battery if you have 8-10S LiPos. Using the volume control potentiometer, the sound level was adjusted to 103 dBa and the current was 1.35 amps. The output can be increased, but I am not sure if the speakers will take it, but believe me that is loud enough! It is four times the sound power level of the 'Half Pound Sound' system but also four times the weight.

Micro Mods

I have been using the TBS Micro with the auxiliary channel toggle switch so that audible gunfire can be added. This is very important to have in the Messerschmitt bf109 when getting on the tail of Pete's P47! The operation when flying was as follows: Operate one forward click on the 3-position switch to programme the engine start, then operate the switch the other way to activate the engine start and tickover. To programme the guns then the same switch has to be switched three clicks forwards before take-off so that the rearward movement of the switch would operate the guns. At the end of the flight this programming was reversed. I asked Thomas if it was possible to have the start/stop sequence permanently programmed on one side of the switch and the guns on the other. He has come up with this as a further improvement and I have just received it to try. Thomas has indeed revised the software so that after initially configuring the Micro to your transmitter, the auxiliary control is permanently programmed so that the start/stop sequence is always on one side of the switch and the machine guns are always on the other side. So there is no setting up procedure at the flying field. It works! It is simpler and that helps for a dummy like me. This is a great improvement.

So we now have a refined Micro controller, three amplifiers to choose from to allow for different voltage considerations and speakers to select, depending on weight considerations. Once you have tried it you will be hooked and scale realism just took another leap forward. Q&EFI

Hornet speaker positions where the radiators would have been