

Newsletter

March 2019

Dear Members - Sorry that this newsletter is late. I have been spending my time at the hospital visiting my wife who has had a major operation but is recovering well.

I'm hoping to have her back home within the next couple of weeks. I could never believe that spending hours at a hospital could so drain you but it does. They don't restrict me to normal visiting hours so I've been there all day every day for the past 4 weeks. Fingers crossed that I'll have her back home within a couple of weeks.

Justin sent me some pictures of his new DC3 which looks rather interesting. I'm hoping he can let us have a some info on how this one flies. He said that he's already had problems with it which will entail one or two repairs. Fascinating model nevertheless. It makes such a change from the stereotyped aerobatic designs. I know they fly amazing well but it's nice to see something scale and I so love the older style of model.



Date Changes

John Higgins very kindly pointed out that some of the dates I had included for events were wrong. I have (hopefully) rectified these errors in this issue.

Thanks very much John for pointing it out.

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A VIEW FROM THE HEDGE. (By Will Sparrow)



You might never believe it, but in the latter part of February we have all been enjoying an unprecedented early spring, and haven't you modellers been taking advantage of it! Under azure skies your models have had the dust shaken off them and have embraced the barely-moving airs. One Sunday saw as many members on the field as I would expect to see on the best of summer days – according to one member the temperature was only 1^oC cooler than the temperature in the south of France. How often can one say that? On this particular day, I was pleased to see the re-appearance of that nice, big Corsair – the one with the sweet-sounding four-stroke, radial petrol engine – which we hedge-dwellers enthused about a few weeks ago. The model still flew well but the landing was a little on the heavy side and the model suffered the indignity of having its left undercarriage leg removed (repairable) and its propeller broken (not repairable). Much aviation took place that afternoon and even the big, petrol-engined models impressed the feathered brethren with their quietness. This situation was to be fairly short-lived, however, when one of your long-standing members, recently returned from foreign parts, turned up with an ancient trainer model that he had rescued from his attic. This little model flew in a spirited manner but made the sort of noise, rarely heard these days, that left some of our more sensitive hedge-dwellers with a dose of tinnitus! Today's glow engines really are much quieter than their thirty year old cousins! (The petrol flyers in the pits looked very smug!).

The following Monday produced a repeat of the good flying conditions and soon a few "gentlemen of leisure" members arrived to take full advantage. My attention was piqued when I noticed a really nice, blue and yellow biplane being unloaded in the pits: I flew over for a closer look. The workmanship and finish were of a high order and the model must have taken many painstaking hours to complete... in this I was totally wrong! This model had not been conventionally made, it had been 3D printed (by all accounts, a process where one presses a button, goes to bed, and wakes up the following morning to see a new model). This day was to be the day of its maiden flight.

A View from the Hedge Continued/...

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The owner looked around for some gullible member to do the honours. No one stepped forward but all but one failed to step back. A test pilot had been found! As you all know, first flights can be nerve-wracking occasions but the angst can be reduced if all the usual careful checks are made. The model's structure was found to be sound, all the control surfaces were zeroed and seen to be well hinged and the CG was in the correct position. Control throws were exactly as one would wish and the electric motor produced a goodly amount of thrust. Once a range check was complete the model was lined up into wind, ready to face its destiny.



The co-opted pilot did not flinch as he opened the throttle (That's because it wasn't his model – Jim Sparrow) and the owner seemed relaxed ("I can always print another one"). We in the hedge, however, were on the edge of our twigs. The model tracked straight and lifted off but it was obvious that the poor thing was badly out of trim: we all held our breaths. We should not have worried as the model was quickly trimmed out and was soon flying smoothly and seemed rock steady. The low and high speed handling were checked and found to be exemplary, the stall was benign. Spins were entered cleanly and spin recovery was instantaneous. The flight ended with a nice landing, a bit fast, perhaps, but better safe than sorry! Back in the pits, checks revealed that nothing had broken



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or come loose. When the battery hatch was removed, however, the esc was found to be a bit on the hot side. It transpired that the owner – a newcomer to electric flight – had thought to protect the esc by wrapping it in foam! This was missed at the pre-flight check stage; another lesson learnt. I nodded to my stunned hedge mates and said that we had just witnessed the future of modelling. Such innovation from you modellers always lifts my spirits.

We had a nasty surprise the other day: the hedge has been “trimmed” – and I mean trimmed! Our little flock had to flee for our lives as the mean machine approached. Our hedge is now much lower and you can see all the way through it. Even my favourite viewing twig fell to the flail. Things will, of course, grow back in time, but just now it’s a trifle draughty in the hedge as storm Gareth does his best to blow us into the next field.

As you all know, the fickle jet stream caused the early spring to end on 27th February and we are now in the middle of a stint of un-flyable weather. Be of good cheer. Many of you enjoyed spring’s false dawn. Me? I’m looking forward to the joys the real spring has to offer... and so should you.

WS

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David Kirkbride's PT17



The pictures of this fabulous model by David Kirkbride



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Heat

Article by Brian Holdsworth

Electrical equipment is generally housed in a case for physical protection, and internal component temperatures will be considerably higher than that of the external case surfaces, making determining temperatures difficult. Since internal temperature rise is proportional to the local ambient, adequate performance in cold weather does not guarantee performance in hot weather. Exposure to a hot sun during a heat wave (!) could result in the unpowered internal temperature exceeding 50 degrees or so, with powered temperatures significantly above that. It would be wise to provide some shade, especially as many cases are largely black, which is ideal for absorbing heat.

It may be expected that equipment designers would have handled such heat considerations adequately, but much evidence suggests otherwise! The general temperature rules apply - hot when touched causes concern, too hot to hold is a problem and too hot to touch is probably already damaged!

Battery chargers can become very warm in use, and allowing a few minutes cooling between cycles would be helpful; this also applies to any separate power supplies. Most have cooling fans, which need unrestricted access for their airflow.

In general, transmitters cope with their internally generated heat, though, as above, it would be helpful to provide some shade from direct sun when not in use. Similarly, receivers and servos etc under a large clear canopy, as commonly used, can become very hot, and some shade would be beneficial. Closing off the bottom of such a canopy would be relatively easy and the resultant shade would significantly reduce the effects.

Wrapping equipment in foam insulates it, increasing its vulnerability to overheating, and the widely used plastic foam is almost useless for vibration or crash protection. While many manuals still include such recommendations, this is carried over from 35MHz receivers, which generated little heat, but were much heavier and considerably more vulnerable to vibration than 2.4GHz items.

Using Velcro for mounting such equipment onto internal structure is simple and effective, with an additional Velcro strap wrapped round heavier items such as



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batteries, perhaps multiple straps for larger electric flight batteries where the Velcro is likely to wear with the frequent battery swapping between flights. Double-sided foam tape could be used, but removal would be difficult; however, it is usually recommended for mounting gyro stabilisers, since Velcro would allow too much movement for satisfactory operation.

2.4GHz receivers are marginal for internal heat, and the practice of wrapping such items in foam, with tight tie-wraps to clamp them to the structure, maximises heating and vibration coupling, neither of which is helpful for reliable operation!

The CDI units for petrol ignition handle very high voltages and generate considerable internal heat making them very vulnerable, especially as they often lack cooling airflow, being tucked behind the engine to maximise the separation from the receiver, desirable to reduce possible interference.

ESC's (Electronic Speed Controllers) are an example of the use of an internal heat sink to delay over-heating sufficiently for satisfactory operation. Up to 50 amps or so, they include a thin metal plate, which absorbs much of the heat generated by the circuitry. While some heat is dissipated into the ambient, this is limited by the enclosing thick heat-shrink case, which is quite a good insulator, especially as there is usually an identifying sticky label applied over it. This seems sufficiently effective for relatively short flights up to about 10 minutes at cruising power. The ESC should be mounted with its flat surface (the plate) exposed to the ambient, which means that the opposite uneven surface should be used for the Velcro etc to hold it, which is awkward, but...!

Longer flights present a problem, since the internal temperature would continue to rise with consequentially increased likelihood of failure. The current rating, and implicitly the heat capability, is rated for a steady (D.C.) current. A finned heat sink is usually included in higher-rated items, to help dissipation of the heat into the ambient, needing an adequate airflow to avoid the "oven effect" - a high power (kilowatts) installation may require a cooling fan to generate sufficient airflow over the fins. However, the internal components would need



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Heat Continued..

Article by Brian Holdsworth

to be bonded to the heat sink to transfer the heat, but evidence suggests that such coupling is generally lacking!

ESC specifications often claim over-temperature monitoring to reduce the output, or shut down, until it cools sufficiently to resume normal operation. However, this monitoring is incorporated within the control circuitry, with little coupling to the main heat source of the multiple FET's driving the motor, so has limited effect and should not be relied upon for protection.

The current taken by a motor has a complex waveform with the maximum transients being about double that indicated by a meter, which applies considerable smoothing to the display. The generated heat is largely proportional to the square of the transient current. Thus, it would be wise to use a higher ESC rating than the maximum intended motor current; for example, 30A meter reading would suggest a 40A ESC. Even if overloaded, an ESC would still operate, but with a shortened life - many RTF's included inadequately rated ESC's for economy, with frequent early failure, but some now seem to be fitting better items. The only penalties for using a higher rating are increased cost, physical dimensions and weight, but the greater margin would improve reliability.

Most of the heat in the airborne part of a radio control system is generated by the servos. The considerable current drawn by the motor generates heat from its winding resistance. The output transistors in the servo amplifier control this current and generate significant heat; they are very vulnerable to overheating and prone to failure. Much of the weight in a servo is in the motor, which provides a heat sink capable of absorbing considerable heat, as for an ESC above. Where fitted, metal gears could also absorb some heat, but the case layout separates them from the heat sources, so that little would be absorbed in practice. A plastic case is a good insulator, so that any servo above about standard size needs a metal case to pass this heat to the ambient. As above, a servo which feels warm to the touch is likely to be very hot inside...!

The early servos used discrete components rather than the modern integrated circuits. In particular, the transistors controlling the output drive current to the



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motor were physically large with a considerable thermal capacity. SMT (Surface Mount Technology) is now universal with automated assembly, soldering and protective varnish coating producing improved reliability and robustness due to the better control over the manufacturing process. The downside is that the automation allows the use of physically small components (too small for manual handling) with little thermal capacity, increasing the vulnerability to overheating.

The increased torque capability, requiring higher currents with consequently increased heat generation, means that servo reliability remains a problem with overheating, rather than mechanical failure (bad solder joints and broken wires), being a common cause of failure. This often has an intermittent nature, occurring only when sufficiently warmed after a period of use, meaning that ground testing may seem fine, but problems arise a few minutes into the flight...!

Over-specifying servo capability can cause problems. The resultant excessive transient current demands can overload the power supply (battery and/or regulator) and, together with the increased voltage drops through the wiring, produce erratic operation up to receiver shutdown. Servos are being used with torques many times the weight of the model, but if more than a fraction of such capability was actually used, the structure would be torn apart by the resultant forces!

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Club Instructors

Jason Reid, John Higgins, Chris Vernon, Mark Conlin, Brian Holdsworth, Jim Sheldon, Paul Cusworth, Andy Harrison, Justin Goldstone, John Prothero & Allan Bates.



Another picture of Justin's DC3 (taken by Justin)

Club Events

22nd June Fly In

21st July BMFA Scale event

Scale and Aero Show Trophy Event - TBA



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Shows 2019

9th June

Cleveleys Classic Car Show

14th-16th June

Weston Park Model Show

6th - 7th July

Cosford LMA

10th - 11th August

Elvington LMA

31st August - 1st September

Much Marcle LMA

In Conclusion

I guess you guys will be looking forward not only to nice weather which as ever is just around the corner but also the Shows will be starting very soon. Shame that the Haydock LMA show hasn't run - I went with my mate Bill and really enjoyed it.

Thanks to all of you who have contributed to this newsletter. You also provided me with some excellent pictures.

I hope that I will be able to get down to the field again soon to get more pictures - it seems to have been so long, that I probably won't recognise anyone!

I hope this weather improves very soon and wish you all happy and safe flying.