Newsletter

September 2018

The Ripmax Zephyr

Photos by Carl Skovlund

Strange month, this month. Very mixed weather - mainly crap. I was however, very pleased to buy from Allan Cardwell his Ripmax Zephyr. The covering was a bit wrinkled and the whole thing looked just a bit 'tired'. A hot iron has sorted those wrinkles and after 4 applications of liquid car polish, the coverings are again looking quite lustrous. It so looks like the old Keil Kraft designs - Contestor or Competitor. Those rubber powered models flew so well 'back in the day'.

This model looks right and I bet it flies as well as it looks. It may be a 'simple' 3 channel model but that maiden flight is for me, just that bit unnerving. It is built so light that even a minor crash could result in a lot of damage.

With all these thoughts running out of control in my mind, I went to the local field with a good friend of mine. He had offered to take pictures with my camera. I took a few pre-crash shots and then handed the camera over. The grass was a little deep and quite wet with dew (it was only 8:30 in the morning). I applied about half power gradually building up but it stuck resolutely in that grass. It needed full power before it reluctantly moved and was almost immediately airborne but with the tailplane hanging right down. I fed in lots of down and got it to a safe height - gave it full 'down' digital trim and it was flying reasonably level at about one third throttle. I got used to it's handling before bringing it in to a safe gentle landing.

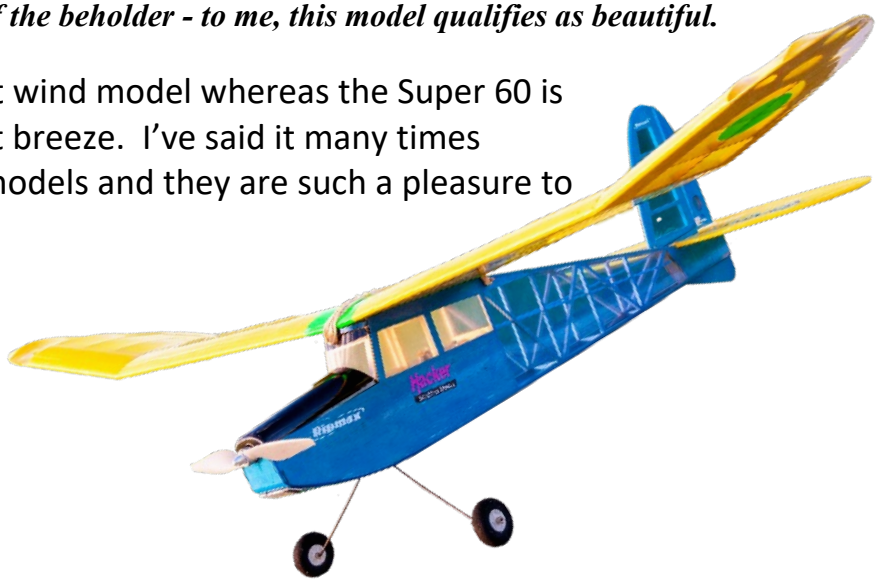
Carl shot this just as I took off for the first time.

I then neutralised the 'down' trim and corrected it in the transmitter. The next take off was easy and with just a click more of down it was really good to fly. It's very responsive - loops are easy and barrel rolls look good and are easy to do. It'll take a few more flights in calm weather to really tune it in but all I can say is that it is a really lovely model - looks good in

the air and is so pleasant to fly. Yes, it's a bit like a powered sailplane but much more responsive. I am so pleased I bought this model from Allan.

Beauty is in the eye of the beholder - to me, this model qualifies as beautiful.

The Zephyr is very much a light wind model whereas the Super 60 is beefy enough to fly in a decent breeze. I've said it many times before, I love these 'Vintage' models and they are such a pleasure to fly.



A VIEW FROM THE HEDGE. (By Will Sparrow)

As I'm sure that you're aware, we hedge-dwellers are as close to nature as it is possible to get: somehow we are more alive to the nuances of the seasons and the weather patterns than even the most observant modeller can reasonably be expected to be (even those of you who are forever glued to the weather forecasts!). Different senses tend to dominate at different times of the year. Spring is all about sight; the hawthorn blossoms in our hedge, verdant grasses are sprouting everywhere and we birds are starting to admire our breeding plumage. Spring is also the time when new models are to be seen on the field, and the time when new models tend to have misfortunes as rusty thumbs, long dormant over the winter, are applied to transmitter sticks! Summer is a season of touch; the summer sun hot on the back and the heat making a covering of feathers at times uncomfortable. Winter also is a "touch" season with Jack Frost nibbling the extremities and the icy wind biting as it scythes through the leafless hedge. Autumn, though, is the season of the nose! Ah, the smell of ripe berries and mouldering leaves spiced with the merest hint of wood smoke on the breeze…You may have gathered that I really like the bittersweet notes of autumn. In this part of the world we like to celebrate the turn of the seasons so, on the last eve of August, we made merry to welcome the first day of autumn. The juice of fermented berries was imbibed with gusto and, as darkness fell, the hedge, and its sparrows, settled down for the night. Generally, we like to sleep in close proximity (its warmer!) but not all sparrows are the same. One of our number, Susan Sparrow, prefers solitude ("I want to be alone") and usually sleeps, by herself, on a twig up towards the car park entrance. As autumn dawned we were aware of frantic tweeting coming from the top end of the hedge: a few of us flew over (somewhat unsteadily) to see what all the fuss was about. We found poor Susan unable to get off her twig and in a right state. It transpired that some malevolent idiot had smeared Susan's twig with superglue. It took us ages to ease her feet off the twig with the help of dock leaf juice. A little later that same

morning we found out that the combination lock on the car park gate had also been covered in superglue and members, as they started to arrive, could not gain access to the car park. I've never understood what these mindless twerps see in vandalism…

Some semblance of normality was restored as Sunday dawned and with it the annual club scale event. The day was fine but there was quite a strong breeze blowing from the south – the worse direction for you modellers – making take-offs and landings a little tricky. Before long the pits were populated with more members than I have seen in quite some time, sporting all sorts and types of scale models. After the usual delayed start (!), things progressed at a goodly pace with model after model performing their "compulsory" and "optional" manoeuvres. As you might expect, there was a wide range of presentations on show from the good to the "What was that supposed to be?" type. The important thing was that everybody seemed to be having a good time and enjoying the participation in a communal event. I like to see you all enjoying your hobby. Because of time constraint, the "Aeroshow" event would not fit in and had to be postponed. Still, that's one more thing for me to look forward to. Ever since the scale "do" the weather has closed in with a vengeance and, although I have been treated to a bit of a flying fix by the usual club stalwarts, the field has been a bit of an aviation desert. I bet it won't be long before we start to be lashed by the tails of nasty foreign hurricanes. Yes, I really like the bittersweet notes of autumn…

WS

Batteries

September 2018

Article by Brian Holdsworth

The current Spektrum manuals are very sparse, but include the recommendation that the voltage at the receiver should not drop below 4.8 volts even when all servos are heavily loaded; this is in addition to the statement that the minimum operational voltage is 3.5 volts. Such checks would be largely meaningless with a fully charged battery, so should apply to a near-discharged item, though not stated. This indicates that their sensitivity to brownout, where a momentary drop in supply voltage causes the receiver to reset, is still regarded as a problem. Since there will always be some voltage drop through the wiring and switch to the receiver, with the transient voltage drop being about double that indicated by a meter, this means that a 4 cell NiMH with its nominal 4.8 volts would not meet the recommendation, needing a 5 cell NiMH or a regulated supply.

For the obsolete DSM2, the reset duration is claimed as 4/100 of a second after the voltage recovers, with no mention of that for DSMX, which is likely to take longer. The flashing LED added to DSM2 receivers is not available with DSMX, so that there would be no indication that such an event had occurred. The other brands generally use a different type of processor, which does not include a voltage monitor as incorporated in that used by Spektrum, allowing operation to a lower voltage so reducing their sensitivity to brownout; recovery duration is not documented but should be short.

The consequence of a brownout would be no drive to the servos, and hence no control response, until reset is complete and synchronisation achieved with the transmitter. For electric flight, the interruption to the throttle channel would cause the ESC to shutdown momentarily producing an audible hesitation in motor operation. Similarly, a jet engine controller or a petrol ignition cut out may stop the engine depending upon setup. Similar symptoms would be evident if the flight battery voltage dropped below the ESC low voltage threshold, or the failsafe was triggered by a momentary loss of reception of the transmitter signal due to aerial orientation etc.

A regulator produces its output voltage regardless of input voltage and load current variations within its limits. The performance of powered equipment such as receivers and servos would be constant through the battery discharge cycle. However, it is essential to respect the limits since the regulator may, effectively, shutdown instantly if they are exceeded, removing power from the connected equipment.

The supply voltage must always be above the specified minimum otherwise the output

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Article by Brian Holdsworth

voltage will drop, possibly to zero if the regulator shuts down. It must not exceed the maximum otherwise the internal circuitry may be overloaded, resulting in erratic operation such as excessive output variations or excessive heat generation. Catastrophic failure may result, causing the output to drop to zero or become linked directly to its supply resulting in over voltage, and consequent failure, of powered equipment. The resultant heat may also cause a fire for high power applications.

The output current has an implicit maximum value, which cannot be exceeded even momentarily, and is the absolute maximum transient capability. This current capability generally increases with the difference between the input and output voltages and, if exceeded, the output voltage drops until it is able to deliver the reduced current. Component variations mean that most, but not all, will be capable of greater currents than specified, and some manufacturers cut costs by using under-specified components in the expectation that it would be difficult to prove - component markings are often obliterated during equipment production and claims of making cloning difficult are dubious!

The generated heat within the circuitry is normally the main limiting factor in practice, and heat damage is cumulative, increasing the likelihood of failure. The circuitry is packaged in some form of case which can limit heat dissipation and disguise the actual temperature of its components. The required cooling provision is rarely mentioned, but any part of the case which feels hot should cause concern, and too hot to hold is likely to have caused damage!

The maximum continuous current is that specified as capable of being drawn continuously without the internal temperature limits being exceeded. The peak current should be mentioned, which is the maximum current capable of being drawn for a quoted period (typically 10 seconds) starting from cold, not in addition to other usage.

The maximum transient current is rarely mentioned, so should be assumed to be the peak value. This means that, for example, servo loads of 5 amps indicated by a meter would require a regulator capable of ~10 amps peak to allow for the transient current being up to double the indicated maximum.

Linear regulators generate a voltage drop across the regulator equal to the difference between the supply voltage and the specified output voltage, maintaining the output voltage constant for varying supply voltages and loads. The current drawn from the supply

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Article by Brian Holdsworth

is equal to that drawn by the load, plus a small amount for the regulator circuitry. They are available in the form of single-chip integrated circuits and are widely used in many types of equipment, being effective and reliable for lower current applications. Many incorporate overheat protection to avoid cascade failures in the powered equipment; this would shutdown the regulator, removing the output until it has cooled sufficiently and the supply has been cycled off and on, which would have obvious consequences in flight! The supply voltage is often specified to be at least 1.4 volts greater than the output. Their major disadvantage is that they are inefficient, requiring to dissipate a significant amount of heat. For example, producing 1 amp at 5 volts from a 10 volt supply would put 5 watts into the powered equipment with the regulator having to dissipate 5 watts, giving an efficiency of 50%; a 15 volt supply would dissipate 10 watts giving an efficiency of 33%. Thus, smaller input-output voltage differences are preferred. While 5 watts may not seem much, it is quite difficult to dissipate this amount of heat to avoid damaging temperatures within the circuitry.

Switch-mode regulators connect the supply to the output on and off, at a rate of 50 KHz or so, through a filter to smooth the output, where the on/off ratio is varied to maintain the output voltage. Sometimes, additional filtering is included with the output wires being wrapped round a ferrite ring. They are efficient, 90% or so, but the filtering always leaves some fluctuations in the output, descriptively termed ripple. Relatively recently, integrated circuits have become available to implement the complex control circuitry, encouraging more widespread use. While the circuitry can be arranged such that the output voltage is greater than the input (step up), it is generally preferable to step down the voltage. The current drawn from the supply is generally less than that drawn by the load, inversely proportional to the difference between input and output voltages; for example, supply voltage twice that of the output would draw half the output current from the supply, plus a small amount for the regulator circuitry.

For 35 MHz receivers, switch-mode ripple, even with a ferrite ring added, often caused erratic operation, so that linear regulators were preferred. However, the integrated circuits comprising 2.4 GHz receivers are designed with a greater tolerance to supply variations, so that switch-mode regulators seem adequate and preferable to reduce heat problems. Standalone regulators (UBEC's) are generally switch-mode but, for example, PowerBox use linear regulators, where some of their range have only recently been upgraded with heat sinks to dissipate their heat.

ESC's up to 40 amps generally include a BEC (Battery Eliminator Circuit) in the form of a

Batteries Continued

Article by Brian Holdsworth

5 volt linear regulator rated at up to ~3 amps. Where allowed by the specification, usage with 4 cell LiPo's could generate excessive BEC heat but such applications are likely to require higher amp ratings so this should not be a restriction in practice. Over 40 amps with up to 6 cells, a 5.5 volt SBEC (Switching Battery Eliminator Circuit) rated at up to ~4 amps is generally included in the form of a switch-mode regulator. ~40 amp units may have either. Some are available without a BEC. ESC's for over 6 cells do not include a BEC, due to the difficulties of handling the high supply voltage and the heat generated, especially with the higher servo capability required for larger models.

Originally, ESC's without BEC's included optical couplers in the throttle signal to isolate their circuitry from the receiver and servos, to reduce the interference coupled from the high motor currents. These were described as OPTO as an abbreviation, and this is generally used to indicate no BEC even where no optical coupler is included. Such isolation is not considered necessary for 2.4 GHz receivers.

Typically, 3 amps would be adequate for 4/5 analogue servos, from micro up to standard size. Digital servos draw more power, preferring a switch-mode regulator rated at ~1 amp peak per servo. Larger servos would need greater current capability.

To supply a regulator, there seems no point in using NiMH's with their limited current capability etc. 2 cell LiPo's of ~2200 mAHr capacity, depending on consumption, are thus preferred with LiFe and LiIon offering little for their extra cost and limited availability. If access is available, as is often the case with ARTF's, it may be considered adequate to plug in the battery directly. Where a switch is used, an electronic type is preferable to a mechanical unit for its better performance and reliability.

Club Instructors

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

Social Evenings/ Club Events

Yes, it's that time again - our Social Evenings are here again commencing 3rd October - usual venue and usual time 7:30pm for 8 at the Marton Institute at Oxford Square, Blackpool FY4 4DR.

Bring a model - you can give a talk about it if you wish and just meet up with your buddies - the beer's good too!

3rd November will be the ever popular BONFIRE NIGHT at the field. The fire will be lit around 6:30pm and the fireworks are scheduled for 7pm. Bring one big firework if you don't mind splashing out and food if you wish. Just join in the fun. Jason and others will of course be putting on yet another night flying spectacular.

7th November will be a Social evening - Jason will be giving a talk and demo of LED lighting on his night flying models (this assumes that those models were not consumed by fire on bonfire night) and Mark will give a talk on programming the LEDs'.

That's it for this month - thanks once more to you guys who have again spent your valuable time putting together articles for this newsletter.

I wish you all happy and safe flying.