Nuremberg.

The International Toy Fair held each February in Nuremberg is a massive event which covers the full range of toys and associated products and includes an area allocated to all aspects of modelling. It is a very different show to that held annually in Dortmund, mainly because it is for the display of new items and the placing of bulk orders within the trade. There is no selling to the public and the majority of visitors are from the trade and the press. It is not a show I regularly attend but the opportunity arose this year to pop in for a single day to have a look round (wearing my columnist's hat).

I have included a few photos to give you an idea of the way the show is arranged, but I have to admit that I was rather disappointed with my visit. All of the big outfits had displays with Graupner, Robbe, Aeronaut, Simprop and Multiplex leading the way. Ripmax and Weston were flying the flag for the UK, but none of the big stands had anything I would have thought dramatic, at least from a technology point of view. Lots of tiny helicopters and moulded foam models but I found myself drawn more to the smaller stands of the less well-known sources where there were a few interesting tit-bits. In the end I chose the stand of a German firm called Böhm Technik to be my "best of show". This firm specialises in miniature heat engines, both ready made and as kits, using both Stirling and vacuum systems, and in single and multi-cylinder formats. What really stands out is the design and finish of the components. They should really be classified as works of art, and although they wouldn't "blow the skin off a rice pudding", they would grace any display cabinet. The website gives a good description of their products and they do have UK suppliers.

BEC and High Power.

Not a new problem this, but one which has been exacerbated recently by the use of lithium packs. If we go back to basic ESCs developed at a time when power packs were Nickel based and of low cell counts (7/8 cells being typical), the BECs built into the controllers were simple linear regulators which reduced pack voltage down to a value suitable for the Rx/servos. They suffered the disadvantage of dispersing the excess wattage (the product of the total Rx/servo current and the voltage drop from the pack voltage to the required Rx voltage) in the form of heat. If either of the components of this equation became too large (i.e. more cells in the pack giving too high a voltage drop, or more/heavy duty servos increasing the current draw) the heat produced would also increase, and if the cooling of the ESC was inadequate its temperature would rise to the point where damage or a cut-off would occur.

The introduction of Lithium packs had an immediate effect of this situation since the voltage steps per cell are 3.6 volts rather than the 1.0 volts of the Nickel cells. Whilst a 2S lithium pack (7.2 volts with a voltage drop of 2.2 volts to reach 5 volts for servos and Rx) is fine, a 3S pack (10.8 volts with a drop of 5.8 volts) needs care with the servo count, and a 4S pack (14.4 volts and a drop of 9.4 volts) is definitely a problem. The initial solution to the problem was, and still can be, the use of a separate battery for the Rx/servos with an opto-coupler used in the ESC to reduce the possibility of interference in the system. This is fine when using a 4/5 cell Nickel pack to give 4.8/6 volts for the Rx/servos, but again the use of Lithium (more volts/cell) causes a difficulty in that 3.6 volts for 1S is too low and 7.2 volts for 2S is too high.

The latest approach to the problem is to use a different type of regulator and the switchable regulator can be applied to both Nickel and Lithium packs of all sizes. The basic principle is to use electronics to switch the supply on and off rapidly and to vary the on to off ratio so that the system sees a constant lower voltage. In this case there is much less energy to dissipate as heat and these regulators can handle higher power loads and supply voltages. They have been available as stand alone units (to be combined with an opto-isolated ESC) such as the Ultimate BEC, the ParkBEC and the Hyperion, but are now also appearing as built-in versions with ESCs such as the Jeti Spin range and the Medusa Fusion range.

There is an intermediate solution which is based upon the cheaper linear regulators but using them as stand-alone units, again with an opto-isolated ESC. This approach allows the user to combine the simplicity and economy of a linear regulator with the improved interference resistance of opto-isolation. The separation of the BEC and the ESC means that the BEC can be positioned away from the ESC in a location with maximised cooling and there is no danger of thermal overload to the ESC. It is also much easier to make the BEC a more versatile unit and to build in a number of additional features which might not be practical with a combined unit. I was recently offered the chance to look at two stand-alone BECs, both supplied by Alan Fry (Importeknik), one a linear and the other a switching regulator.

The Jeti Max BEC.

The first of these units is a linear regulator but is specified to handle much higher power loading that any built-in linear BEC I know. The unit is 60 x 25 x 10 mm and weighs 24 gms (including cables). The specification quotes a maximum input voltage of 16 volts with an adjustable output of 5, 5.4, 5.7, or 6 volts. The maximum power output is 5 amps at 6 volts (3 watts) on a 2S Lithium supply (or 6 Nickel cells). This reduces to 1.4 amps at 6 volts for a 3S Lithium supply and to 1 amp at 6 volts for a 12-cell Nickel pack. You will see from these values how the linear regulator is restricted by high input voltage. There are other features of this unit which compensate however.

The output voltage is adjusted by moving the bridging link across the series of pins at the right edge of the unit. Also on the right edge is the duplicated output lead. It is often not appreciated how normal servo leads and connectors have a limited power capacity and so Jeti have supplied the duplicate leads and plugs which are used with a spare pair of receiver sockets to share the load. There is also a switch connected into this arrangement which allows the BEC (and hence the Rx/servos to be switched on or off. The unit also has a set of LEDs which indicate the level of supply voltage, particularly useful if the supply is from a Lithium pack.

On the input (left) side of the unit there is a pair of 0.5 sq.mm. cables for the supply power. The user must fit a plug to these which matches that used on the supply pack. There is also a standard servo lead connected to this side which allows the supply pack to be recharged without disconnection (max 0.5 amp). This unit is well thought out and I can envisage a number of applications where it would be an improvement over a standard ESC with BEC.

The Master Bec Boy.

This unit is a switching regulator and, as indicated above, operates in a way which produces much less heat. The specification shows just what effect this has on usage in terms of the power handling ability of a very small component. The Bec Boy is only 40 x 20 x 10 mm and weighs a mere 12 gms including cables. It will, however, handle inputs up to 23 volts with a choice of 5 or 6 volts output (again adjusted by jumper), and will handle loads of 3 amps continuous and 5 amps bursts. The specification does not give details of any change in output power with input voltage (as is clearly the case with the linear regulator) implying that this is not a factor in the use of the unit.

Testing the BECs.

There is really no way that I was going to be able to simulate full field use of these units during bench testing, but at least I was able to set up a rig to check their specified performance from minimum to maximum input voltage. I was able to use my bench power supply to provide input voltage at both ends of the range (5.5 to 16 volts for the Jeti and 7.2 to 23 volts for the Bec Boy). Knowing what output voltage and current were specified allowed me to calculate a resistive load to match these and putting the Wattmeter into the load circuit gave me the actual output values.

In the case of the Jeti the BEC produced the stated output of 6 volt/5 amp for 7 volt input, and of 6 volt/1 amp for 16 volt input. In both cases the tests were extended to 5 minutes continuous without the unit exceeding an acceptable temperature. For the Bec Boy the figures were 6 volt/3 amp for 7.5 volt input to 6 volt/3 amp for 23 volt input. Again these figures were stable over 5 minutes although the Bec Boy did get hotter than the Jeti unit at the higher voltage. This is not surprising when you look at the wattages involved. At the maximum specified voltage the Jeti is dissipating 10 watts (1 amp x (16-6) volts), whereas the Bec Boy is 50 watts (3 amp x (23-6) volts). Not a true comparison of course, because of the way in which a switching regulator works, but a useful way of looking at the two systems.

New Kid on the Block.

I was talking to Wayne Giles at the BEFA AGM trade show and he mentioned some new Lithium packs which he been looking at and which he felt were very good value. He pointed me towards a new UK supplier with the somewhat unlikely name of Giantcod RC. When I got home I looked up the website (see contacts) and found that the guy in charge is Rob Carpenter. Not sure how long Rob has had the operation but I think it is only a few months and the outfit is still expanding rapidly. His prices are very competitive and the site is certainly worth a visit. I placed an order immediately and it arrived within 48 hours so I now have the set of Lithium packs which you will see in the photo and I expect to have some test results available in the next issue. I also, as you will see, ordered some micro servos and a controller and these also look to be useful units. I am sure Rob will prove to be a very useful source of supply for the electric flyer.

Contacts.

ImporTeknik, Alan Fry, 29 Braiswick, Colchester, Essex, CO4 5AU - Tel 01206 852209

Giantcod RC, Unit 9A, Great Western Railway Yard, St Agnes, Cornwall, TR5 0PD.
Telephone: 01273 782495 website **www.giantcod.co.uk**

Photographs.

QEFI75-1	**Nuremberg – The three wise men of Overtec.**
QEFI75-2	**Nuremberg – A new source of LiFePO4 cells (similar technology to A123)**
QEFI75-3	**Nuremberg – Weston UK flying the flag.**
QEFI75-4	**Nuremberg – New rubber encapsulated Kontronik controller.**
QEFI75-5	**Nuremberg – The Aeronaut stand.**

QEFI75-6 **Nuremberg – The Ripmax stand.**

QEFI75-7 **Nuremberg – Chinese Suppliers “all in a row”.**

QEFI75-8 **Nuremberg – The beautifully machined heat engines of Böhm Technik.**

QEFI75-9 **The Master Bec Boy stand-alone Switching BEC.**

QEFI75-10 **The Jeti Max Bec stand-alone Linear BEC.**

QEFI75-11 **Very bright LEDs on the Max Bec show supply voltage level.**

QEFI75-12 **The three LiPos supplied by Giantcod RC.**

QEFI75-13 **The ESC and Micro Servos from Giantcod RC.**


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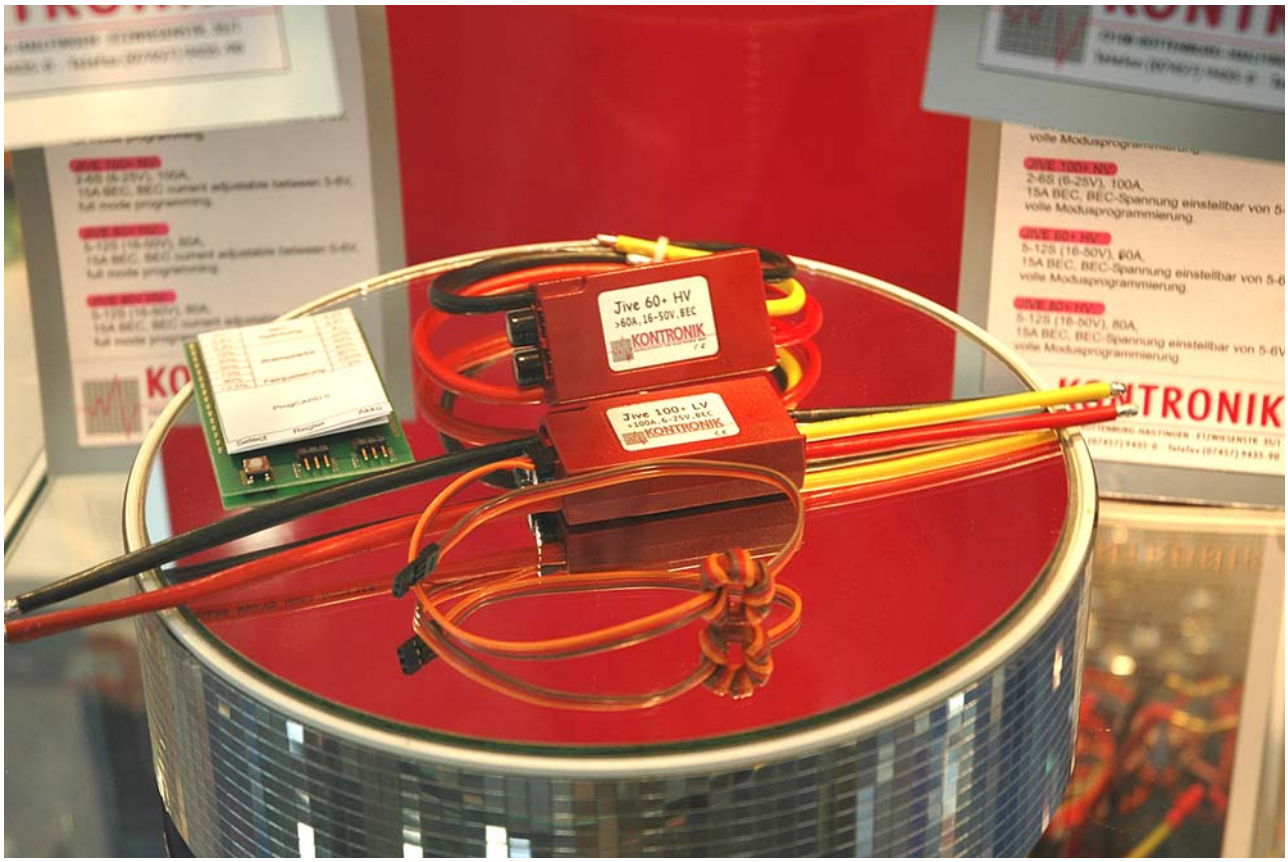
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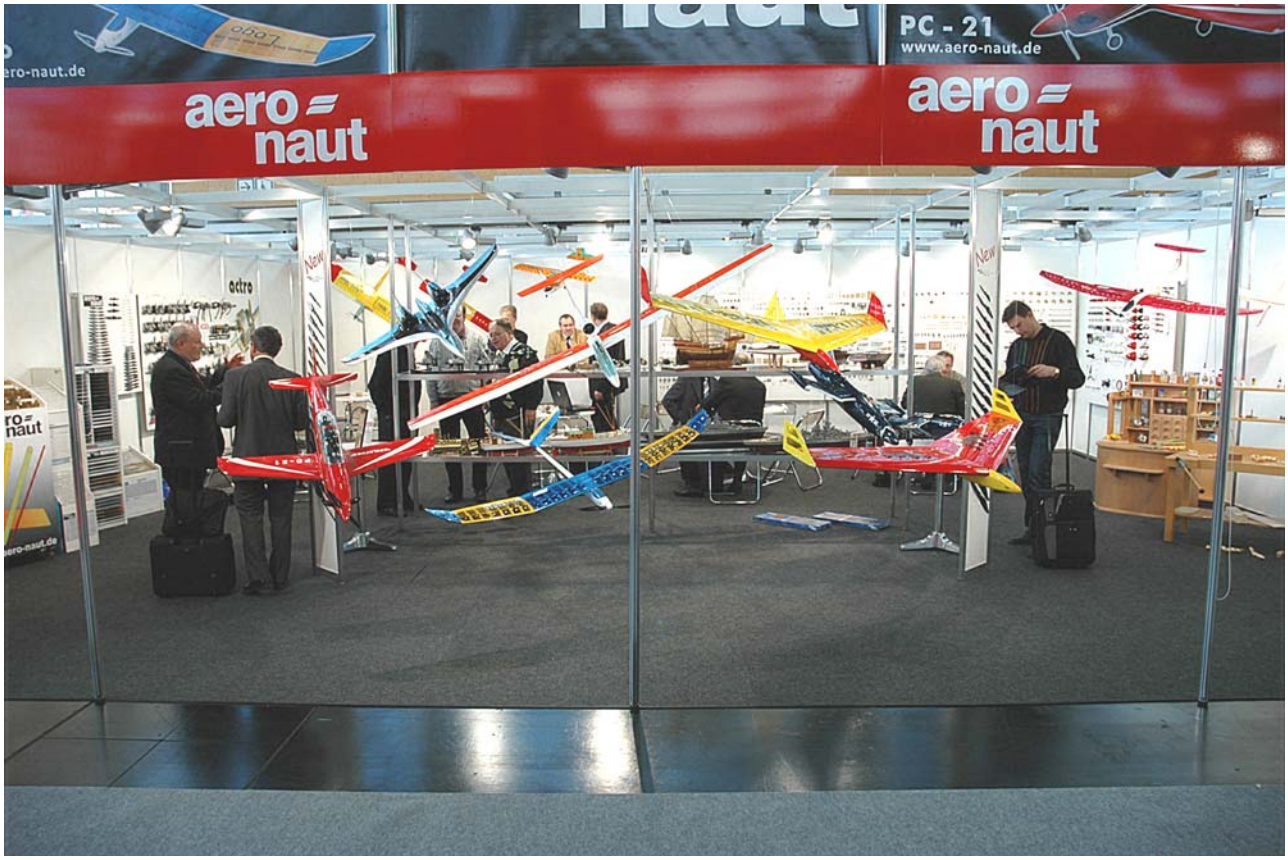
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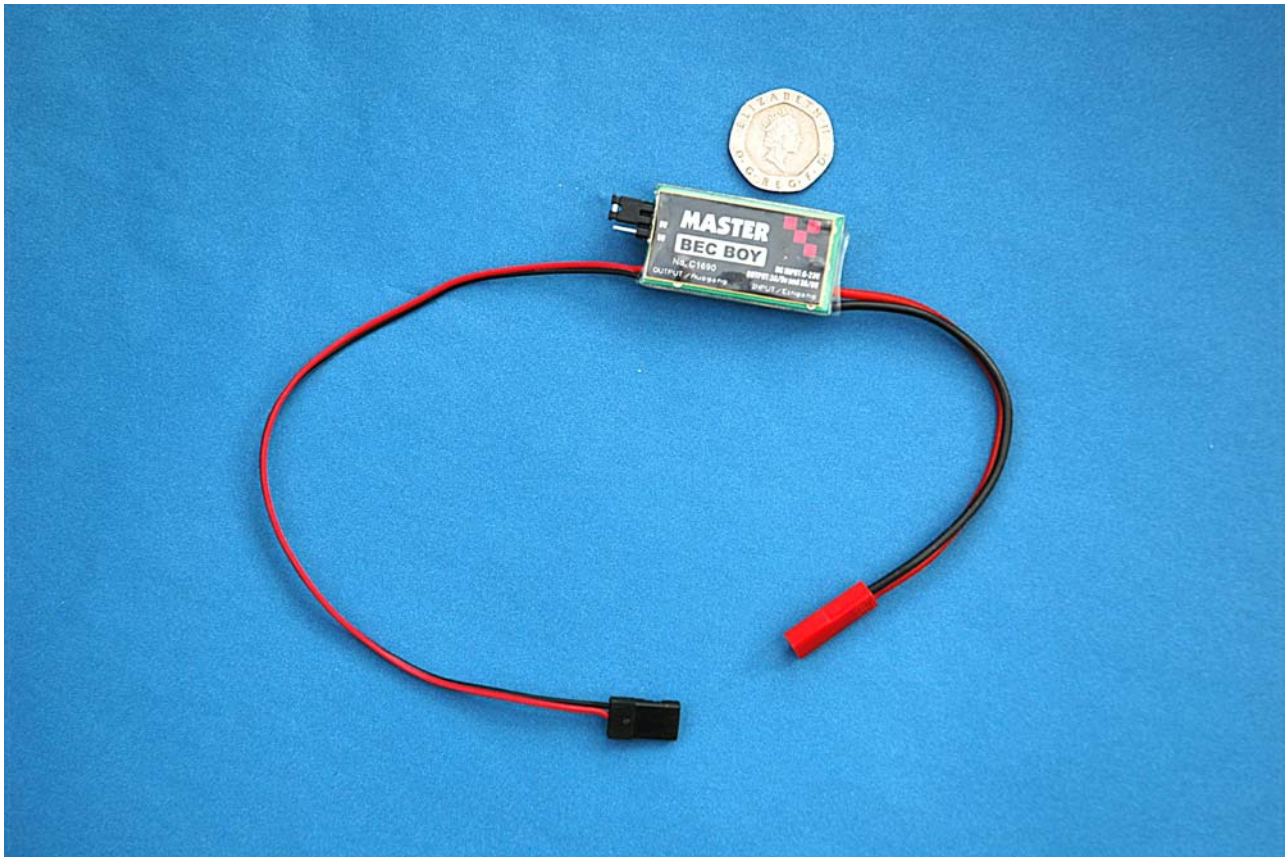
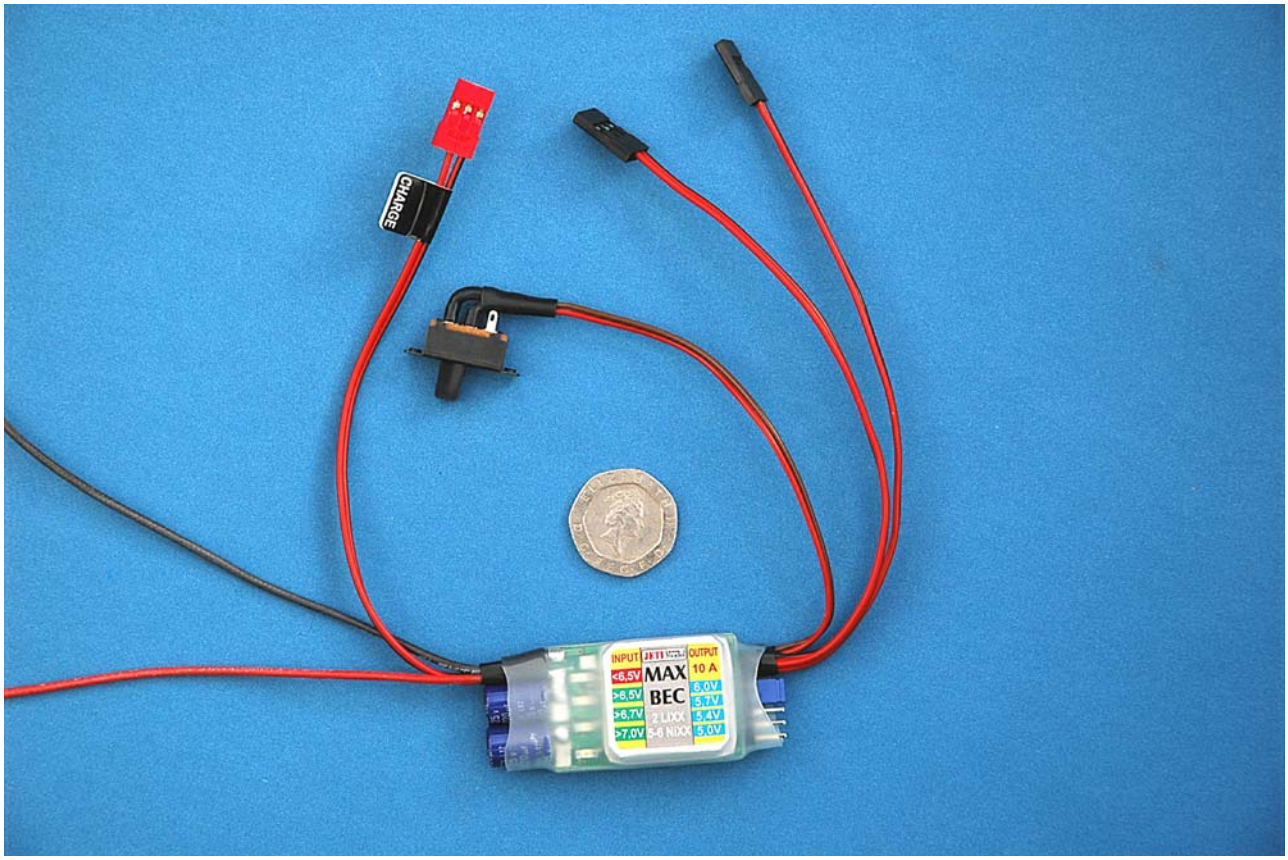

MASTER
BEC BOY


CHARGE
INPUT
JETI
OUTPUT
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MAX
10 A
>6,5V
BEC
6,0V
>6,7V
2 LiXX
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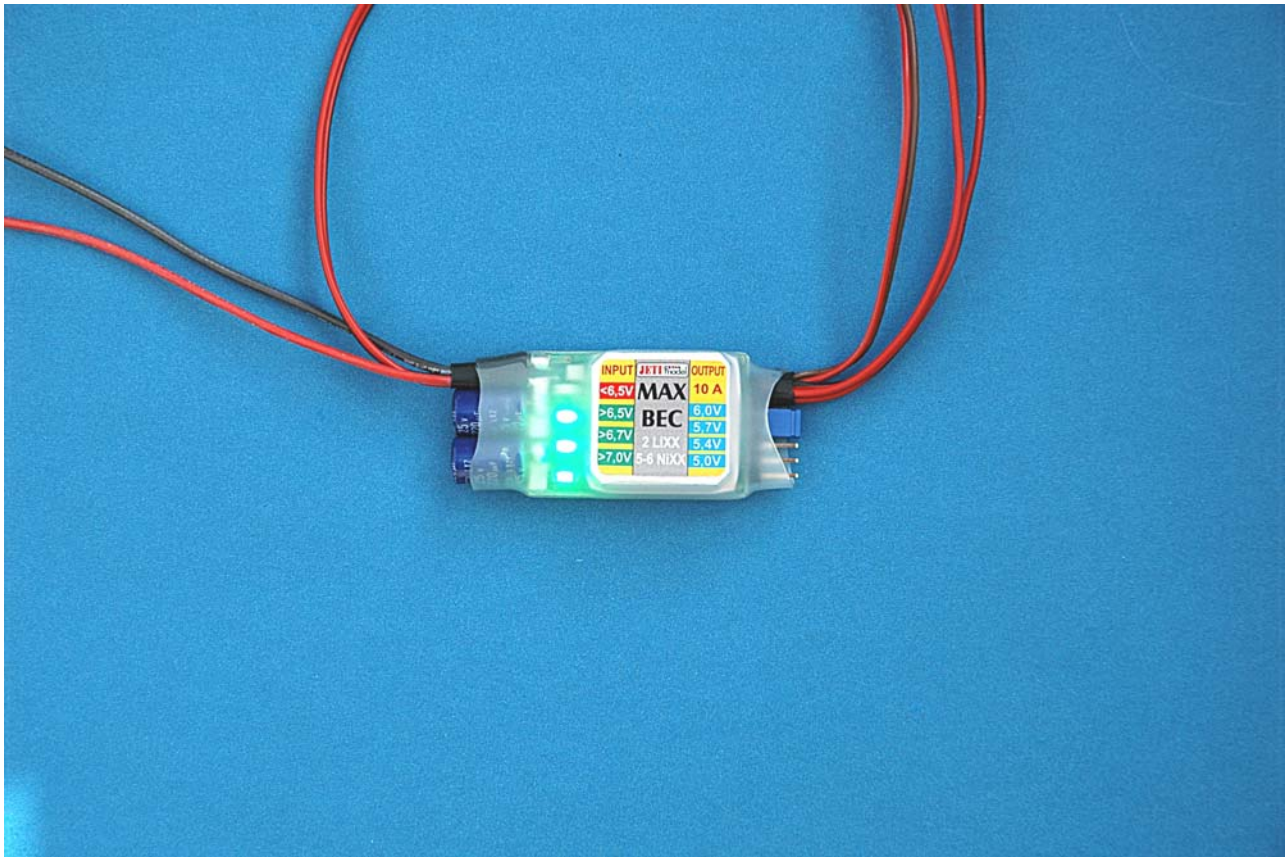
>7,0V
5-6 NiXX
5,0V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5-6 NiXX
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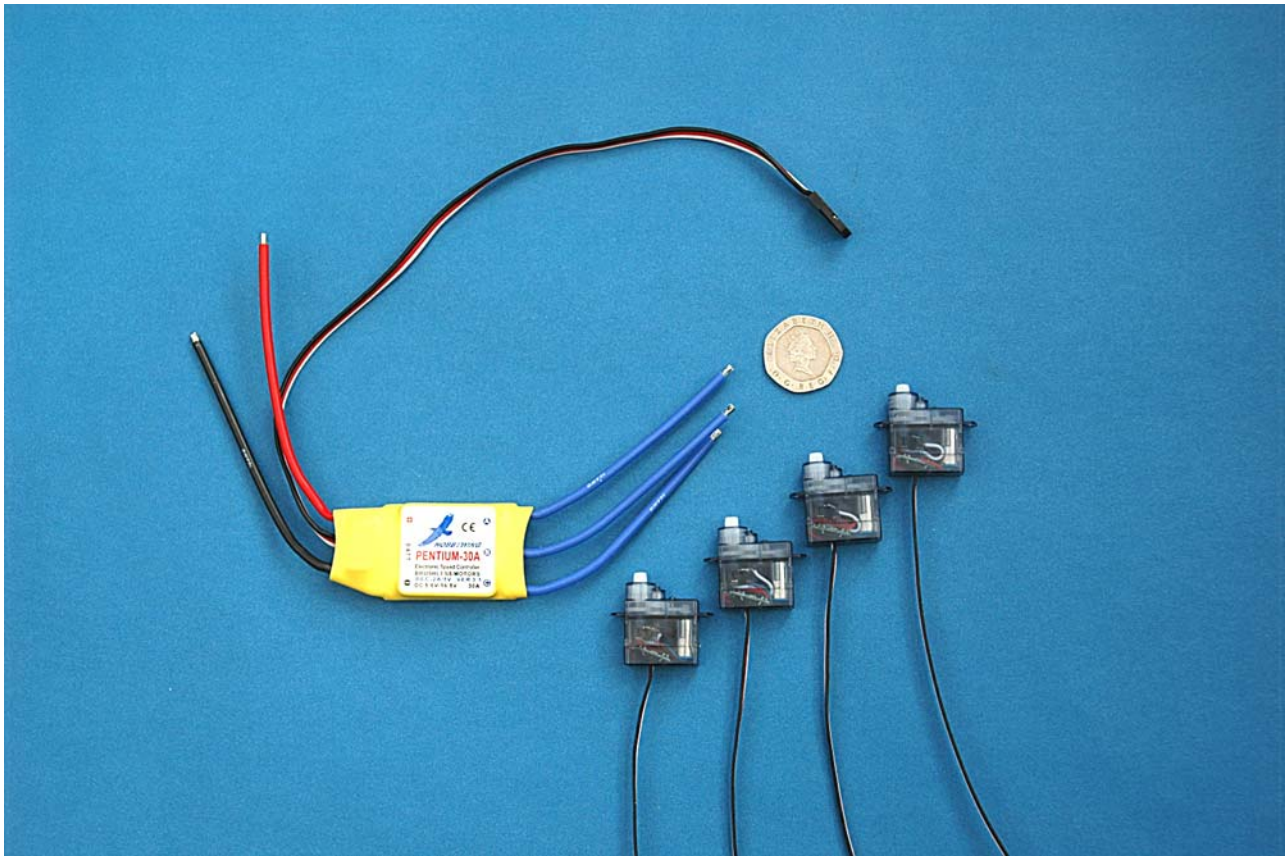
FOR RC PROFESSIONAL POWER
1000 mAH
LOONG-MAX
FOR RC PROFESSIONAL POWER
1600 mAH
HIGH DISCHARGE LI-PO BATTERY
LOONG-MAX
FOR RC PROFESSIONAL POWER
CAUTION
Do not short circuit
Do not throw it into fire
Remove battery from model when not in using
Do not disassemble
2250 mAH
HIGH DISCHARGE LI-PO BATTERY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