AGENDA ANNEX 7d **United Kingdom**
Agenda Item 13.6 m)
F1Q 3Q.2.a & b

3.Q.2. Characteristics

Nickel Cadmium (NiCad), Nickel Metal ~~Hydrate~~ **Hydride** (NiMH) and Lithium (Li) batteries can be used.

Lithium type battery packs must be in "as manufactured" condition with the covering around the cell surface. If more than one cell is used a balancer connector must be fitted.

External Battery packs are required to have a safety tether to the fuselage.

Safety locks must be used to prevent unintentional restarting of motor(s) after motor(s) have been stopped.

Rule B.3.1. of Section 4b does not apply to class (No builder of the model requirement.)

The motor run time will be determined by a maximum energy amount. In addition, motor runs over 20 seconds are regarded as overruns. The energy budget of each model is 5 joules per gram of the total weight. For energy calculations, weight exceeding 550 grams is to be ignored. Energy limitation will be by an energy limiter or by a motor run limit related to measured power.

a) For models with energy limiters. The allowed energy amount starts to be calculated with the launch of the model **and finishes when the motor has stopped**. If the energy limiter does not have the capability of detecting the launching moment it may start its calculation from ~~the beginning of the motor run~~ **when the motor is started**. The measuring device has to calculate the energy consumed in real time. ~~After coming to the end of the limited energy supply, the motor(s) must stop irreversibly. The timer stays independent, but the device may inform the timer about the end of the energy supply~~. **The motor(s) must be stopped irreversibly by the end of the allowed energy amount or at the stated motor run time.**

b) For models without energy limiters the motor's energy in watt-sec over the motor run is calculated as the measured wattage multiplied by the motor run. A freshly charged battery (4.15 to 4.2 volts per Li cell, 1.2 volts per NiCad or NMH cells) should be used. ~~When the motor has reached full power,~~ **For wattage measurement the motor, its controller and timer must be set to reach full power within 5 seconds of start-up. 10 seconds after the motor has been started for this measuring process,** wattage is measured using a commercial wattmeter via 3.5 mm male and female bullet connectors furnished by the contestant. The calculated motor run should be clearly marked on the model.

F1Q models may use radio control only for irreversible actions … to end of 3.Q.2. Characteristics, remain unchanged.

Reasons:

3.Q.2. Characteristics as written present specifications for models with Energy limiters - subsection a), and models without energy limiters – subsection b). The intention of the CIAM F1 Technical Meeting 2011 was to word these subsections so that each provided models with equal potential performance. Unfortunately the original wording was imprecise and unworkable. The CIAM Technical Secretary and F1 Subcommittee Chairman agreed a rewording that would make the subsection b) workable, and this was included in the 2012 sporting code. During the 2012 season it has become apparent that though subsection b) is workable it does not provide a model with equal performance to subsection a).

In practice models complying with subsection b) – models without energy limiters, do not have an equal performance to models complying with subsection a) – models with energy limiters. This is due to the wording not allowing an equivalent method of measuring energy used. The results of this wording have been a noticeable reduction in entries for the class is a number of countries.

The intentions of this proposal are to modify the wording so that the method of energy measurement used does produce an equal performance potential from both types of model. Additionally the proposal includes

a number of word changes in the entire 3.Q.2. Characteristics, to produce a more precise meaning.

All of these wording changes are intended to provide a clear and easy method of implementing the required specifications. They do not alter the specifications of the models or the quantities of energy or weight required. As such it is suggested that the proposal might be implemented with immediate effect as a clarification of the originally intended rule.

Data is provided below showing the effects in energy consumption of two models without energy limiters.

Supporting Data**:**

Sample Model Data 1 of 2

Model 1 Motor: "Shockie IIM
Prop: 8.5"D x 4.5"P
Battery: Dualsky 450 mAh, 30C, 3 Cell. Recharged after each test
A.U. Model Weight: 297.7 grams.
Energy Allowance: 5 Joules/gram
Energy Budget: 5 x 297.7 = 1488.5 Watt/Second

	Measured (Watts)	M'Run (Sec)	M'Run Variation
a) Power Measurement from start-up	106.0	14.04	Bench Mark
b) Power Measurement – Launch point	103.0	14.45	+ 2.9%
c) Average Power Measurement: (106 W + 90W)/2	98.0	15.19	+ 8.2%
d) Power Measurement – 10 Secs from start-up (effective Full Power)	97.0	15.35	+ 9.3%
e) Measured Total Energy used at a) = 1368.0 W/S, recalculated for Power	97.4	15.28	+ 8.8%
f) Total Energy allowed (as per energy limiter) = 1488.5 W/S, recalculated for Power as e)	97.4	15.28	+ 8.8%

cont/…

Sample Model Data 2 of 2

Model 2 Motor: “Shockie IIM

Prop: 8.0”D x 4.5”P

Battery: Dualsky 450 mAh, 30C, 3 Cell. Recharged after each test

A.U. Model Weight: 286.4 grams.

Energy Allowance: 5 Joules/gram

Energy Budget: 5 x 286.4 = 1432.0 Watt/Second

	Measured (Watts)	M’Run (Sec)	M’Run Variation
a) Power Measurement from start-up	115.0	12.45	Bench Mark
b) Power Measurement – Launch point	112.0	12.78	+ 2.7%
c) Average Power Measurement: (106 W + 90W)/2	107.5	13.32	+ 7.0%
d) Power Measurement – 10 Secs from start-up (effective Full Power)	104.0	13.77	+ 10.6%
e) Measured Total Energy used at a) = 1188.0 W/S, recalculated for Power	95.4	15.01	+ 20.6%
f) Total Energy allowed (as per energy limiter) = 1432.0 W/S, recalculated for Power as e)	95.4	15.01	+ 20.6%

It should be noted that these tests were conducted in ‘real’ conditions (not in a laboratory) as would prevail at a typical competition. In such conditions test results vary with temperature and pressure. Typically tests conducted on different days produced variations, but the comparisons between the different measurements remained broadly equivalent.

What IS shown is the difference between non-energy limiter and energy limiter equipped models. These differences are considerable and increase when more power is drawn from the battery. The conclusion is: that the two specifications are not equal.

---oOo---