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CHICHESTER AND DISTRICT

Chichester and District Model Aero Club

Committee 2004

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Committee appointed positions

Junior Members Protection Co-ordinator:
Bruce Smith 01243 531602

Visit the club's excellent Web Site,
<http://cadmac.virtualsite.co.uk>

Cover photograph:

R. Hackett of Chichester is seen with his 1/6 scale Bucker Jungmeister resplendent in Swiss markings, powered by a Frog 80 and J. Simmance is standing with his finely detailed Sopwith Snipe made to 1/8 scale for a Frog 150R.

From Aero Modeller - September 1960

You might be an aeromodeller if

- ...Your wife spray paints her wrought-iron patio furniture with your fuel-proof paint.
- ...You use fuel tubing to drink from your Coke can.
- ...You have to put out an APB for your plane that flew out of the back of your pickup on the motorway.
- ...You buy the "wife and kids" a new Pentium III computer for Christmas so you can practice with the "Tru-Flight" simulator.
- ...You have watched TOP GUN and IRON EAGLES more than ten times.
- ...Your neighbour calls the cops on you for spraying your lawn with an Aries Thrush crop duster model.
- ...You put DU-BRO wheels on your TV tray.
- ...You wear goggles and a silk scarf around your neck driving to the field.
- ...Your wife's coffee table has glue and fuel stains on it.
- ...The weather is too bad to rake the leaves but you can go flying.
- ...You got more "toys" for Christmas than your kids did.
- ...You have a field box full of every special tool made but don't have a jack when you have a flat tyre on your car.
- ...You look for the servo linkage and antenna wire on every airplane in a movie!
- ...You have at least ten T-shirts with airplanes on them.
- ...You carry a chain saw with you to the flying field so you can retrieve your plane or clear for a landing approach.
- ...You have ever made a picture frame from parts left over from an airplane kit.

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settings a little more difficult. (3) I have not been able to fathom out 'gain control' for the TDA2003. It generates over 20v which is more than is needed and causes both chips to work harder than they need to. I suspect the LM2577 would be better as the voltage is adjustable. Please let me know if you try this approach.

As usual, I welcome feedback. You can contact me on the email below.

David Theunissen

dwt@ukgateway.net

<http://www.flyelectric.ukgateway.net>



INDOOR FLYING

WESTBOURNE HOUSE SCHOOL OIVING

**Next Meeting 15th January
20.00hrs**

Poor support in recent months has left the indoor flying account very much in the RED

We are in danger of losing this venue!

Editorial

SAD LOSS

It is with great sadness that I have to begin a New Year's edition of CD with the report of the loss of one of CADMAC's founder members. Ray Hackett one of our Life Members passed away last month and will be greatly missed by his family, colleagues and those many aeromodelling friends whose life he has influenced over a period of fifty years.

It is not within my capabilities or indeed my position to record a tribute befitting such a venerable member and those who knew him well, will give testimony to his genius in a later edition. This month, however, we carry a cover depicting possibly the only CADMAC member to make front page of the Aero Modeller, courtesy of Dave Etherton and a pictorial tribute to Ray, with photographs courtesy of John Riall.

Annual Subscriptions

As you'll read later in this edition, our Chairman **predicts** an overall increase of £6.00 in the combined membership package and as the CADMAC committee have not had their January meeting (December 30th) to formalise the subscription rates - this may or may not be the case. I have had to ask for any CD contributions to reach me by Boxing Day a.t.v.l. as I need to begin printing today (27th December) and Peter, very kindly, put aside the Christmas preparations 'et al' last week, and dutifully wrote his 'Chairbourne' article before knowing what the

committee would finally come up with.

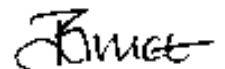
Why the rush?

All my fault, I'm afraid. On January 2nd the Memsahb and I jet off to the old Mouse Cow to visit the Gremlin and one of our sprogs who's teaching young Moscovites to swear in English at the local Uni. As we won't be back till late on the 6th and it takes four days to complete a CD print-run I've got to roll the press before we go 'coz the next general meeting will be on the 8th!

Thank you very much for re-electing me as your editor for another year! Funny, I was just thinking that while you were making waste of the festive banquet and I was knocking seven bells out of the old qwerty on Christmas Day! Anyway, I hope 2004 will be a good one for you and on behalf of the committee may I sincerely wish you:

**HAPPY LANDINGS
and a
HAPPY NEW YEAR**

..pretty much the same thing really?



Chairbourne

The result of the December AGM election of Club officers for 2004 was as follows: -

Chairman	Peter Sackman
Secretary and Social Events Organiser	Trevor Bowry
Treasurer and Membership Secretary	Alan Misselbrook
Safety Officer	Tony Chant
Chief Examiner and Training Officer	John Riall
Porthole Representative	Mick Blundel
Thorney Representative	Harry Walton
Slope Representative	Ron Hemblade
Junior Representative	Gavin Bidwell
BMFA Representative	Kenneth Knox
Clear Dope Editor/Webmaster/ JMPC	Bruce Smith
Competitions Secretary	Post Vacant

On behalf of myself and the other re-elected Committee members, I would like to welcome "on board", Gavin Bidwell who is serving on the Committee for the first time and John Riall who returns to the Committee after a four year absence to perform a task he has never stopped doing! Following our January general meeting I'm delighted to welcome Maurice Campbell to the post of Competitions Secretary.

The new Committee held it's first meeting on the 30th December 2003, the main agenda items being the setting of the Club 2004 Budget and the annual membership subscription fees. Following a detailed review by the Committee of the Club income and expenditure forecast for the coming year, the annual subscriptions were set as follows, for the various membership grades: -

Membership Grade	BMFA(£)	FPA(£)	CADMAC(£)	Total(£)
Senior	23	6	25	54
Junior	13	-	-	13
Family Partner	13	6	25	44
Family Junior	9	-	-	9
Country	-	6	25	31

The BMFA and Fishbourne Playing Fields Association elements of the Club annual subscription are unchanged from last year but the CADMAC element has been increased by £6 to cover in the main, the major increase in Thorney rent reported in the December edition of Clear Dope.

A copy of the Club 2004 Budget document will be available at the January Club

pack!

Note that my circuit is designed around three rechargeable Li-Ions. Since the purpose of lithiums is to save weight, BEC is the obvious choice for receiver power and this limits us to 3 cells at this time (with an appropriate ESC). You can design the circuit for more cells if you wish but it would not be advisable to use BEC to power the receiver from 4 or more Li-Ions. If you only want to charge one or two cells, don't bother with the 'voltage doubler' section. You would just build the rest and control voltage and current appropriately. Feed your source voltage (eg: 12v) into points 'A+' and 'A-'. If you need to charge different cell numbers or types, you could design a switch mechanism to select different resistors and light bulbs to vary voltage and current, etc.

HEAT: The TDA2003 generates considerable heat at the currents indicated (about 1A in and 0.5A out). If you look at the close-up photo, it is the chip on the left. I attached two 3x20x50mm aluminium plates with a spacer between them to act as a heat sink. Even the diodes and capacitors get warm. The LM317 also gets very hot but less so than the TDA2003. It appears on the right in the photo and has just one 3x20x50mm heat sink attached. The ends of the clear plastic box were removed to allow air to flow. The top of the box also has holes to allow the air to circulate. I think everything is working within spec, and the plastic box itself only gets slightly warm. The devices can handle

150 degrees C and they are not tripping the thermal protection so it should be OK as illustrated.

CHARGE TERMINATION:

I happened to have a tiny panel meter so I added this to give a visual indication of charge current (at the bottom of the close-up picture). The components cool down as the charge reaches completion (lower current therefore less heat). The 'fingertip temperature test' is therefore an excellent way to determine end of charge if you don't have a permanently mounted meter (you DO need a meter to set the circuit up initially). If your version uses light bulbs, try different combinations. For instance, a 3v 'grain of wheat' in parallel with a 20w 12v bulb will continue to give visual indication at lower currents than the 20w bulb. I've seen a circuit diagram for a LED-based indicator of current flow but to be quite frank I don't think its worth the added complexity (unless someone knows a real simple way).

MORE OPTIONS:

- (1) The LM317 and light bulb approach is a surprisingly elegant solution for a complex charging requirement. However, you can use a L200 regulator instead which is designed to control both current and voltage in one chip, again with very few external components. I struggled a little with the L200 data sheet but if you search for example projects on the web you should find enough to guide you.
- (2) R1 and the 500 ohm variable resistor can be replaced with a single larger value variable resistor (eg: 2k) but this makes accurate voltage

sistors to limit current in a predictable way! They don't do weird things once in place, but they don't yield results according to the Ohms Law I know! Start with the values suggested (or nothing!), use an ammeter, and experiment.

SOURCE VOLTAGE:

Each Li-Ion cell requires 4.2v to charge fully. The LM317 data sheet specifies that the input voltage to the regulator should exceed the output voltage by 3v (some of this is needed to sustain the claimed 1.5A rating (which I have never achieved) so if you are charging at a lower current you may get away with less). So, in theory you need 7.2v input to charge one cell, 11.4v to charge two cells and 15.6v to charge three cells (3x4.2 + 3). A 12v battery will happily charge one or two Li-Ions but will not fill three. If you want to charge three cells, you need a higher voltage source.

OPTION 1: Most of us have 12v batteries or power supplies but higher than this is less common. One option is to buy an appropriate power supply. You will probably get away with 15v although 16v and up would meet the requirements better. These tend to be a little pricey, however. Some laptop computers have 16v supplies (to charge their lithiums!) so if you can find one you are in luck, although this limits you to mains charging (not a restriction in reality due to the time it takes). Note that although the LM317 can handle up to 40v input, the higher it is the harder it has to work and the larger the heat sink will need to be.

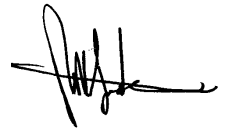
OPTION 2: You can build your own mains power supply using a transformer, a bridge rectifier and a capacitor. Although not very expensive, there are cheaper ways and you have the risk of working directly with mains supply. There are loads of web sites which will advise you on how to select appropriate components for this but be careful with mains voltages. Note that I built one using a 16v RMS transformer and it yielded 22v output. 12v RMS may be sufficient???

OPTION 3: If you want to use a 12v source battery, there are a number of ways to step up DC voltage. The first approach is to use purpose designed components such as the LM2577 DC/DC converter. Once again the data sheets for chips like these are freely available on the web. Another way is to use a car audio amplifier chip to boost voltage instead of sound. This sounded so neat when I saw Tony van Roon's circuit that I had to try it! It's also the cheapest option (£1.20 vs £6.99 for the LM2577) and has turned out to solve the current regulation problem mentioned above. Although rated at 3.5A, when used as described in this circuit the TDA2003 amplifier yielded only about 500 to 600mA charge current and draws just over double that from the 12v source (ie: no specific current regulation components are needed for this set-up if this current is OK for you). From my freshly charged 12.8v battery the circuit yielded 24.1v. From a flat 8 cell Nicad at 8.6v it yielded 15.4v. So, you could charge your three cell lithium batteries from an 8 cell nicad

Meeting for any member who wishes to examine it (see myself or Alan Missetbrook if he is not too busy collecting subscriptions). It is a tight but achievable budget, which relies in the main on membership numbers remaining at the current levels and as with last year, a tight control being maintained on Clear Dope production and circulation costs.

Prompt payment by members of this year's subscriptions, due in January, would be most appreciated. As well as providing the necessary Club operating funds at the beginning of the year, when many of the Club's big bills come in, in particular, Club Flying Site rental fees, paying your subscription in January will ensure you are covered from the start of the year by BMFA insurance and before March will ensure you remain on the Club Membership list. To quote from Rule 2.9 of the Club's Constitution, "Any member, whose subscription is still overdue at the March meeting shall have their membership terminated and may be required to rejoin the Club in the normal way."

On this "cheerful" note, I wish everyone a happy and prosperous New Year.

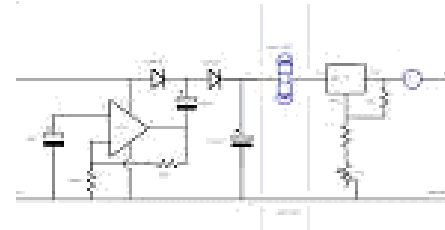


WHAT THE HELI!

I found the following warning on the BMFA site, Safety Area, back in December and while it was particularly relevant at the time I think with the country's continuing heightened state of alert it still holds good particularly for coastal and defence sensitive areas. Ed.

Due to President Bush's visit to the UK there has been an increased level of military activity particularly in the London area. The BMFA has received a report of low flying US forces' helicopters which not only presented an airmiss hazard but are suspected to have caused two RC model aircraft to crash as a result of interference. This would be the case if the helicopters were transmitting high powered signals or using broadband electronic counter measure equipment which is likely. Consequently, all members and clubs are advised of the potential interference and airmiss hazards and that on sighting any low flying military aircraft, particularly helicopters, to land and stop flying until the full size aircraft have departed the area. The BMFA will address the situation with the authorities but it is unlikely this situation is likely to be resolved in the short term.

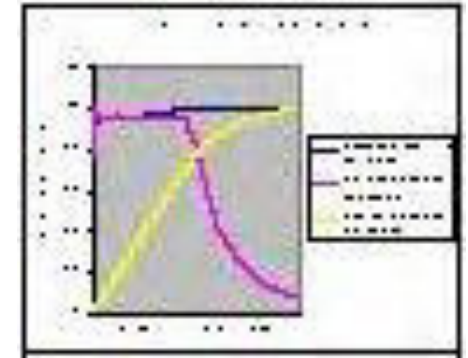
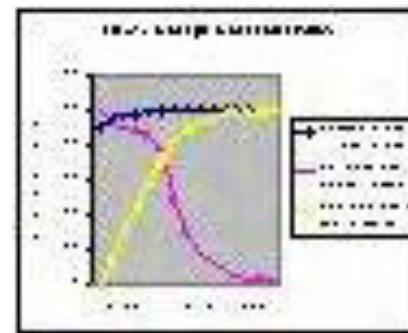
RAY HACKETT



close to 100%. Naturally the Orbit stops charging automatically and monitors charge characteristics so it will be substantially safer if anything were to change suddenly during the charge. However, both are remarkably similar.

VOLTAGE REGULATION:

As mentioned, the charging circuit (LM317T) is incredibly simple (the 'T' version has thermal protection and higher current capability which is advisable). With an appropriate power source it is easy to configure. The combination of resistors determines the maximum output voltage (values given on the circuit diagram) which is set once using the 500 ohm variable resistor (green 'blob' in the photo). Set the voltage by measuring points 'B+' and 'B-' before you start charging and without the lithium battery attached. This setting should remain static for the life of the charger, although it might be



worth checking periodically. With the values given, you only need to vary resistor R1 for different cell numbers (or replace R1 and 500 ohm pot with a 2k pot). The LM317 data sheet explains the formula for setting output voltage and is freely available on the web (recommended reading).

CURRENT REGULATION:

The charge current may need to be regulated. If you build a circuit similar to mine, this may be achieved with inherent power supply limitations (read more on this below). However, your circuit may need specific components to limit current, and a 12v car globe is a good way to achieve this. It is shown as an option on the circuit diagram. Start with 10w and 20w bulbs and measure the charge current with each (the meter position for measurements is indicated on the diagram). In some of my experiments these gave between 200 and 800mA using various power sources. You can use fixed resistors instead, as well as different bulb voltages. Remember I drew attention to the fact that I'm not qualified to advise on electrical matters? Well, I could not get the bulbs or re-

numbers of cells. I have redrawn the diagram (below) and include the revised values and alternatives for other cell numbers. The design really does work and it is incredibly cheap and simple and meets two of the requirements above. The current starts off at the maximum for which it has been configured and falls as battery voltage rises. It never switches off (ie: it does not meet requirement 3) but as the current becomes progressively lower, the main issue with this is not to leave it trickle charging too long (although in reality it drops so low that this may not be a problem). If you know the charge current and battery capacity, you can estimate when to disconnect. If you use a light bulb to limit current, it glows when current is flowing and stops when the current is low. However, in my experience, it stops glowing well before the end of the charge. Nevertheless its a good mid-point indicator and is nice and simple.

Photos of chargers I have made together with the revised circuit diagram are below. You may notice that my first charger (2 pictures on the left) is a little more complex than the others. This is because three Li-Ions need a higher voltage than a 12v battery can supply. You don't need 70% of this circuit if you are only going to charge one or two cells or have an alternative power

supply. This is illustrated in the third and fourth photos which show simple 2 and 1 cell chargers. The 2 and 3 cell versions have no current limit components and charge flat cells at about 800mA initially. The right-hand 1 cell version uses a 12v grain of wheat bulb in series with the positive input and this limits the initial current to 50mA which is suitable for a 40mAh Li-Pol which I have. I have been told that an 8.2 ohm 3W resistor (instead of the light bulbs) yields a 500mAh charge current, and 2.2 ohm a 1 amp charge. These values will probably depend on your setup but it should get you close enough to experiment. The circuit diagram follows and illustrates the various sections of the circuit which are described in more detail below.

Two graphs follow which illustrate what is happening while three 800mAh Li-Ion cells are charged. The first graph is for the home-made LM317 charger and the second is for the Orbit. I have 'normalised' the readings to make it easier to present graphically. Here is the [Excel spreadsheet](#) (19kb) with the raw data for the LM317 if you are interested. Data measurements were taken every 10 minutes with the LM317 and every 5 seconds on the Orbit. As you can see, starting with about 1C (800/727mA), both chargers reach about 80% charge in an hour and take quite a bit longer to get



Jerry Devonish, Ray Hackett, John Riall and Mike Schofield - Judges judging each other and all past Chairmen of CADMAC.



Aerotutor and Minitutor. Two of Ray's very popular own designs which fly as good as they look.

Another successful design - The RH Delta



John Riall (then Chaiman) presents Lifetime Membership honours to Jerry Devonish (left) Ray Hacrkett (centre) and John McStae (right.)

ent current consumption. Tell me if you know why!

MODELS

The GWS and S280 motors on 3x800mAh cells suit almost any park or indoor model. (See website for these pics - Ed.) The AndNow and Drenalyn models will prop-hang with the GWS motor. I use the S280 on a simple 38" glider to great effect (Watter wing and tail surfaces on a PicoStick type fuz). I am pleased with the performance of the Speed 300 with 3x1600mAh Li-Ions on an Elipstick '420' and it flies my Curtiss very well. My next model will be a twin, possibly Tom Hunt's 'Twin Dimwatt'. Designed for 2 Speed 400's, I will use 2 Speed 280's off 3x1600 Li-Ions. This should further improve the overall power to weight ratio of the complete 'package'.

Where do these experiments go? Well, take a look at the specs of the 9.8 foot wingspan lithium-powered Latecoere on my Monster Models page... Anything is possible.

CHARGER

You cannot use a normal Nicad, NiMH or Lead Acid charger for lithium cells. Please don't try! Li-Ion chargers need to have three main characteristics:

(1) The charge current must be kept within limits (eg: 1C or less for rechargeable Li-Ions), particularly during the initial charge period when the battery is flat.

(2) The voltage must never exceed the maximum allowed (eg: 4.2v per Li-Ion cell), particularly towards the end of the charge when the battery is full. Chargers not designed for

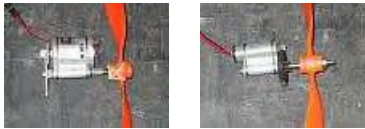
lithiums do not provide this feature. (3) The charge should be terminated when the battery is full (eg: based on time or when the charge current drops below about 50 to 100mA). Lithiums are not designed for long trickle charges.

There are currently three groups of charger which will work. The most versatile are the expensive professional chargers such as Orbit and Schulze. Next are the purpose designed ones, such as the 1-3 cell charger from indoor suppliers for about £32/\$50. And finally, you can build your own very cheaply (about £10/\$15) but it will require some experimentation. Please note if you are contemplating building your own charger, you need to have some electrical savvy. Please ask a friend to help if you don't. A multimeter is a requirement as the output voltage has to be set accurately. You also need to be able to measure the output current while building the charger as different versions of components have different tolerances and results. Please note, although I have some knowledge of electronics I am no expert and am not qualified to design circuits or give advice on these matters. I present this information purely as my experience. If you follow any of this advice or build the circuit you do so entirely at your own risk.

The Sodbusters club and others have published a circuit diagram using an LM317 (adjustable voltage regulator) to control voltage and a light bulb to limit current. The values have to be changed to suit rechargeable Li-Ions and for different

LITHIUM CELLS (Continued)

By David Theunissen



MOTORS

I have experimented with three types of motor to use with my lithiums. These are the small GWS motors and two Graupner Speed motors (280 and 300). Some of my measurements are given in the following table and explained below: The weights given relate only to the motor, gearbox, prop and battery (no radio, airframe, etc.). The best power to weight ratio is available from the small GWS '150' sized motors. These come in Standard, Deluxe ('Dx') and Carbon Brushed versions. I only recommend the latter two varieties (Dx and Carbon Brush) with the Carbon Brush version being the best (although it takes a while to run in). I only use

the 'D' ratio gearbox (9.66:1) with 3x800Ah cells. 3 Li-Ion cells burns out the 'B' version (7:1 ratio). Please note also that even on the high 'D' ratio the specs of the motor are being exceeded considerably and they are not likely to last very long.

A cheaper alternative to the GWS motors is the Speed 280. Note that not all 280's are the same. The above measurements were with a Graupner motor. If you can handle a larger prop, the higher gear ratio is beneficial.

The Graupner Speed 300 is a little more expensive than the 280 and about 10g heavier. It generates about 50% more power but needs larger cells for the higher current. I use three of the larger 1600mAh Li-Ions for this motor and am probably still not at the motor's maximum. For some reason two different GWS props of the same size produced identical thrust but with vastly differ-

Motor	Gear Ratio	Prop	Current	Thrust (Static)	Weight	Thrust to weight ratio
GWS 'Dx'	9.66:1	GWS 12x6	2.2A	212g (7.5oz)	109g (3.8oz)	1.9:1
Speed 280	6:1	GWS 11x4.7	2.0A	193g (6.8oz)	131g (4.6oz)	1.5:1
Speed 280	4.33:1	GWS 9x4.7	2.1A	172g (6.1oz)	126g (4.5oz)	1.4:1
Speed 300	6.2:1	GWS 9x4.7	4.6-5.9A	260g (9.2oz)	188g (6.6oz)	1.4:1

Cubs - Mountain and Glacier Flying

The following info and website came as part of a very interesting email from our member Colin Stevens. NB. The site is in German but a hyperlink at the menu foot takes you to the English site. Ed.

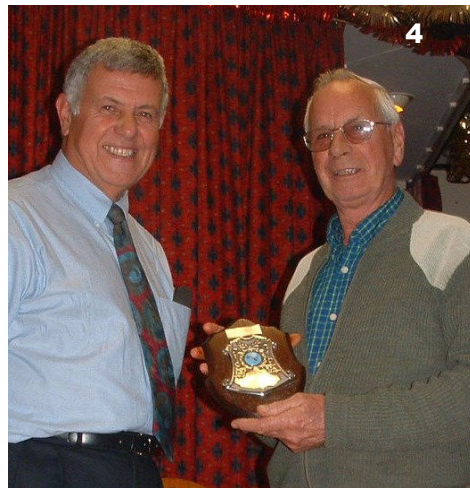
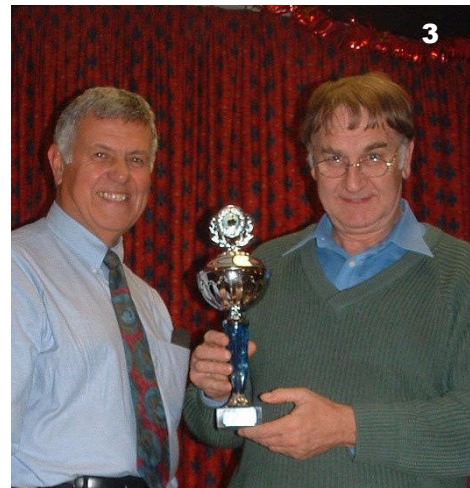
.....I have just obtained a Flair Piper Cub/Enya 40, plus all accessories, in new flying condition, from someone going electric. I hope to use this for my 'A' test, and as I'm interested in seeing what can be done to it to improve its scale appearance in the event of its (and my) survival, I've been surfing-around for information.

One item I came-across at <http://www.gletscherflug.ch> relates to Cub operations on the snow-fields near the Monschjochhutte, near the Jungfrau in Switzerland. Some years ago, my wife and I trekked through the snowfields up to this hut, and on the way photographed one of the Cubs doing its thing. I regret very much now not forking-out some cash for a flight, but of course it carried only one passenger. However, as my wife says now, we've not yet lost the chance, and a flight together in a Maule would be unforgettable. Picking the right day is a real lottery though, at that altitude. This is a real gem of a site if you like Cubs, hundreds of pictures as below. Do have a look when you have a spare week.

Colin



TROPHY PRESENTATIONS AT THE 2003 AGM



Chairman, Peter Sackman, presents: (1) Don Biles (2) John Riall and (3) Ray Beadle with respectively 3rd, 2nd and 1st place cups for the Victor Ludorum Trophy which is awarded for the highest total of points gained in the various club competitions throughout the year; (4) George Chant with the Electric Trophy for electric duration; (5) John Riall with the Sailplane Cup for glider duration (6) Maurice Campbell with the Most Improved Senior Flier

Cup; (7) Mick Pearce with the trophy for Best Scale Model and (8) Bruce Smith with the Radio Cup - basically for the gall to keep turning up for competitions and not winning anything! Chris Kingston was again the winner of the most improved Junior Trophy but was not present at the AGM.