

Electric Flight

March/April 1997

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*The Magazine for
Switched on Modellers*

International

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flies again!**

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Graupner Me 323 Gigant

SAS Thing-Ohmy



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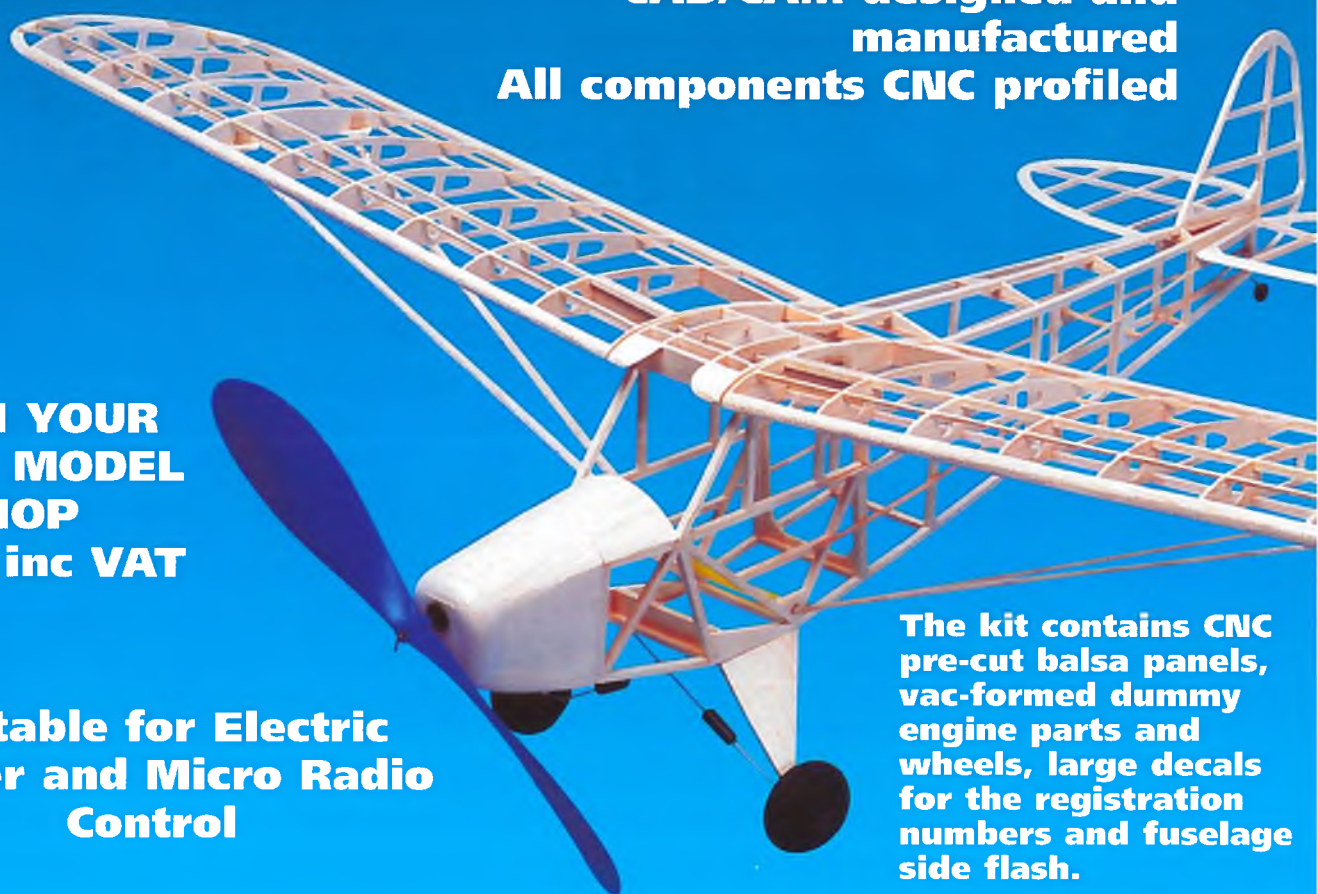


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Electric Flight *International*

MANAGING DIRECTOR
Tony Stephenson

EDITOR
Stephen Mettam

ADVERTISING DIRECTOR
Jane Stephenson

**ADVERTISING COPY
CONTROL**
Karen Ranković

**ART & PRODUCTION
DIRECTOR**
Neil Blowers

ART & PRODUCTION
Sharon Billington
(Production Manager),
Chris Hughes
(DTP System Manager),
Sue Huxley, Janet
Atkinson, Ray Lloyd,
Lee Wisedale,
Steaven Heppener &
David Coleman

All correspondence should be sent to
Electric Flight International Magazine,
Traplet House, Severn Drive, Upton-upon-Severn,
Worcestershire, WR8 0JL, England. Tel: (01684)
594505 Fax: (01684) 594586.
E-mail: traplet@dial.pipex.com
Website: <http://www.traplet.co.uk/traplet/>
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2435, USA. Tel: (818) 836 6931, Fax: (818) 836
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Editorial.

Model flying? I always say "Start 'em young" but this is the youngest electric pilot I have seen getting SO enthusiastic about electric models. It must be because he is reading (early starter there too) the most informative electric magazine.



Start 'em young

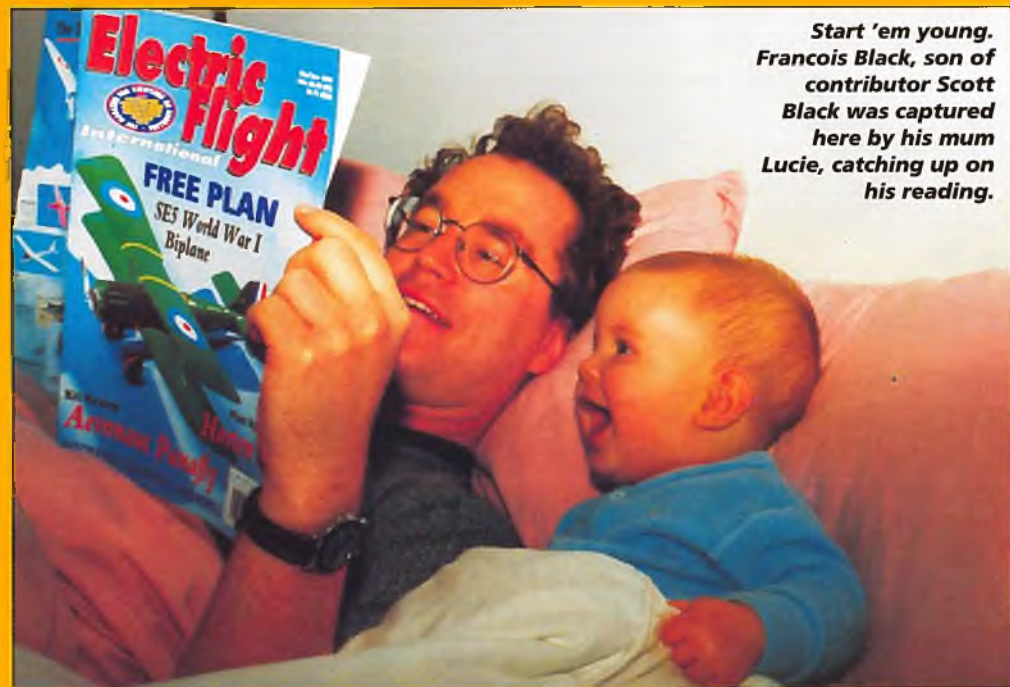
Electric flying might be very expensive to a youngster. Setting-up is always costly and the younger you are the more costly it seems. If you can lean on Dad or an elder brother or friend and borrow a lot of his equipment, you can acquire what you need more gradually and spread the cost over a longer time-scale.

We have several beginners' models, reviews for which will be published soon but what about those who cannot afford electrics yet? They (or you) will for that reason possibly not be reading this editorial or even this magazine. This is where the established electric flyers amongst us can help.

Any novice can learn a lot with a chuck glider. (Some very experienced model pilots still build chuck gliders of proposed unconventional new models to check out the flying characteristics, balance point, etc.)

Do you have a son/grandson/nephew/young friend who is showing an interest in aircraft (or you think should be!)? That question is sexist I know, please adjust to nieces etc., if you possibly can but this editor knows only one female who is still building and flying amongst hundreds of male pilots, a superb pilot - but she does not fly electric. If you do know any such person, provide him (or her) with a chuck glider. If it only lasts one day it may do the trick. I used to take small chuck gliders to competitions to entertain other competitors' children. When these models broke I put them back into the car to repair at home at my leisure and bring back next week. Some lasted for months, reduced the number of footballs that got too close to my models, hopefully kept them out of mischief and may have converted a few youngsters to flying. They gave me something to play with too.

There are some new chuck gliders of scale models (not gliders) that look recognisable and fly, try them out on a youngster, or any likely potential pilots not embarrassed to chuck. They might learn a lot.



Start 'em young.
Francois Black, son of
contributor Scott
Black was captured
here by his mum
Lucie, catching up on
his reading.

WHY NOT TAKE OUT A SUBSCRIPTION

Diversity

When this magazine was launched a little more than two years ago, it was wondered by many if the electric flight field as a 'specialty interest' field was wide enough to gather enough interest to support three quarters of a magazine. (When we started one quarter was devoted to gliders.) 'Electrics' has grown so fast that it is not only replacing IC power for many pilots but moving into areas that seemed less likely for electrics two years ago. Ducted fans were electric then but not many and small. Electrics are replacing CO2 and rubber motors for indoor flying and smaller RC gear is helping create another electric class or classes for indoor flying. Technology is opening new routes for us and electrics is making flying easier in established areas of model flying.

Ducted fans

Pseudo jets have been trying hard for almost as long as man carrying jet propelled aircraft. Rockets have been rockets for centuries, Butler and Edwards designed a jet 'paper dart' in 1867 and someone will now find me a jet model that is pre-1940.

Jetex (rocket) powered models flew in the late 1940s. IC engined ducted fan models have been flying since the early 1950s and RC, IC ducted fans are now a well established part of the sport. As soon as one gas turbine powered model had emerged - everyone who could afford it was doing it. Very powerful IC engines driving very well developed fan units are very expensive. A lot of ducted fan flyers prefer to pay a bit more for the real thing, have dug deeper into their pockets, purchased gas turbines and I suspect now have a motor that is easier to start and more reliable. If it isn't it soon will be. We now have available to us several commercial electric ducted fan units.

A prediction (by this editor sticking his neck out) is that all the bigger more powerful IC engined ducted fan models will disappear as their very high revving motors wear out, to be replaced by gas turbines. There has always been an 'economy camp' to the IC ducted fan brigade, using anything from Cox Black Widow and 09 motors to K&B 21s or OS 25s. This area will be replaced by electric ducted fan models. Apart from the 'ecology-nuts' who will only fly electric anyway, smaller IC ducted fans are so

much less expensive. So too are electric fan units. These will vary from Speed 400 motors and fan units costing a total of £40, 100DM or \$65, to rare earth motors in 100mm fan units costing £300, 750DM or \$500.

Electric ducted fan units do sound like vacuum cleaners or hair dryers but they are not very noisy once airborne, much quieter than high revving IC motors and so much quieter than gas turbines.

There are many fan units available now for small to middle sized ferrite motors and small to big rare earth motors. You can use these as singles or multiples. In the next issue there is the full story of an eight engined B-52.

Jet models

I mean models of jet propelled aeroplanes (or airplanes). A ducted fan model may just be another model to you. Buy a fan unit, there are many available and maybe buy another motor if you do not already have a suitable one. Buy a kit or plan or design your own model to suit this fan unit. This may sound too expensive. If it does, build your own!

There are a few kits to assemble from CNC cut wood components. If these still seem 'out of reach' make your own plastic moulded fan. In this issue Gernot Neuböck describes how you can build the fan unit he has designed. This is very much simpler than you may think. Gernot wanted to fly ducted fan models, he did not wish to pay

Internet & Email

Many readers will already have access to the Internet. How much do you use this as an aid to model design, or model and component selection, or just for more model information?

Traplet have the Website:

<http://www.traplet.co.uk/traplet>

which provides you with a wide range of information on all Traplet magazines, videos and books and how to subscribe. We have our own email too:

traplet@dial.pipex.com

for any messages or enquiries you may wish to send.

There is an electric flyer named James Bourke who operates a Website based in the USA that is devoted to electric flying models, it is called the E Zone.

<http://www.ezonemag.com>

Check it out.

One thing you will find on the E Zone is how to get onto the 'Eflight' mailing list. The Eflight subscriber list (which costs YOU nothing) is truly international and messages are on it daily from all round the world. Subscribers vary from absolute beginners needing help to get into electrics, to some of the world's most competent designers and manufacturers and pilots. The only language used is English. Consider getting onto that list. If you do not find it useful you can get off it just as easily.

If you competition fly electric gliders, or don't yet but would like to have a go at the 'Second Electric Email Competition', check out:

MAAAPage@http://www.ozemail.com.au/~maaa

'Surfers' of the net (if you do not wish to devote all your spare time to building models) will find interesting news elsewhere. For instance the US Naval Research Lab, has done work with Aveox-powered UAV's. This is what the Unmanned Systems magazine says about NRL's Sender mini-drone:

"The Sender has a four foot wingspan and has a 10 pound gross weight including 2.5 pounds of payload, yet it is capable of autonomous flight and navigation. It can fly 100 nautical miles at 50 knots, has a 90 knot dash speed and two hours endurance. The motor is a brushless DC cobalt power-plant powered by lithium batteries. The drone's auto-pilot is based on a Motorola 16 Mhz 68332 processor, and has a Trimble GPS receiver."

This sounds like our size of model aeroplane, the motor is an Aveox and the only part not readily available to us is the lithium battery which delivers enough power for a two hour cruise for a fast heavy model. If you can get lithium cells, they are primary (not rechargeable) and very expensive. But I'm sure someone is working on that!

a lot for fan units or expensive motors in order to get an acceptable performance. He decided to mould his own. This is not difficult to anyone who is capable of making a built-up model aeroplane.

Gernot could have provided drawings of every single component but this really is not necessary. The drawings with his article are fully dimensioned and easy to understand when you have read the text (mostly because all components are round or part of a circular unit). He describes how you will make patterns, make 'soft' tools and make mouldings from them. This may be an unfamiliar

process to you but it is not at all difficult. This editor has instructed many persons how to do this and now I wish some of these had been fan units!

When you have decided which size unit to go for, 600 or 700, and when you have built it, you will need a model. By the time the next issue is published you may have finished your own fan unit. Expect to see a plan in the next issue for one of Gernot's models and several more during the next year for more of his models. If you finish your fan early and cannot wait, try Martin Lagerstedt's Henschel 132, a plan for which was in the last issue.

SEE PAGE 19 FOR DETAILS

Comet history

In 1933 the Australian Sir MacPherson Robertson put up £15,000 as prize money for a race from England to Australia. Three de Havilland DH 88 Comets were designed and built specifically for this 12,300 mile (19,680km) race. The first Comet flew in September 1934.

The race started from Mildenhall at dawn on October 20 1934 and the all-red Comet G-ACSS "Grosvenor House" won this race by arriving at Melbourne 70 hours and 54 minutes later. G-ACSS was the fourth aircraft to arrive and turned round to establish an out-and-back record of thirteen days.

The exceptionally 'clean' Comet was of all-wood construction and its two 230HP (172kW) de Havilland Gypsy Six R engines gave it a maximum speed of 237MPH (379KPH), high cruising speed of 220MPH (252KPH) and range of 2,925 miles (4680km).

Unusual features for 1934 were split trailing edge flaps, retractable undercarriage and two position variable pitch propellers, a feature carelessly overlooked even for military British aircraft until WW2.

Hiroyuki Sakai and the prototype model of the new Hirobo DH 88 Comet.

Cover Story.

de Havilland Comet DH 88 by Hirobo

restoration by the de Havilland Technical School and now fortunately it has been restored again by the Shuttleworth Trust who are getting accustomed to repairing it after landing accidents. A lot of the design/build

The model

The one photographed here by the editor had been taken to the Czech Republic by Hiroyuki Sakai, a pilot in the Japanese F5B team. The fuselage is fibreglass and the wing is moulded in expanded polystyrene but differs in detail from the production models. The pilot and the editor had almost no words more than "Hello!" that was understood by both but fortunately Koichi Harada was there and willing to interpret. Plastic moulding processes is another language that one can have problems with so some of my details may still not be quite right!

The model in these photos was out of early tools and not final production dies but the finish was to a very high standard. I was informed that the wing surface would have 'skin' but I'm not sure

A total of six Comets were built and all were used for record breaking or experimental fast air-mail routes. G-ACSS was acquired by the Air Ministry and used for research by the RAF but was damaged and scrapped in 1936. Fortunately it was rescued, rebuilt and used for several more record breaking flights. This editor remembers seeing it displayed at the 1951 'Festival of Britain' exhibition after

technology learned from the Comets was used a few years later for the manufacture of thousands of DH Mosquitos.

'Clean', 'light weight', 'all-wood construction' makes it sound an ideal candidate for electric power and this high quality kit is all-plastic!

Graupner Precision Spinner and Speed Prop, what will be recommended for the production models?



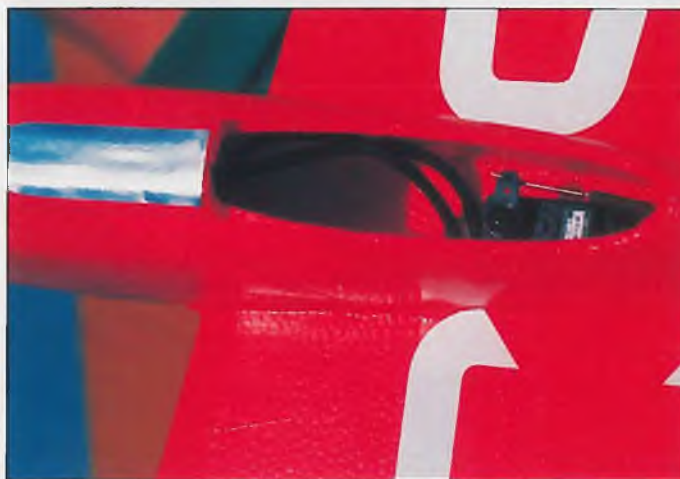
At the last F5 world championships in the Czech Republic a lot of competitors, helpers, spectators and fliers who came to the World Aeromodelling Games brought with them not only competition models but a lot of fun models too. Early arrivals had time to practice with the hot models or relax with the soft ones. Between competitions and in the evenings a lot of interesting models appeared from model boxes and car boots. This is one of the more interesting ones. Even more interesting, is that you can purchase one of these. It will be manufactured in quantity and released for sale in May of this year.

(my language problem) if this is a skin sprayed or inserted into the mould so the styrofoam bonds to it, or if the foam would just have its own integral skin. The Comet here already has a very fine finish, enhanced by a sprayed on coat of red paint and in not many spots was apparent the usual 'bubbly' finish of polystyrene foam. I was given the impression that this would be even less visible on production items.

This Comet uses one servo for each aileron and these were visible inside the engine nacelles, visible through the 'retractable undercarriage hole'. Futaba S 5102 mini servos were used but you could I am sure save money and weight by using smaller cheaper micro servos. These holes prompted the obvious question: "Will a production model have the option of wheels?" The ensuing giggles suggested that this was a silly question. I suspect that this pilot uses

undercarriages on electric models about as often as I do. Wheels are a good way of abbreviating flight times, spoiling the climb and glide angles and best ignored wherever possible. The wing is retained by screws and on this model there was an aluminium sheet cover which allowed access to power pack but I think this is not a production item. This was after all, a development model.

It flies fast with the pair of



Nacelle 'undercarriage hole' and aileron servo.

'Hirobo 400' motors that are probably from the same source as many others and this model used 7 x 600 cells. Three control functions are used, aileron, elevator and motor control. The rudder has moulded hinge lines and clearance from the fuselage but a rudder is of limited use on a model this size and the weight of a servo is worth saving. Wingspan is 1200mm (47") and typical weight 800g (28oz).

CAP and Su-31 all for Mabuchi 540 or OS SF-26 power. Watch this space for more news!

These models provide a wide choice to suit your flying inclinations: racer (Comet), and fast combat aircraft (Lightning and Mosquito) and we will have to wait and see how aerobatic or how inclined towards 'sports' flying are the Extra, Grob, Pitts and Sukoi.

Hirobo

Interested? Ask your dealer. If he does not have links with Hirobo, show him these addresses:

Hirobo Limited, 530-214 Motoyama-Cho, Fuchu-Shi, Hiroshima-Pref., Japan 726. tel: 81 847 41 7400, fax: 81 847 41 9361.

Hirobo Europe Sanv, Mechelsesteenweg 309, 2550 Kontich, Belgium, tel: 03 458 14 46, fax: 03 458 12 55.

Model Rectifier Corp, 80 Newfield Avenue, Edison, NJ 08837, USA. tel: 908 225 2100, fax: 908 225 0091.

Range of models

There will soon be available a whole range of electric powered scale models manufactured by Hirobo, Japan. The first two to be released will be this DH 88 Comet for 400 motors and a Pitts S-2A Special for Mabuchi 540 or OS SF-26 (IC engine). These are the first in a series of Hirobo scale models that Hirobo refer to as 'mini-scale' and 'mini-scale aerobatic'. Next in the series will be a Grob G109B, P-38 Lightning, DH 98 Mosquito, all for Hirobo 400 motors, and an Extra,



If there is an IC power model you like but you wish to only fly electric, convert it. You can save weight on all of the structure associated with the original engine. You may need to add a little structure to cope with your power pack. It need not weigh more. It will fly as well and be clean and quiet – much better!

Robbe Acrobat

conversion to electric power by David Howe

Weight

Judging by the size of the radio gear shown on the plan, this model was released in the early 80s, designed for a 0.25 IC motor fitted with a tuned pipe. The construction is sheet tail surfaces, built up wing and a box sheet fuselage made to look pretty with some nice ABS mouldings. Flying weight as quoted in the instruction booklet is 1350g – AS AN IC MODEL.

This kit was bought at the Model Engineering Show some 3 years ago from Hobby Store by a friend, I



weight would go up and I feel safer with a strong D box wing structure. The centres of the sheet tailplane and fin were cut out and spars put in, this reduced their weight by 17g without affecting rigidity. Most of the fuselage formers were omitted along with the ply doublers, the front bulkhead was made up of three ply formers, but one is enough for a smooth running electric motor.

The power train consists of an Astro 05 FAI geared, controlled by a Zippy 40 from Gordon Tarling, powered by 10 Sanyo 1700 SCRCs. (An alternative



convinced him it could be flown electric and he gave me the kit (thanks John).

Bigger and lighter

The span of the design is 1 metre but all of the spars, LE & TE are cut overlength, by re-spacing the ribs the span was increased to 1130mm, the other alterations made to the wing were to fit extra shear webbing, and leading edge sheeting to the bottom of the wing (original had top sheeting only). I knew the

motor would be a Speed 700 Turbo.) This would give about 250watt at the prop and if the weight is kept to about 1.5kg a good aerobatic performance should follow.

White Solarfilm was used to cover the model, and with the decals provided plus a little red Stick-a-Trim the box art was vaguely replicated. Whilst doing the battery location and CG checks I realised how much of the good looks of this aeroplane are down to the mouldings, they change it from a basic box



fuselage into quite an attractive shape. (If only they were in lightweight glass and resin.)

The final AUW is 1.58kg, a little over my hoped for 1.5kg, and the propeller chosen after static load checks is an APC 9 x 7. This pulls 27 amps with the throttle trim pulled back, with the trim pushed forwards the current can be pushed to 34 amps which I feel is high for the Astro 05 on a continuous basis and would defeat the objective of having a reliable low maintenance power train.



Flying

I know this is the bit most people read first. As an 'ex' wet power flier for more years than I care to remember (Wot 4s and Panics etc.) I feel qualified to compare this model with the noisy smelly ones. There are but two differences, the first is the silence, just the prop noise along with the familiar Astro gearbox whine. The second is the flight

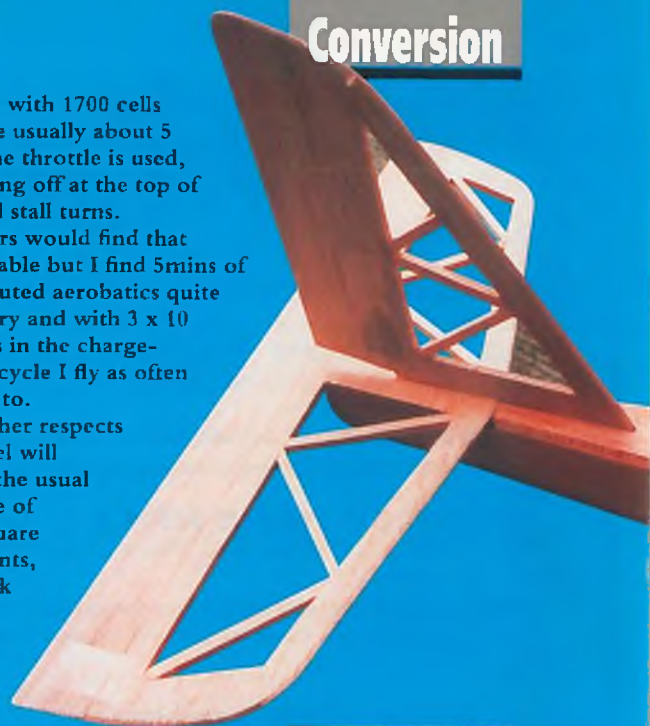
duration, with 1700 cells flights are usually about 5 mins if the throttle is used, i.e. backing off at the top of loops and stall turns.

Wet fliers would find that unacceptable but I find 5mins of well executed aerobatics quite satisfactory and with 3 x 10 cell packs in the charge-cool-use cycle I fly as often as I want to.

In all other respects this model will perform the usual repertoire of loops, square loops, bunts, spins, flick rolls, 4 point rolls. As usual the limiting factor is the pilot.

Having gone electric some 5 years ago I have always hung on to a 40 powered aerobatic model, tucked away in a corner of the loft, just in case I fancied a real good thrash of lunatic flicks and spins. This model means I can go 100% electric and hang up my electric starter for good.

(I wonder what size prop would fit an electric starter on 14 cells?)



Conversion



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30" span for '400' electric power or .049 motors and standard radio. Contains pre-cut parts, hardware, plans etc.

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EF0397

ElectriCalc

A computer program for evaluating electric flight

Reviewed by Dick Whitehead

Many newcomers to electric flight have problems understanding which combinations of motor, battery, and propeller they can use to get their dream machine into the air. This is not surprising really - after several years in the game I still have problems myself! As a result I am always on the lookout for anything that can help me.

When I first heard about ElectriCalc it sounded promising, but would it live up to that promise? Well, the only way to find out is to try it - so lets get started.

The Computer Bit

If you don't understand computers - and perhaps don't want to - it doesn't matter. All you need to know is that if you have an IBM compatible computer that uses Microsoft Windows 3.1 or better you can use ElectriCalc. You don't even need a printer, you can see everything on the screen. ElectriCalc comes on a single 3.5" floppy disc and the only written instructions are how to load it on your computer and start it, and a note to the effect that all the other instructions you will require are available in the "on-line" help system once it is running.

Being a Windows based programme makes the whole thing easy to load. Insert the disc, go into File Manager, run the SETUP routine as per the instructions, and the rest is done

for you. A new ECALC directory will be created on your hard disk taking up a total space of about 330 kB, and a new Icon created. There is nothing more to do as it uses your existing Windows display and printing set-up. Just start ElectriCalc by clicking on the Icon in the usual Windows manner.

I tried it. It worked. What else can I say. Believe me, it really is that simple!

Description

Let's have a look at what you get when you start up.

ElectriCalc is built round a basic "master" screen (Fig 1) which has the usual Windows style drop down menus at the top. We will come back to these menus shortly, but for the moment let's look at the basic screen.

The screen is divided vertically into four panels which represent details of the battery, motor, propeller, and model. Each panel has text boxes into which you can type details such as the number of cells or the diameter and pitch of your propeller, and below them a 'slider' with which you can select standard cell types, motor types, propeller

types, and a selection of planes, from a database. On the screen below the sliders there is an area showing details such as calculated current, duration, motor RPM, etc. And finally at the bottom of two of the panels are additional sliders which allow you to select a throttle setting if you are planning to use a speed control, or a particular speed if for example you want a scale like performance.

Let's have a look at those drop-down menus.

The Data menu leads to screens (like Fig 2) which allow you to select battery, motor, prop, and plane type from lists rather than stepping through them one by one using

Fig. 1

Power Parameters				Motor Parameters		Drive Parameters		Engine Parameters	
10	Cell Count	1289	Kv RPM/V	13.00	Diameter	79	Plane Wt ounces		
1.25	Cell Volts	25	Rm mohm	8.00	Pitch	20.7	Wing Load oz./sq.ft.		
5.5	Cell mohm	3.0	Io amps	1.31	K prop	550	Wing Area sq. in.		
15	ESC mohm	79.3	AMPS	0.00	K pitch	0.030	Drag Coefficient		
1950	MAH	Ultra	Mfr	1.00	Gearing	1	Motor Configuration		
N-1700SCRC		1800/3		Thin carbon fiber			Parabola		
CELLS				MOTORS		PROPS		PLANES	
73.3	Battery amps	5.86K	Motor RPM	5.86K	Prop RPM	1218	ft/min		
1.5	Minutes	72%	Motor Eff.	388	Prop Watts	60'	climbout		
42%	System Eff.	540	Motor Watts	52	MPH pitch spd	17	MPH stall spd		
916	Watts created	151	Watts lost	109	Watts per lb	65	MPH max. spd		
376	Watts lost	Max Eff @ 19.9A		75 oz thrust					
100%	Throttle	7.4	Motor Volts	7 oz drag					

Fig. 2

PLANE	WING (sq. in.)	WT (oz)	DRAG COEF.	PROP DIA.	PROP PITCH	PROP CHILLS (inches)	ESC (%)	Wt (oz)	pointers C H P
E Hots 10 Cells	372	48	0.063	7.00	6.00	10	15	1	v2n zBy EWg
GP Electrostream	342	40	0.045	7.00	6.00	7	15	1	v2n IW6 Cu4
E'streak 10 cells	342	48	0.045	7.00	6.00	10	15	1	v2n zBy etV
Freedom 20	440	79	0.081	11.00	7.00	12	15	1	v2n 5aa Ldp
Hecker Electro	335	48	0.077	8.00	4.00	7	15	1	v2n dK Cu4
Junkies J052	403	56	0.078	6.50	4.00	7	15	3P	v2n 78q etV
Pattensville	378	55	0.070	5.00	4.00	8	15	2P	v2n uuz etV
Sig 4 Scar	504	82	0.063	11.00	7.00	16	15	1	v2n spJ etV
Tecumotor	288	37	0.066	7.00	6.00	7	15	1	CRK IW6 oqg
Tiger Kitten	420	59	0.055	10.00	6.00	12	15	1	v2n RTU etV
Tiger Kitten	420	55	0.055	13.00	10.00	10	15	1	v2n 50m etV
Parabola	550	85	0.1336	13.00	6.00	10	15	1	v2n gp0 hdm

Fig. 3

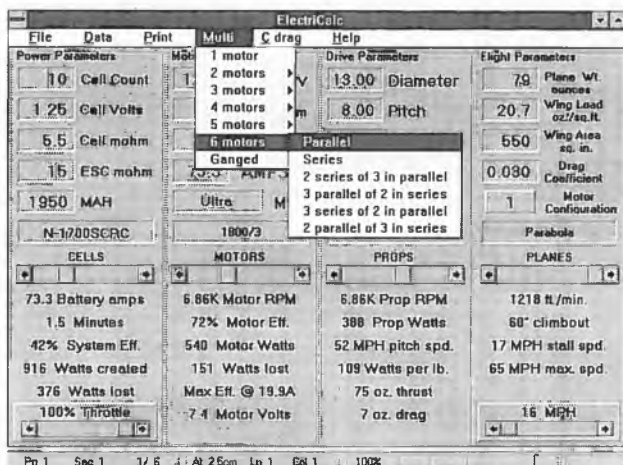


Fig. 4

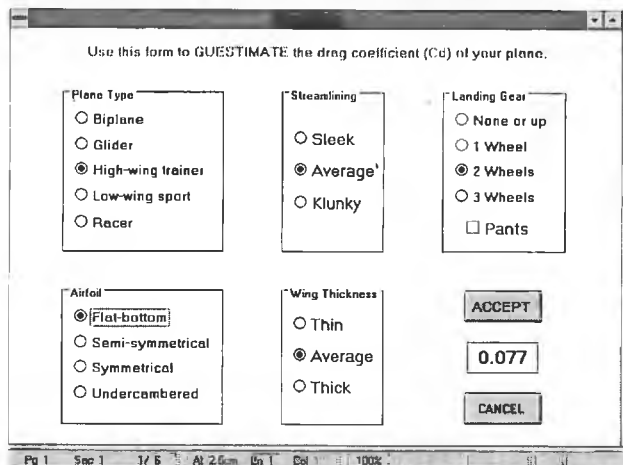
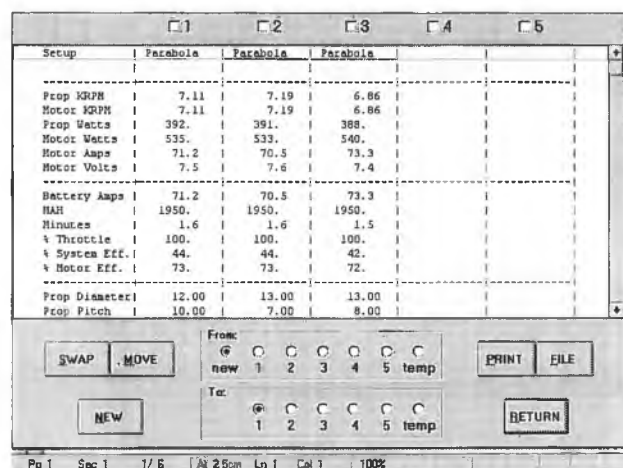


Fig. 5



the slider, but it also allows you to edit the data or add more information as new developments come onto the market, e.g. a new motor or battery type. The Multi menu (Fig 3) is used to select options for up to six motors connected in a variety of series or parallel configurations - there can't be many models that won't cover but I suppose someone will see it as a challenge! And finally the Cdrag menu (Fig 4) is used to estimate the drag of your model by selecting from options describing model type, wing section, undercarriage, etc.

The standard Windows style menus - File, Print, and Help - do more or less what you would expect, but a few points are worth noting. As well as the usual options for saving and restoring data, the file menu has an option for merging data files copied from someone else's ElectriCalc, e.g. if a friend has added new information to his database

it is easy to add it to yours. The Print menu (Fig 5) has the ability to store 5 different sets of results for the same plane (e.g. different props) and print them all together for comparison.

Using ElectriCalc

As I mentioned at the beginning that there are no written instructions for using ElectriCalc - everything is available on-line using the Help menu or by just selecting the thing you want to do and pressing the F1 key. The help system is very good, and for those of you unfamiliar with Windows it even has its own Help section explaining how to use the main "Help" system.

The logical way to use ElectriCalc is to start by entering details of the plane you want to fly. You can enter the details direct using the text boxes for weights and wing loadings, the Multi menu to enter the number of motors, and the Cdrag menu to enter model type details, or you can select one of the standard models. If you decide to select one of the standard models you can use the slider to display one model at a time on the main screen, or pick a model from the full list in the Data menu,

If you have selected one of the standard models ElectriCalc will also fill in the suggested motor, battery, and prop details for you. If not you will have to enter them yourself. Again you can do this by using the slider to select options, selecting from the full list in the data menu, or by typing details direct in the text boxes.

When choosing from the standard models and motors etc. I found it easier to do this from the list in the Data menu rather than use the slider to display them one at a time on the main screen. The model names are probably well known on the American market, but they meant nothing to me. The full list displays more detail and it is easier to pick something close to what you want. Once you are familiar with the options using the slider may be quicker.

Whichever way you do it, as you enter details you can see the results of your choices in the calculated performance figures at the bottom of the screen. Don't worry about making mistakes, you can go back and alter things as often as you like. Try more cells or less cells, try different

prop sizes, different motors. As you make each change you can see the effect on current, RPM, and climb angle until eventually you get something that looks about right.

Now let's go into the print menu and save what we have got so far into one of the 5 available spaces. Once that is done it's back to the main screen and try a few changes to fine tune our choices. Let's add a cell and reduce propeller diameter by an inch. Now back into the print menu and save the latest version into another of the 5 spaces. Once you have as many versions as you want you can print them all out together on one table comparing all the results. You don't have to print it if you don't want to because you can also see this table on the screen.

What if your model or your favourite motor are not listed in the options? What I did was to pick something close and then modify the figures. With motors for example I played around with some of the parameters until I got the results to equal the right RPM on a known prop and battery combination. Once I had done that, changing the prop and battery should then give the right results for the new combination. The Help system also suggests ways of measuring the internal resistance of your own battery pack. Details of the new models and motors you have created can now be saved in the database and used again next time.

As a check I entered details of my own regularly flown models and these gave me performance figures which agreed with what actually happens.

Conclusions

Does it work? Are the results accurate? Yes it does, and yes they are. ElectriCalc does not claim to help you design a world beating model, nor does it claim to be able to compare say two different motors down to the last percent of efficiency. What it does claim is that it will help you pick combinations of battery, motor, prop, and model that are likely to work, and give you an indication of how well they will work. In that aim it succeeds admirably.

My only criticism would be of the motor selection which is obviously aimed at the North American market. It contains the full range of Astro and Aveox motors but none of the European rare earth magnet motors like

the Robbe, or Graupner Ultra range. This would not worry most users however, as it does contain a full range of the Graupner ferrite motors plus a fair selection of others. As I described above it was not too difficult to get a reasonable approximation of my Ultra 1800 into the motor database.

As a bonus the Help pages contain a recipe for "Shoo-fly Pie" which is described as the official food of electric flyers. I tried baking it in the interest of this review and it was delicious. The recipe, like the programme, will be used again and again and

can be used to justify purchase to your wife, girlfriend, or mother (sorry, that's sexist, I mean spouse, fiancée, or parent!).

If like me you are curious about computer programmes and look at the files in the directory, you will find a small one called MEMORY.VRS which only contains the phrase "Proverbs 1:7" - no, I am not going to do everything for you and spoil your fun, look it up yourself.

And finally!

The "Introduction" in the Help pages ends with the word "Enjoy!".

That's what our hobby is all about isn't it, and you can have a lot of fun with ElectriCalc without actually building a model.

Enjoy!

Availability

Electricalcalc is available in the UK from:
Gordon Tarling, 87 Cowling Mill Road, Uxbridge,
Middx, UB8 2QD. Tel & fax: 01895 251551.

Email: 100554.2174@Compuserve.com

Or from source at: SLK Electronics, 2906 Charlais
Drive, Greensboro, NC 27406, USA.

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Build your own DUCTED FAN units

Gernot Neuböck describes how you can build your own low cost electric ducted fan units. He describes how you can make tools for moulding your own components. This production process owes a lot to quantity manufacturing, but it is well within the capabilities of anyone who has constructed model aircraft. He has designed a series of models too, into which you can fit his fans, or proprietary available ones if you do not have the time to build your own.

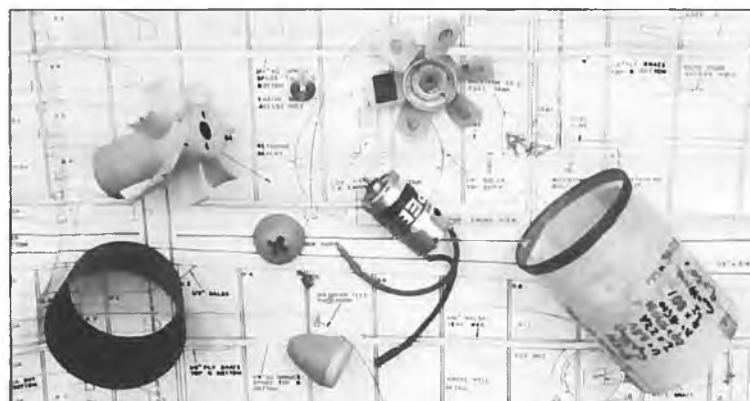
Encouraged by the success of the Speed 400 electric ducted fans, I asked myself if it was possible to develop electric fans with more thrust and performance but still using only low cost motors. My targets were two fan units, one with a thrust of 5 Newtons and another with a thrust of 13 Newtons. For the propulsion I selected the Speed 600 7.2V BB and the Speed 700 9.6V BB Turbo. Each of these low cost motors has good performance. After spending some time with my self-writ-

ten computer program for ducted fan calculation, I realised that it definitely was possible to build these fans units.

The selected low cost motors can only be operated with a maximum current of 25 amps; therefore it is necessary to pull out all the aerodynamic stops to get an adequate propulsion system for radio controlled electric jets. To achieve this it follows that there is also a big expenditure necessary for manufacturing. On the other hand the general costs could be kept down by the use of low cost materials.

Fan design

Both fan units have the same basic construction. They only differ in the detail aerodynamic design (twist of the blades etc). These differences can be seen on the construction drawings on these pages. For this reason I will explain the detailed construction only once. If you want to build either or both of these fans, it is assumed that you already have some experience in the use of Epoxy resins. The required machine tools are a pillar drill and an (electric) oven to cure (harden) the Epoxy components. Throughout these instructions



All the parts of an EDF-600. Top centre is the rotor, and clockwise round the motor are: fixing screws for the stator, the fan housing (shroud), tailcone, spinner, nozzle, motor tube with stator blades and last, prop adaptor.



An EDF-700 dismantled. Top centre is a six blade rotor, next clockwise are stator fixing screws, spinner, motor tube with stator blades, 700 motor with prop adaptor fitted, fan housing (shroud) and last, the tailcone.

the 'fan' or 'impeller' is called a 'rotor' and the fixed components comprise the 'stator'.

Manufacture

Some components you will construct as single items, just as you do with most of your model building. Some you need multiples of, but don't be put off by the jargon that sounds like quantity manufacturing. You are into a 'mini mass production' process that is well within the capabilities of anyone who has constructed model aircraft.

Rotor hub

The rotor consists of the hub and the fan blades. The hub in the photos is made of plywood rings and discs which are glued together with Cyanoacrylate

(CA). These plywood rings can easily be made with a 'hole saw', used in a pillar drill. After gluing, the hub has to be mounted in a pillar drill or on a faceplate (or lathe if you have one) and sanded to the correct diameter. The 6mm holes for the fan vanes have to be drilled (their positions are shown on the drawings).

Rotor blades

It is first necessary to make a ('positive' or 'male') 'pattern' of a rotor blade and from this the ('negative' or 'female') mould. This is the 'production tool' from which vanes will be moulded.

This is like building a wing with ribs and spars. The pattern consists of a 1mm (one millimetre) steel wire and four templates of

the rotor blade sections. These templates are glued on the wire with CA and microballoons, each spaced correctly and each at the correct angle of attack, as shown on the plans. The Göttingen GO-623 airfoil is used for the rotor blade section. The exact section co-ordinates are not listed in this article because it is quite difficult to make such small blade section templates out of these.

The spaces between the blade section templates are now filled with Polyester filler (as used for car body repairs). After the filler has set this blade pattern has to be sanded until the edges of section templates are just showing through the surface. Take care to ensure an even curvature of the rotor blade.

In order to mount the rotor blade on the hub you will need a locating peg, and this will be moulded onto every blade root. A piece of a 6mm pine dowel is glued on the bottom of the blade pattern. The position and length are shown on the drawings. When the pattern is finished, it has to be coated with a wax release agent. One side of the pattern (and half the peg) is embedded in plasticine. The open side has to be pressed into a small tub filled with a mixture of 5 minute epoxy and microballoons. When the hardening process of the Epoxy is completed, remove all the plasticine. After this (with the blade still in new epoxy half mould) both have to be coated with a wax release agent. The remaining open side has to be pressed into a small tub filled with a mixture of 5 minute epoxy and microballoons. When hardened (cured) you now have a complete mould. Separate the two halves of the mould carefully with a screwdriver. Carefully remove the pattern. You now have a 'mould' or 'tool'. Coat both mould halves with wax release agent - three times.

Production!

Moulding blades is a simple procedure. Fill each mould half with a mixture of 5 minute Epoxy and 60% (by volume) microballoons. The surplus resin will squeeze out of the 6mm locating rod hole, so ensure that this is open when you finish the tool. When the new blade has hardened (after 30 minutes) the mould can be opened with a mortise chisel. To achieve the full strength of the resin, the rotor blades must be 'post cured' by putting them into an oven at 60°C for 30 minutes. After sanding off the 'flash' (any resin that crept into the mould joint) from the blade, the rotor blades are ready to be glued on the hub with CA and Epoxy.

The stator blades can be made in the same way. This method of construction gives enough strength and therefore use of glass cloth is not essential for these fan units. I have never had a rotor blade break in use and I don't treat my finished fans carefully! However it is absolutely necessary to guard against the possibility of screws, small stones or other objects being sucked into the fan.

These fans do not have the thrust of the IC powered ones, but nevertheless they have 'a powerful suck' at the inlet.

SPECIFICATION

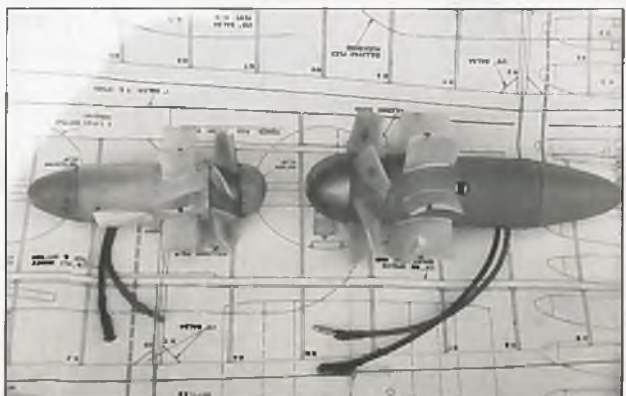
	EDF600	EDF700
Thrust	5.5N	12N
Efflux velocity	30m/s	32m/s
Battery	8 cells	16 cells
Current	22A	26A
Motor	Speed 600 7.2 V BB	Speed 700 9.6 V BB Turbo
Diameter	90mm (2.6")	110mm (4.4")
Wt. inc motor	320g	600g

PARTS LIST EDL-600

NO	NAME	MATERIAL	QTY
1	Spinner	balsa	1
2	Duct leading edge	2mm balsa	1
3	Duct leading edge	2mm balsa	1
4	Rotor blade	epoxy/microballoons	6
5	Stator screws 2.2 x 14	steel	6
6	Stator blade	epoxy/microballoons	6
7	Cooling duct	plastic	2
8	Tailcone	balsa	1
9	Spinner screw M3 x 20	steel	1
10	Rotor disc	5mm plywood	1
11	Prop adaptor 1/8" shaft	Al/steel	1
12	Motor screw M3 x 10	steel	2
13	Motor mounting plate	4mm plywood	1
14	Reinforcement	epoxy/glass cloth	1
15	Speed 600 7.2V BB		
16	Fan housing	epoxy/glass cloth	1
17	Motor tube	Plexiglas tube	1

PARTS LIST EDL-700

NO	NAME	MATERIAL	QTY
1	Spinner	balsa	1
2	Spinner base disc	plywood	1
3	Spinner base disc	plywood	1
4	Rotor blade	epoxy/microballoons	5
5	Motor mounting plate	4mm plywood	1
6	Stator screws 2.2 x 14	steel	6
7	Stator blade	poxy/microballoons	6
8	Motor tube	Plexiglas tube	1
9	Tailcone	balsa	1
10	Duct leading edge	2mm balsa	2
11	Fan housing	epoxy/glass cloth	1
12	Spinner screw M3 x 22	steel	1
13	Rotor disc	5mm plywood	1
14	Prop adaptor 5mm shaft	Al/steel	1
15	Motor screw M4 x 10	steel	2
16	Speed 700 9.6V BB Turbo		1



Both units with motors, rotors and spinners fitted but out of the shrouds.



The size difference shows here, the 700 is almost twice the weight of the 600 for more than twice the thrust.



A five blade EDF-700. You can see how close a fit are the rotor blades to the shroud.

Other components

The fan housing (shroud) consists of four layers glass cloth (80g/sq.m) that are wrapped round a split 'Plexiglas' (Perspex/Oroglass/Acrylic) tube. The nozzle is made from a plastic flower pot that has to be cut to the right length. To make the tailcone, mount a balsa block on a screw in a pillar drill. With the drill running, sand the block to the form of the tailcone. The shape of this tailcone is correct for the angle of the nozzle. A smaller diameter exhaust nozzle will only lead to an increased consumption of amps without more thrust.

Assembly

The fan body is made from a Plexiglas or other plastic tube (the photos show an earlier version made from lami-

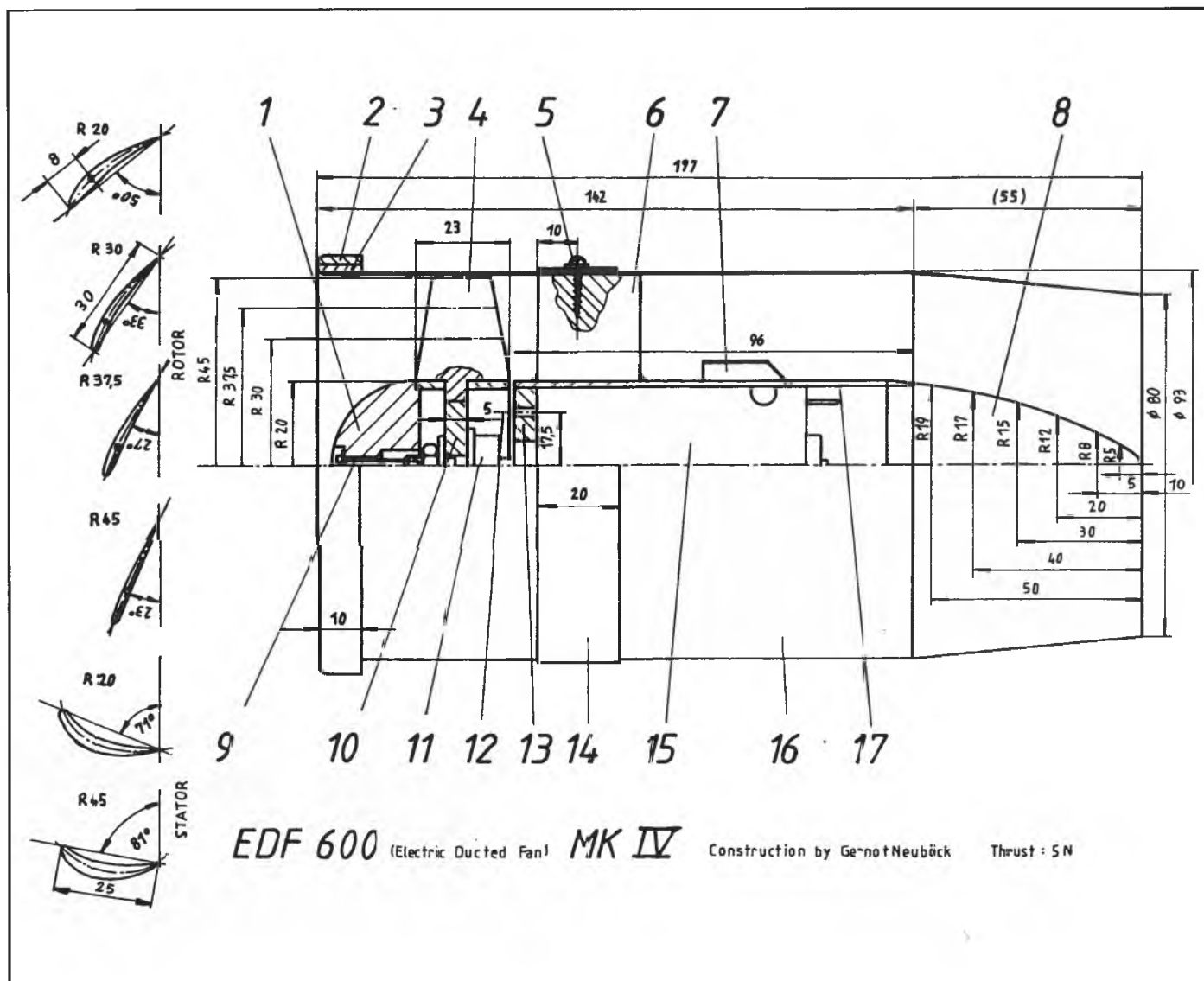
nated wood). In order to eventually fix the motor adaptor a plywood disc has to be cut out and glued into this fan body tube. For strength it is essential that this plywood disc is a tight fit in the tube.

The next step is to glue the stator blades to the motor tube at the right angle of attack, as shown on the plans. For this, liquid CA and microballoons is recommended. In order to fit the fan housing over the stator

blades (with a little force), it is necessary to sand the blades to the right length. After that, Ø2mm holes for the fastening screws must be drilled in the stator blades. After slipping the fan housing over the stator blades into the right position, the mounting holes are just visible through the epoxy housing. Drill the Ø4mm holes for the fastening screws in the fan housing at the right place.

Now the rotor has to be sanded to the right diameter. The gap (clearance) between the rotor blades and the fan housing should be about 0.5mm.

To centre the motor tube, it is necessary to assemble the complete fan unit (motor tube, motor/prop adaptor/rotor,). After putting this unit into the fan housing, the gap between the rotor blades and the housing has to be filled with small strips of cardboard 0.5mm thick. Finally the stator screws have to be tightened and secured with a drop of CA. After removing the



cardboard strips the right gap between the rotor and the fan housing is maintained.

If there is any vibration when the fan is run, the rotor will need to be balanced (with strips of adhesive tape on at the back of the rotor blades).

Performance

I wish to advise about the use of my fan units. The EDF-600 delivers a thrust of 5.5 Newtons and an efflux velocity of 30m/s on 8 cells. The maximum model weight for this fan should not exceed 1200g. A maximum wing loading of 60g/sq.dm (20oz/sq.ft) is recommended for hand launching. I tested this fan in single and twin engined models with great success. The EDF-700 produces a thrust of 12N and an efflux velocity of 32m/s. On 16 cells the Speed 700 motor reached its limit of performance. Nevertheless this motor will perform for a complete flying season. I tested this fan in a Heinkel 162 weighing 2700g with a wing



This Heinkel 162 uses an EDF-700 unit, Gernot also has an EDF -700 powered U-2

loading of 65g/sq.dm with great success. With the use of flaps a hand launch caused no problems even without a headwind.

In order to achieve the maximum flight time of 4 to 5 minutes the use of a motor speed controller is strongly recommended for each fan.

The flying of electric jets is a little different from conventional propeller driven models. For example, the acceleration is not as good but they do achieve a high flying speed. The performance of ducted fan models is a little bit lower than conventional

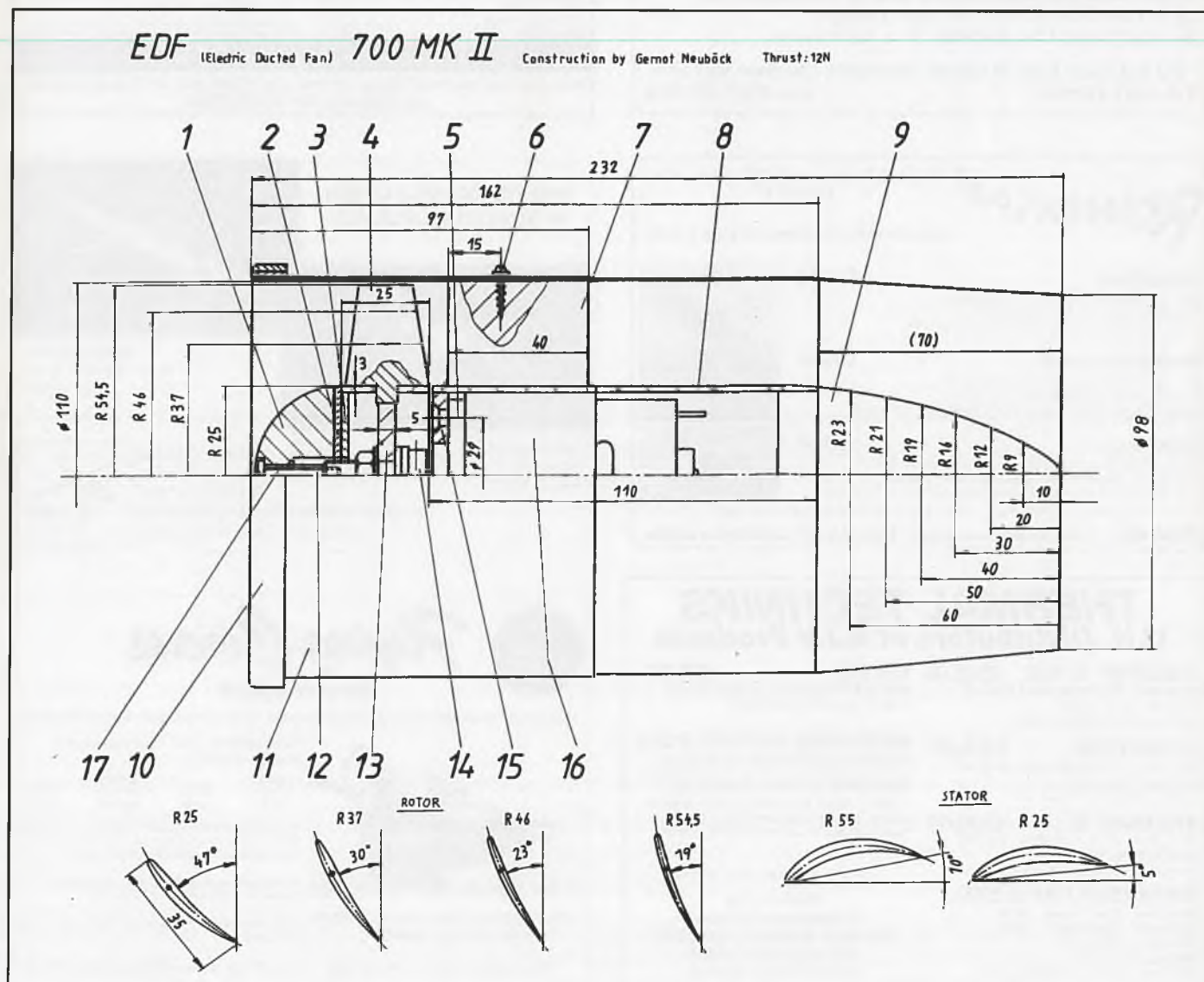


Gernot's A-10 uses two EDF-600 units and eight cells.

models with the same power, but it is great fun to fly these jets and listen to the near scale like sound!

Suitable aircraft

Gernot has designed a series of models too, into which you can fit his fans, or proprietary available ones if you do not have the time to build your own. We may be publishing some of these in the near future.



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Scale Models at

KRC



Every year, the third weekend in September sees the largest North American gathering of electric fliers at an event known only as "KRC". This is short form for the Keystone RC Club's annual fun fly. In the last issue we covered the whole electric scene, in this one Martin Irvine concentrates on the outstanding scale models that were there on September 20th, 21st and 22nd, 1996.

New site

Traditionally this event has been held at the Buc-Le Aerosportsmen RC Club field in Quakertown, Pennsylvania, a gas field generously lent annually for this weekend event. The past couple of years has seen a growth in attendance that severely taxed the facilities of that field, especially the parking.

This year the event was moved to the nearby Queen City Airport in Allentown, PA, just a few minutes away from the old site. (In fact a number of the contestants stayed at the same hotels as last year, they were so close.) This move has put an end to the parking difficulties as well as providing cover from the traditional Sunday rain in the form of a hanger right there.

Unfortunately Sunday was rained out again. This is becoming an annual occurrence. This year however, because we were at an airfield, there was a hanger available. This allowed vendors to set up booths and pilots to catch up on what is new as well as do the socialising they missed the day before. In fact, for me and for others who have long distances to travel, this early wrap up of the weekend is sometimes a blessing in disguise. Driving 7 hours after a day in the sun is no fun.

Once again I would encourage anyone who flies electric to try to make it to at least one KRC event. You won't regret it!

New motor

A new motor we have been hearing about for months was demonstrated in a model at KRC. It is the AstroFlite brushless and may have a name/number like '200'. The motor is about 3/4", (19mm) in diameter, but the

controller is still larger than the final production ones will be, this IS the prototype after all.

In Keith Shaw's little Zlin 526, using a TopFlite 5 1/4 x 4 prop and 7 x 500AR cells, the motor turns 17,000 RPM and is good for 2 to 3 minutes flying. If a BEC is used, the ARs have too sharp a knee and can run the cells down too far, so Keith uses 600AEs and backs off the throttle right after launch.

So what we have is a motor/controller combination which is perhaps an ounce lighter than a Speed 400 and controller with every likelihood of getting lighter yet. On top of the weight savings, this motor is 80% efficient and can handle 15 amps! Just the efficiency difference means 30% more power delivered to the prop and the current increase is 50% on top of that. If a Speed 400 is running 10 amps on 7 cells, (say 7 volts), 70 watts are going in but at perhaps 65% efficiency, only 45 is going to the prop. At the little Astro's 80% efficiency, 56 watts are going to the prop. If you increase the current to 15 amps, the prop gets 84 watts. Of course at these

levels you have to look at "real" cells, 700 or 800ARs as the little AEs have their voltage depressed so much by the current as to, in effect, throw one or two cells away in heat.

So how does it work? Very well indeed. How about 2 vertical rolls from level flight? The airplane itself has a 36" span and 200 sq. in. and its all up weight is 18 oz.

This will open up a whole new area of electric modelling as this motor will be a good match for a number of 1/2A, (.049 or .8cc) designs from years ago. Fred Reese did a series of WW2 fighters, for House of Balsa I believe, that would convert quite easily to this motor. Think of all the marginal fliers on Speed 400s that would be transformed with this little Astro. Price will be a factor as the rumours suggest that Astro will try to sell this for around \$150.00 retail which means its "street value" will be more like \$100.00 but that is for a motor and controller. Add up what you pay for a small high rate controller and a Speed 400 and the value of this motor is obvious.

Misfortunes

There were a number of crashes this year but there was one that stood out for me, but not for the reason you might expect.

Halfway through his regular airshow, Keith Shaw launched his Horten flying wing powered by a pair of Astro ducted fan motors turning homemade fan units at 32,000 rpm, (EFI Jan/Feb 95). He had done one 90 degree turn when the plane dove straight in at about 70 MPH.

There was a gasp from the crowd as it was obvious that there would be major damage if there was even anything left. Keith turned around shaking his head slightly, collapsed the antenna, and put the transmitter down. He then immediately picked up another transmitter, and rolled out his new Bearcat for its third flight ever and proceeded to do a full airshow routine. He knew that the Horten crash was not due to anything he had done so there was no reason to not fly the rest of the show. Now that's confidence!

I helped with the search party but it took an hour to find the wreckage as the bush was so thick. It was written off and, after a post mortem that evening, Keith discovered that an open circuit in the battery pack was probably to blame. Externally, the pack looked fine.

The show

Marc Thomson returned with his Canadair CL 415, (EFI Jan/Feb 96) and was regularly taking it off from a dolly. This flies with lots of power and Marc has developed a personal stunt. I first saw this at the Kingston fun-fly in June and I think it was discovered by chance. The CL415 will do a Lomchevak and go into an inverted spin, nose high! Marc is a very good pilot and really enjoys this extreme manoeuvre.

The models

The flight line, longer than at the old field, had a full scale paved runway immediately in front and a grass strip just beyond. As usual, the organisation was excellent and the events went off without a hitch. By noon on Saturday, the registration was over 220 fliers.

Full descriptions of the models are given in the captions to the photos, read on!



The Mig 15 was built by Dave Ribbe and has appeared at a number of jet rallies and contests in the US and Canada and demonstrated to the gas fliers what can be done with electrics. It has a 56" span and a wing area of about 4 sq.ft. The motor is a 6 turn Astro 40 on 18 or 20 x 1700SCRCs turning a modified Viojet rotor clipped to 4.2" dia. It draws 50 amps static but with a little throttle work he gets 3 1/2 minutes in the air. It is equipped with retracts and weighs 6 1/4 lb. Flights were quite impressive with good speed and adequate vertical, probably better than the original. I know of at least two other pilots who are starting on their own versions of this model.



The stand off scale FW 190 was brought by Gary Grollmund. Originally a Wing Manufacturing "short kit", it has a 54" span and an all up weight of 94 oz. for a wing loading of 20 oz/sq.ft. Gary powered the model with a custom 2:1 twin gear box using a pair of "Green Machine" car motors. It had 14 x 1700SCRCs and a 12 x 10 Master Airscrew electric prop. (These are great props for gear driven motors. They are heavily undercambered so aren't much use over 6 or 7,000 rpm, the same way undercambered wings are best on slow airplanes, having too much drag to go fast.)



Thayer Syme built a lovely Tiger Moth from the Gordon Whitehead plan. It has a 47 1/2" span and a wing area of 631 sq.in. Thayer lightened the ply nose section and used contest balsa throughout. With an Astro geared FAI 15 and 10 x 1700SCRCs, the 12 x 8 prop draws 26 amps and gives flights in excess of 5 minutes.

Scale

The beautiful DH92 Albatross is by Laddie Mikulasko, (who built the Bellanca 28-92 of a couple of issues ago), for Speed 400s. According to the card by the model, it has a 71" span to lift its 5 lb. The motors are propped with 6 x 4s with vac-formed spinners. The battery is 10 x 1700SCRCs. Construction is a combination of balsa, ply, and spruce for the wing and tail with brown paper covered pink foam for the fuselage, just as Scott Black described in Sept/Oct EFL. Laddie is making plans and construction articles available for CAN\$20.00, (Sept. 96) so you can write to him at: 7 Griffin Road, Dundas, Ont., Canada, L9H 6S1.



The big P-38 is the work of Bill Kumpf of Butler, PA. It is based on the 74" span Royal kit. It uses a pair of geared Astro 25s to lift its 10 lbs, (the wing loading is therefore over 32 oz/sq.ft). It is modelled after one of the aircraft that was recovered from a Greenland Glacier. A squadron landed there over 50 years ago after running out of gas. They gradually sank in the ice and this one was recovered from something like 100ft below the surface. Its a fascinating story that has been written up in a couple of full scale aviation magazines.



The 56" span Staudacher S-300 is, I assume, from Laddie Mikulasko's plan published in RCM. This one was built by Bill Jones and is powered by a geared Astro 25 on 14 cells. The prop is a 12 X 10 and the aircraft weighs 82 oz. for a 25 oz/sq.ft wing loading.



John Chapis of Chapis plans brought the prototype of a lovely little Aeronca Champion kit to be produced by Classic Cut Models, RT 5, Box 848, Seaford, DE 19973, ph. 302-629-6373. Plans only are also available from them. It has a 71" span and 650 sq.in. It uses a geared 15 to 25, (ie 12 to 16 cells), and can be flown with or without ailerons. The weight should end up about 5 lb. John should be in the picture too, but I made some comment about the plane being prettier than him and he left!



Keith Mey brought an all glass 1/16 scale B-17. This is a model that he manufactures as M.D.K Productions, White Pond Road, Stormville, NY 12582; USA, ph, 914-878-9594. The workmanship seemed very good. The engine nacelles are moulded into the wing and it is equipped with pneumatic retracts. The flying weight is 11 lbs all hauled along by a quartet of Goldfire direct drive motors, a robust Speed 600 type motor. He uses 28 cells and 7 x 6 props, (probably in the 25 to 30 amp range), and it really moves. He was passing some of the faster sport models in the air. I would bet that 8 x 4s on 24 cells would work well and give better duration. The Goldfire is certainly more financially reasonable for multis than the better quality cobalts.

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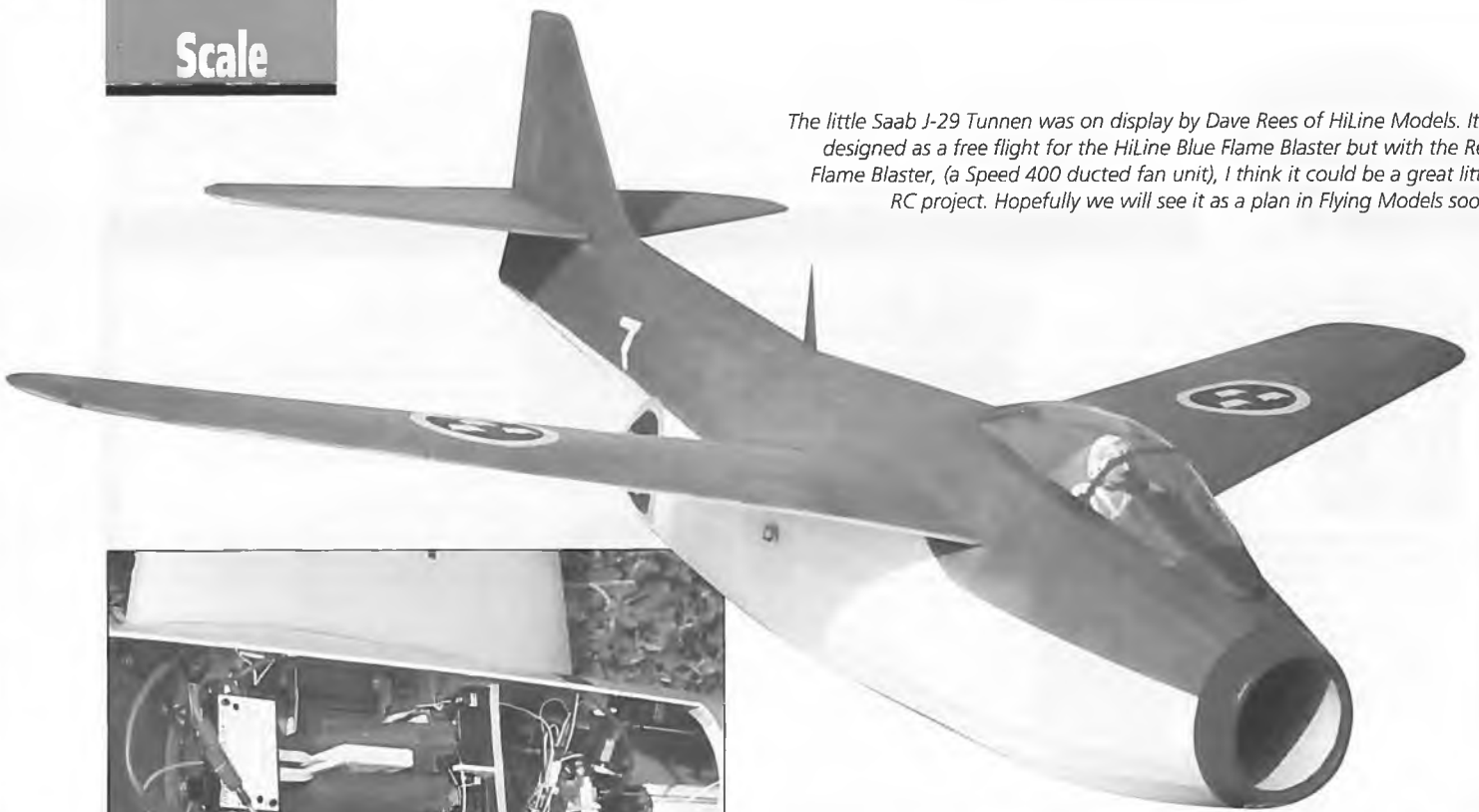
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The little Saab J-29 Tunnen was on display by Dave Rees of HiLine Models. It is designed as a free flight for the HiLine Blue Flame Blaster but with the Red Flame Blaster, (a Speed 400 ducted fan unit), I think it could be a great little RC project. Hopefully we will see it as a plan in Flying Models soon.



Inside Keith Mey's all-moulded B-17.



Next are a couple of photos of some of the scale models lined up for judging. In the middle of the multi engine models is Don Bousquet's NC-4 that won Multi-motor and Scale last year. The two B-17s are here-as is a little Arado 234 built by Don Belfort of Ohio. It is powered by a pair of modified Red Flame Blasters and goes quite well.

The original Pou de Ciel, (Flying Flea) was an easy to fly, death trap. In a 15 degree dive the slot effect needed for stability was lost and the plane would dive straight into the ground. This eventually was fixed but Roger Tennyson built this 42", (span and length), version from a Randy Wrisley plan originally published in Model Builder (I think). There is a larger version of it in the RCM plansbook too. Originally flying with an .09, Roger put in an Astro 05 direct drive with an APC 8 x 4 prop. He pulls the throttle right back after take off so that the cruising current is about 10 amps. 6 1/2 minute flights are the norm for this 42 oz. airplane. He is using a 7 cell pack of 1400SCRs. One curious note - Roger found that a full pilot caused considerable control problems but that going to a profile pilot solved them all. Perhaps a full pilot caused just enough extra turbulence over the tail to mess things up.



Another B-17 was this silver beast, one of two brought by Joe Beshar. The wingspan is 10 1/2 ft and the area is 15.7 sq.ft. Even at just under 20 lbs. the wing loading is just 20.25 oz./sq.ft. - nearly a glider at this size. There are 4 geared Astro 05s swinging 12 x 8 Zinger props. 32 x 1800SCRCs provide the power and are controlled by a Jomar Maxcell speed controller. I would guess that the motors are drawing about 25 amps for 800 watts or about 40 watts/lb. Given the efficiencies that multis seem to exhibit over single motor airplanes, and especially the light wing loading this is plenty of power for solid scale flight. Just behind Joe's B-17 is Dave Grife's Mosquito, an 81" span 36 cell performer. This suffered a major crash with extensive damage and Dave spent most of the summer rebuilding. Further details are in the Jan/Feb 95 issue of EFL.

Charlie Sylvia has run CS Flight Systems for a number of years now and is a regular at KRC. This year he brought a 64 1/2" Stearman built from a Sterling kit. It is powered by an Astro geared 60 on 32 x 1800SCRCs. It uses a 16 x 6 prop which draws 45 amps at takeoff. While the wing loading is high, (it weighs 14 1/2 lbs.), the power loading is 100 watts/lb. Wow.



The big Grumman Bearcat is this season's project from workbench of Keith Shaw. This is an original design that qualifies as Giant Scale as it has a 81" span. It is 1:5.5 scale and weighs 15 lb. The wing area is 1190 sq.in. (8.2 sq.ft.) and it is powered by an Astro FAI 60 in a ModelAir-Tech 3:1 Belt drive, their H-1500 model. This combination, with 32 x 1700SCRCs, spins a 22 x 16 prop at 4200 RPM. Initial draw is 42 amps but with some throttle work 4 minute flights are common. Keith does a 3 minute airshow routine so that he has lots available if a go-round is necessary. The model uses 1/15 scale Spring-Aire retracts with a gear door sequencer, (from Ace I think). The unusual colour scheme is scale, from a post war airshow plane. The test flight was just the previous weekend. Keith's original hope had been for some large swooping type manoeuvres, typical of full scale fighters at airshows, but there is more power available than expected, probably a function of the large prop and its increased efficiency over smaller ones, (Reynolds numbers are important with props as well as wings). A vertical roll from level flight is easy and other manoeuvres are also done with corresponding ease. As the Saturday flight was only its third, Keith is still finding out what it can do, but he is very happy with the results.



The green and white Bellanca Super Decathlon was the work of Clay Howe from Sturgis, Michigan, (about 15 driving hours from KRC!). Clay took a Midwest Citabria kit and modified it to match the Decathlon. Powered by an Astro geared 40 on 20 x 1700SCRCs it uses a Zinger 14 x 6-10 prop and I would guess a current draw just under 30 amps. At 10 lbs. and 80 1/2" span, it is IMAA legal for giant scale fly ins.



From one end of the size spectrum to the other is the little Zlin 526 held by Keith Shaw. This has THE prototype brushless motor fromAstroFlite! The motor was first shown at Toledo last spring and once the bugs were worked out of the controller, the combination was sent to Keith to field test.



Wiley Post's famous Lockheed Vega, "The Winnie Mae" was modelled by Bill Wargo. It has a geared Astro 40 in it now but I bet Bill will go to a bigger motor once it is test flown. For some unknown reason, I missed the details of this model but it is a big one, possibly with an 80" span. Hopefully I can tell you more about it in a future column.



The contra-rotating prop is on the front end of Tom Hunt's Pica Spitfire. This is a unit put out by ModelAir-Tech. It uses one motor, (they also have a two motor version), with a pinion on each end. The forward belt goes to the pulley on the hollow shaft while the rear belt drives the internal shaft. Of course everything runs in ball races. Tom used an Aveox 1412/4Y motor with a 4:1 ratio. The forward prop is a 3 blade 16 x 6 and the rear one is 16 x 8, the higher pitch because of the airflow being deflected by the forward prop. On 24 x 1800 SR cells, it drew 29 amps at 5200 RPM. The flight was a little marginal and rather slow. (This could be expected from the "pitch x RPM" rule of thumb, i.e. 7" pitch, (average), times 52(00)RPM equals 36 MPH. Usually I subtract 10% from this and it is certainly accurate enough for most of us.) I would guess that a pair of 2 bladed props would work better as that would lower the current and so allow more cells for a higher RPM and therefore higher flight speed. Another alternative would be higher pitched props, again to raise the flight speed.



Almost as happy with the way the Bearcat flies are Tom Hunt and Bob Aberle. They are the people behind ModelAir-Tech and the makers of the belt drive. As soon as Keith landed, Tom ran forward to check the belt temperature, (finger test) and found it barely warm, a good indicator of correct tension and low strain. It's almost poetic that two Grumman engineers, (Bob has retired), should have designed the belt drive that went into this terrific model of a Grumman fighter.



Greg Gimlick brought this Bristol monoplane built from the Balsa USA kit. It is powered by a MaxCim Y wind brushless motor and controller through a 3:1 gearbox. It uses a 13 x 8 prop and 18 x 1700SCRCs. It is a little heavy at 7 1/4lb. (but that is what happens when you convert most kits). While I didn't see it fly, Greg reports it to do well and I know that Tom Cimato, of MaxCim, is very pleased with how it works.



The beautiful little Hellcat is the work of Jim Ryan. It has a 6V Speed 400 and weighs 18 oz. It suffered on one landing on the grass surface and broke its tail off. Two things intrigued me about it. First was the terrific finish that Jim had been able to achieve using Floquil railroad paints, (meant for train modellers), and superb masking with artists frisket. The second was that he had used 0.5 oz. cloth and epoxy as a finish. We tend to think of this as a finish for much larger models, but Jim has demonstrated that with some skill, it is a viable finish on even these little titches.



The ModelAir-Tech twin unit ties two motors, (in this case Astro 05s I think), to a common shaft. This is a way of getting more power but only if you have the two motors. Ultimately a single geared motor is a better route. However, if you want almost any kind of motor/belt configuration, ModelAir Tech will custom build a belt drive for you. The H-1000, (1000 watts), in the Mar/Apr 96 column is between the 1500 and the 500.



This belt drive is a ModelAir-Tech unit. The H-1500, (approx. 1500 watts) is the same reduction gear as in Keith Shaw's Bearcat. while the twin is their H-500 twin, (500 watts).

This a photo of (most of), Dave Grife's airforce. The Hughes Racer in the rear was covered in last year's KRC article and the Mosquito and Hurricane were covered in the KRC 94 article. Have you ever noticed how electrics seem to survive year after year? Usually, without the problems of vibration, fuel soaking and engine flame outs, electrics keep on flying. Occasionally there is a catastrophe. Earlier this year one of the Astro 40s in Dave's Mosquito ate its commutator and the plane was going in before Dave had any idea that something was wrong. He spent most of the summer repairing the wing and rebuilding a fuselage and was flying it at KRC with the same skill that has won him so many prizes in the past.



SAM Champs

We chose the right guy! Well before this event the editor asked Jay Burkart to report on this great Old Timer (Vintage) championships and to supply photographs. Jay modestly wondered if he was the right guy. He certainly was, he won every event.

by Jay Burkart

The 1996 SAM (Society of Antique Modelers) Championships was held on

Spencer Field, a satellite field provided for the week by the U.S. Navy. This field can be best described as a one mile square putting green with a few paved areas surrounded by a security fence and bordered by model eating tall trees. This year in these civilized surrounds we had no visiting rattlesnakes but these were replaced by fire ants, so that you still had to watch your step so as not to step on a hill of these aggressive little pests. This makes the second year of watching up as well as down as you walked, up to track your model and down for the fire ants... Well, we must always have some challenge with our flying enjoyment.

Conditions

The weather was mostly fair with some breezy conditions typical in the morning and sometimes windy conditions in the afternoon. Only one day had pronounced cumulus buildup to let us know where to send our models for a long and high flight. Most of the days were a hunt for that elusive thermal.

The contestant entries were over 250 for the 5 days, with most flyers entering multiple events. Once again as is typical at the SAM Champs, the atmosphere was relaxed and the camaraderie high. As before there were no flight rounds nor groups, all you do is call for a timer when you are ready and go fly. I like this as it allows all the contestants to pick when they want to make their flights and creates a relaxed tension as each tries to top the other and out guess each other on flight condi-



Jay Burkart winner of the Spirit of SAM event with Lanzo Cabin, Graupner Speed 400 with Simprop 5.25 to 1 gearbox, Aeronaut 13.5 x 8 prop.

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Events

There were 3 electric events flown at the SAM Champs this year. First was the Spirit of SAM event which this year had been made a regular scheduled event. In this event, the model has to be a pre 1943 rubber powered design and the motor battery pack was restricted to nicads weighing no more than 4.1 oz. The task is to fly two rounds of 15 minutes with unlimited motor run. This year, due to the breezy conditions, many contestants put in their first flight early to take advantage of slightly less breeze in the morning. Due to the wind still being rather brisk most did not make their max for the flight with one exception. This year Jerry Smartt, a well known modeler and contest flyer, fielded a

tions. Each event typically has 2 flights allowed and if you pick the wrong conditions you have another chance. Still it is not uncommon to have several contestants flying at the same time.



Eut Tileston with his Stahl design scale Fairchild, placed second in Spirit of SAM Graupner Speed 400 with Graupner 6 to 1 gearbox, Sonic Tronic 12 x 7 prop. Eut is the founder of the Spirit of SAM event and creator of the Colin Borthwick Memorial Trophy given to the winner of the event each year.



Phil Pearce with his Whitman Sky rider, placed third in Spirit of SAM Multiplex 380 with Multiplex 10 to 1 gearbox, 12 x 16 folder prop.



Eut Tileston with his Stahl design scale Caudron Fighter flown to sixth place by Kirby Hinson in Spirit of SAM event. Graupner Speed 400 with Simprop 5.9 to 1 gearbox, Master Airscrew, 15 x 12 prop.



Jerry Smartt with his Heller's Mulvihill was in first place in Spirit of SAM event until an unfortunate mishap, Kyosho Biennen with Marx Pile 6 to 1 gearbox, Graupner Cam Gear 11 x 8 prop.



Pat Harrison with his Lanzø scale Puss Moth, Spirit of SAM event, Graupner Speed 400 with Graupner 6 to 1 gearbox, Master Airscrew 15 x 12 prop.



Dick Huang with his Comet Phantom Fury, Spirit of SAM event Graupner Speed 400 with Master Airscrew 6 to 1 gearbox, Geist 14.75 x 7.5 prop.



Jay Burkart with Playboy Pylon winner of LMR event, MEGA Mini with Kruse 2 to 1 gearbox, Aeronaut 14 x 7 prop set not to fold.



Rick Richardson with his Cleveland Viking, placed second in LMR event, Astro 05 FAI 6T with Astro gearbox, 11 x 7 Master Airscrew wood prop. Rick's originally from Christchurch Hampshire, UK, now living in Tyron, North Carolina.



Jerry Smartt with his Lanzo Bomber placed third in LMR, Trinity 16T with Master Airscrew 3.5 to 1 gearbox, 11 x 7 Master Airscrew wood prop.



Jack Hiner with his Lanzo Racer placed second in Texaco event, Leisure 28T with Leisure 3.8 to 1 gearbox, Aeronaut 16.5 x 15 prop set not to fold.

different type model, it was a Mulvihill type design which handled the wind much better and he made his max for the flight. He promptly put in his second flight and was well on his way to another max when tragedy struck and for some unknown reason Jerry's model crashed. This left the contest wide open, so the wait began for better flying conditions and as the day progressed, the thermals began developing and Jay Burkart and But Tileston each put in a max flight. But, who is the founder of this event, always enters a scale type of rubber design, which this year was a Stahl Fairchild. This makes for a very eclectic field of models in this event. The event was won by Jay Burkart flying his Lanzo Cabin. Jay also won the event last year flying this same model.

In the Spirit of SAM event most models were powered by Graupner Speed 400's with either the Graupner 6 to 1 gearbox or the Simprop (Ludwig) gearbox, in which most contestants a 5.9 to 1 ratio.

This year the winner was presented with a new memorial trophy for the event, dedicated in memory of Colin Borthwick of Australia who was largely instrumental in getting the SAM movement going down under.

The next day was the LMR (Limited Motor Run) event which is essentially a climb and glide event. This year the rules allowed for a 90 second motor run for all motor types so there were many more high performance motor entries. The models are subject to the same rules as Texaco in that the model must be a pre 1943 gas type model

design and have a minimum wing loading of 8 oz/sq.ft. There were 2 rounds of 10 minute flights and in this event there was the only fly-off of the electric events.

Rick Richardson, who is a British expatriate from Christchurch, Hampshire UK and Jay Burkart each made their max flights for the 2 rounds and were then placed in a head to head fly-off with a motor run time of 45 seconds. Jay Burkart proceeded to win the fly-off with a flight of 6 minutes plus. In this event we saw a lot of Astro FAI motors with gearboxes, yet the winning model, a Playboy pylon, used a MEGA Mini motor and Kruse 2 to 1 gearbox.

The last day of the electric events was the TEXACO event which has the same rules for the model as LMR but a new task this year was for the longest flight of the day, with two attempts allowed per contestant. The new rule was adopted to try to minimize flyoffs since there had been a seven way tie for first at the Champs last year, which in turn had necessitated a very cumbersome flyoff.

This day was the hardest of the three days to guess the weather conditions and seemed to need some unique strategy for choosing the right model. Jerry Smartt flew his LMR model hoping that he could penetrate the wind and get high enough to look for the elusive thermals, but he wouldn't get the long motor runs which is often the desired strategy for this event. Other contestants waited out the weather conditions and tried to launch at the most opportune time, when they thought a ther-



Jerry Smartt with his Lanzo Bomber, third in Texaco, this is the same plane as he used in LMR the previous day. Jerry said he used this strategy to cope with the windy conditions expected throughout the day.



Michael McIntyre with his Lanzo Racer, Mike was using the newly developed Astro Texaco 035 motor with a Leisure 2.43 gearbox, Aeronaut 16.5 x 15 prop set not to fold.



Eut Tileston (left) presenting the Colin Borthwick memorial trophy to Jay Burkart (right) the winner of the Spirit of SAM. The trophy is passed on annually to the winners.

Hiner, flying a Lanzo Racer powered by a Leisure 28T motor with a Leisure 3.8 to 1 gearbox. Jack had a time of 29 min. for the high time of his two tries.

This year there was much more variety in the models used for the Texaco and LMR events, finally breaking the hold that Playboys and Bombers had on these events over the last few years. The Spirit of SAM event had by far the most varied field of models and is showing itself as quickly becoming a very popular electric event, even the scale rubber designs show themselves to be very competitive as proven by their placing well in the field.

Next year the SAM Champs will be held in Las Vegas NV. Sept 22 through 29 on a dry lake bed that's reported to be 2 miles by 5 miles. Watch out! We'll have rattlesnakes again.

mal was letting go and the wind was minimum. This proved to be the strategy that won the event. Jay Burkart won the event getting a flight time of 36 min

on one try. He was flying a Lanzo Bomber powered by a Graupner Speed 400 with a Simprop gearbox 5.9 to 1. Second in the event was Jack

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Horten Ho-XII

club training glider

Part 1 - the original and the model by Erik van den Hoogen

The feature article 'A Very Big Wing from Holland' appeared in the May/June 1995 issue of EFI. Here is an account of the research that led to the construction and details of the structure of this very big model, translated by Theo Gordijn.

The earlier Horten mentioned in this article. The 18.4kg (40.5lb) Horten-VII powered by two Keller 240/5 motors. On the left is engineer Aad van Sorgen, right is pilot Erik van den Hoogen and in the centre is Heinz Scheidhauer, full size test pilot of the full size Horten-VII in 1945.



The occasion is 'Inter Ex 1995'. The model landing is the one third scale model of the Horten-XII, containing a one third scale model of Heinz Scheidhauer. The watching figure on the camping seat in the foreground is Heinz Scheidhauer, test pilot of the Horten-XII in 1945. This remarkable scene was captured by Wim Pijnappel of Holland.

The Hortens

Many of you might have heard of the Horten Flying Wings, without fins or winglets, built between 1933 and 1967.

The idea of a 'pure' flying wing was tested by three brothers, Reimar, Walter and Wolfram in the early thirties by building and flying models. After which, their first man-carrying plane, the Horten I was built in the family home. Several gliders and powered gliders were built and flown before WW2.

Early in the war the threesome fell apart, Wolfram perished, shot down by the RAF during a torpedo raid. The remaining two brothers were enlisted into the Luftwaffe where they managed to continue experimenting with flying wings.

Several were designed as warplanes (Ho-V-B, Ho-VII and Ho-IX) but none of them saw action. Other wings were designed to test the potential of the flying wing. Ho-IV and Ho-VI were high performance gliders whose performance was only surpassed in the fifties and sixties.

A problem for Reimar was to familiarise pilots with a flying wing. In 1944 the Horten XII side-by-side trainer powered glider was built in the village of Kirtorf. The wingspan was 16 metres and it had a 6 cylinder 90BHP engine and a three legged retractable undercarriage.

According to the test pilot Heinz Scheidhauer the propeller was to be a folding prop like the one on the Horten IIIe. Structure was standard for Horten, with the centre section

built of welded steel tubing, partly wooden ribs and plywood covering. The part behind the canopy was sheeted with aluminium. The wing construction was conventional for that time, wooden spars, ribs and lots of ply.

Unlike conventional (at that time) designs the wing section used was derived from a laminar flow section like that used on the Mustang Fighter. Early tests of this section on a Horten Ho-IVb resulted in a fatal crash for the pilot. After this the Ho-XII section was modified.

The prototype made two flights as a glider in March 1945. This war situation did not permit the use of fuel for experimenting. Heinz Scheidhauer had the impression that the plane was good. According to him it would have made a good trainer for flying clubs.

(As a matter of fact Heinz told us that his memories of these flights were more of looking over his shoulders for the fear of Thunderbolts or Mustangs behind him, than handling a new prototype. The Ho-XII must have been a very pilot-friendly plane!)

Soon after these flights the war ended and the Ho-XII was captured and burned by the Allied army. The only remains are photos taken during the building of the mock-up and some details of the tube frame.

The model

With these photos and a two-view plan, calculations and drawings were started to see if building the Ho-XII model was possible. After a lot of tinkering and lessons learned from the earlier Ho-VII model it was decided to build a one third scale model. (The editor knows of the existence of thousands of original Horten drawings.)

This gave us these figures: wingspan, 5.33m (17' 6"); wing area, 404sq.dm (43.5sq.ft);

View from the underside, of the Ho-XII centre section. The size is 1.32 x 0.8m (52 x 31.5"). You can see the two pneumatic 'bottles' that power the retractable undercarriage (not yet fitted) and in the centre the two Robbe-Keller motors and the reduction unit.

estimated weight, 16kg (35lb). This would require substantial power! Two Keller 240/5 motors had powered the 18.4kg (40.5lb) Horten-VII very well. Solution: Belt drive one prop with two motors. Result: a 2.86:1 reduction. The complete unit including a universal joint in the drive shaft (!) weighs 2800g.

The bell shaped lift distribution (essential for HORTEN wings) was converted into rigging angles of each of the 33 wing ribs in each wing panel. Lift distribution is calculated for a lift coefficient $Cl = 0.4$, giving an average airspeed of the model of 45KPH (28MPH). The root section is HU-13-3S, the tip section is NACA 0010. HU-13-3S means, derived from the original Horten section by Mr Uden. Thickness 13%, camber 3%.

Contrary to the real Ho-XII section, this is a stable section like those used in unswept flying wings ("planks"). Because each rib has to have a different angle of incidence, a set of jigs was made for the mainspar and the rear end of the ribs.

Mainspars are laminated from 10 x 5mm and 10 x 2mm pine strips. They taper from 10 x 25 at the wing joints to 10 x 5 at the tips. The rear spars are built up similarly but are only 6mm wide. The main and rear spars are boxspars.

The connection of the wing panels to the centre section is by hard aluminium blocks (lots of milling by Aad van Sorgen) and precision fitting 5mm diameter steel pins. The system had already proved satisfactory on the Ho-VII.

When all ribs, spars, cables and servos were assembled in the jigs, both parts of the centre section were separated from the outer wing panels. After this the outer panels could be planked (sheeted). For each area to be planked about 20 sheets of 2mm balsa are needed. (Erik is popular in hobby shops!) Not all is planked, between mainspar and trailing edge capstrips are added. Complete wing panels weigh 1800g each.

The only serious deviation from true scale is the elevons and tip drag rudders. For our model, the latest development of Dr Horten (tested in Argentina) was chosen. These are small control surfaces that give not only elevator and aileron control but also rudder. So there is no need for drag rudders. The control surfaces (rudelevons?) are about 25% half span and part of the tip is shaped like a balanced control surface.

Alfons Gabsch tested this new system with great success and also the 'Pull 10', a composite structure ultralight, calculated by Dr Horten is built accordingly. This system saves a lot of weight: two servos, two separate hinged control surfaces and two (long) servo cables.

Part 2 will complete the building and describe flying the Ho-XII.

Mid-way through the building of the Ho-XII centre section and bulge for the motor unit. You can just see inside the root ribs, the wing connecting system like that used in the original Horten-XII.



Test run of the motor system for the Ho-XII. Aad van Sorgen at the front of the centre section resists movement as Erik van den Hoogen opens up the two Robbe-Keller 240/5 motors, belt driving on 2.86:1 reduction, a 26 x 14" prop. Output was 2300 watts on 2 x 20 1700SCRC packs of cells, 20 per motor.





The Aero-naut 'Canadair CL-415'.

New at Nürnberg

A few of the regular exhibitors and brands were missing from the 'International Toy Fair' this year but there were lots of new models, new components, new equipment and a lot of all this was electric!

Toy Fair?

The big names were there and are catering more for electric fliers than for any other branch of the sport but the smaller ones were not there this year. 'Smaller' is relative. A small exhibitor at Nürnberg is very probably still representing a fair sized company. The small manufacturers and 'cottage industry' do not exhibit at Nürnberg; they sell instead at the flourishing markets like Dortmund, in a few months time.

If you think the title 'Toy Fair' sounds strange, you deserve an explanation. This 'Toy Fair' is for the buyers from big stores and proprietors from the regular sized shops to see what manufacturers are doing and to place orders for the next big rush, which will be the Christmas

and New Year season late in 1997. If you think this reads as VERY long term planning, it is not 'long term' to a manufacturer. The products we see at Nürnberg are possibly models or prototypes and if the response from dealers is not positive, then it just may not happen – or there may be time to adjust it to suit the market. This is why the models we tell you about in this article every year are often not on dealer shelves

until mid-summer or in some cases not until the next Toy Fair.

You still find 'Toy Fair' a strange name? Models fit into the 'Models, Hobbies and Handicrafts' category and occupy about one quarter of the exhibition hall devoted to that. If you now subtract all the cars and all the boats and all the non-flying models and maybe all the non-electric models, we are a very small part of this enormous Fair, but it is the only chance you

get to see all the new models from all the big brand names. It is a 'trade fair', closed to the public and the general rule is 'no cameras'. Some exhibitors in other halls are very suspicious of those of us that gain entry with a 'Press pass' and carry cameras. Fortunately, the model manufacturers welcome the early publicity and are very willing to let us bring you this news of new models.

This issue will be quick look at the more significant items; I have sneaked these in just as the Fair ended and before this issue went to the printer. There will be more in the next issue.

New models

Cumulus is an old Graupner name that used to belong to a 3 metre glider introduced about twenty years ago. Graupner's 'Cumulus 97' is a 1870mm (74") wingspan electric glider with a plug-on nose and option of a glider nose or an electric nose containing a Speed Gear 400 4:1 6V and 8 x 500mAh cells. This model is a lightweight electric at about 810g (29oz) and its open

The fun starts here. The Graupner 'Loop' mini aerobatic for a geared 400.

structure wings and V tail fits a moulded plastic FRP fuselage but it comes already built and film covered.

The Graupner 'Loop' is a lightweight aerobatic for a Speed 400 6V FG 1.85 (motor/gearbox) on 8 x 500mAh cells. Construction is all built-up, mostly balsa, span is 800mm (31.5"), weight is 650g (20oz) and this model has been flown at indoor meetings.

A popular scale model for more than 50 years has been the Cessna L-19 'Bird Dog'. Graupner are offering us a 1684mm span (66") model of this for geared 700 motors. They suggest the Speed 700 BB Turbo Neodym 9.6V with Power Gear 2:1 (toothed belt reducer, the 'quiet gearbox') and 12 x 1700 or 2000 cells. Weight is 2800g (110oz).

pilots must

entice more beginners into the sport to guarantee its continuity.

There are very simple RC electric models too like the Robbe 'Airdancer' and Multiplex 'Smiley' in its beginners 'Pico' range. The more advanced Simprop SE Youngster is designed as a teaching tool in Germany and the same basic model is a glider, IC powered or electric.

Old Graupner name, new Graupner model, the 'Cumulus 97'.



Trainers

The big brands have a lot of chuck gliders and rubber models at the front of their catalogues. Good! They, and we established

Graupner Cessna L-19 Bird Dog.



This Robbe 'Airdancer' trainer plugs together very quickly.



Multiplex 'Ein-Stein' Rx, 2 servos and speed control in one box.

motors at up to 80A for short runs and it weighs 65g (2.3oz).

A lot of the Graupner Ultra motors are available with different winds, there cannot be many gaps now.

Amongst the Graupner ferrites, the 480 is available with a 3.45 to 1 inline gearbox. Rated as the most significant motor by some is the 480 BB Race, the ball races making prolonged fast use safer with gearboxes and ducted fan units. There are many additions to the ranges of ferrites, most noticeable being the biggest Graupner ferrite, a 'Speed 900 BB Torque', at 645g (23oz) this 12 pole motor is as big as an Ultra 2000 at a fraction of the cost, not as powerful but nevertheless a big economy motor.

New Speed controllers

A few more have been added to several ranges, like the 'Aero-naut Micro 310' for 6 to 10 cells, 40A sustained and 60A for 15 seconds.

Simprow have three new ones; the smallest and what will probably be the most popular is the 'RS 35-16 MC' for 6 to 16 cells and 35A continuous use.

Graupner have four new speed controllers, the 'PICO MOS 36 MC' and 'PICO MOS 56 MC' both with BEC and brake and for 6 to 10 cells, the number is the continuous current rating. The 'POWER MOS 48 MC' for 6 to 16 cells and 'POWER MOS 85

'Power Speed Viper 400', 'Speed 400 6V' or 'Power Speed Viper 400L' on 7 to 10 cells and 6 x 3 up to 7 x 4.5 props all according to your desired performance wishes.

New motors

Most significant amongst the new motors were the three brushless Graupner Ultra motors, the 220/20-2 8V, its 2.5 to 1 geared version: 220/20-2 G 5,1 and the larger 300/30-2 16V. Weights are 180g (6.3oz), 245g (8.6oz) and 295g (10.4oz) and power at max efficiency is 158, 345 and 356 watts but you can increase those figures and still be safe. The 'MC Brushless Control 40' can be used with all these



A twin engined trainer? All the inside details of this very basic model in the next issue.

Multiplex Piper Super Cub.

Star

For scale pilots at the show the star attraction for many was the Aero-naut 'Canadair CL-415' twin engined flying boat for two geared 400 motors. The fuselage and engine nacelles are high quality epoxy/glass mouldings and the wing is veneered foam. Wingspan is 1505mm (59") and the quoted weight with 12 x Panasonic EX cells is 2150g (76oz). The model is claimed to take-off from water with a lighter power pack.

Multiplex had three models on display that were all polystyrene foam and finished with a very smooth surface and are I think cut, not moulded, foam. The finish might be the 'paint' that I saw on the Rödelmodell stand. I have ordered some to assess its use - watch this space! These models were the 'Britten Norman Islander', 1500mm (59") span for two 400 motors, a 'Cessna 182 Cardinal' 1200mm (47") span and 'Piper Super Cub' 1250mm span (49"), both for single 400 motors. All are intended for seven cells, 1700mAh for the twin and 1000mAh for the singles. You can of course fit whatever size cell you wish if the model will accommodate your chosen pack.

The Simprow 'Peppo' is already available (review coming soon) but this was its first Toy Fair. It is a clean lively electric glider with an MH 43 section on its aileron wing and could almost be described as a "long winged pylon racer". It has a span of 1200mm (47") and target weight of 515g (18oz). Recommended motors are the





Multiplex MS-X2 servo.

MC' for 6 to 30 cells are both opto coupled and with brake and the number is the continuous current rating.

The Robbe RSC 118µP is for 5 to 10 cells and 18A weighs 33g (1.2oz).

RC gear

Multiplex displayed its new 'MS-X2' servo 20 x 22 x 11mm wide and weighing 9g (0.32oz)



Aero-naut Turbo-Fan 1000 with carbon reinforced shroud. The one on the right shows the long motor tube.

for use in tiny models. Rumours were that all the big brands also have access to this or a similar weight servo. Gossip was that short cuts had been taken to get this small and to this price (59DM, £22, \$35) but this may be crocodile tears or sour grapes, or it may be worth the risk to stay that light! Time will tell.

New props

Aero-naut have extended further their enormous range of folders and fixed props and Graupner have extended the ranges of CAM Speed, CAM Gear, CAM Folding, CFK Folding and the Precision Spinners that go with them. Listing them takes too much space – more in the next issue.

Ducted Fans

Aeronaut showed a working ducted fan two years ago, a pre-production unit last year and this year two genuine production units that are available now. In the photo are shown two of the 5-blade 'Turbo-Fan 1000' units for 600 motors, one assembled but with the impeller removed and the other almost disassembled. The blades are a push fit, then bonded so the user has a choice of pitch angles to suit his motor and power pack. The 'Turbo-Fan 500' uses identical rotor and stator blades but only 3 blades on the rotor. Rotor diameter is 90mm. Quoted performance is impressive.

Graupner's 'Electro Impeller' is for the Speed 400 6V motor on 8 cells. The 5-blade fan is 58mm in diameter and moulded in one piece from carbon reinforced epoxy. A very neat epoxy/glass shroud is available too. No performance figures are quoted, it is scheduled for availability in June.



Simprop 'Peppo'.



Graupner 'Electro Impeller' for Speed 400 6V motors.



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Plan Review

Six years old and the fuz has been completely recovered in glass cloth, with Solarfilm on the flying surfaces, and it's even lighter!



Mini Mowta

PLAN AND CONSTRUCTION BY MIKE FREEMAN

Mowta history

Electric flight came as a real godsend to me. My first love (in aeromodeling terms!) is slope soaring but on the windless days I needed something to tide me over. I tried IC power but could not get on with the mess that went with it.

In about 1984 I acquired an MFA Olympus unit and built myself a 6 foot wing span powered glider to go with it. This was quite successful, I even used it to carry a camera aloft for aerial photographs. I wanted something a bit more aerobatic though, and I soon started to think about using electric power in a smaller, sports aerobatic model to provide a similar flying style to my slope soaring antics.

A couple of models later and I built the prototype to the model you see here.

The prototype used the Olympus unit in the first few flights but I adapted it and tried a direct drive Graupner Speed 600 motor in it. I was so impressed with the way it performed with direct drive I built the version you see here specifically for direct drive.

On this model I concentrated on keeping the weight down. This involved a built up wing, balsa planking for the curved bits, and a one piece model. I even arranged for the batteries to be ejected in a heavy landing so that reinforcement weight could be kept to a minimum.

With the new version finished and flying well I started to

experiment with power, battery, and prop combinations. I finally settled on a Graupner Speed 600 8.4V along with a Graupner 8 x 4.5 inch folding prop and 7 Sanyo 1.4 Ahr cells. This set up gives a decent thrust for aerobatics. The same motor and battery with a cut down folding prop of 7 x 4.5 gives a slightly faster flying speed but I prefer the aerobatic flying.

Construction

This one piece model with built up wings was designed for minimum weight and easy transportation. Construction is mainly of 3/32" and 1/16" sheet with a small amount of liteply, birch-ply and spruce.

You will need a perfectly flat building board to avoid building in warps. The building sequence needs to be as follows:

Wings, tailplane, then fuselage.

Use PVA glue sparingly, use cyano as much as possible.

Wings

- 1 Cut out ribs from 1/16" quarter grain sheet. Use the sandwich method or photocopy the ones on the plan and with the photocopy face down on balsa sheet, transfer the image with a hot smoothing iron or heat sealing tool. Top and bottom spars to the sheeting and leave to dry.
- 3 Pin bottom sheeting, cap strips and false TE to the board. Prop up the LE sheet with scrap balsa.
- 4 Make dihedral brace from laminated 1/32" birch ply. Remember to build in the bend at the centre line.
- 5 Glue the ribs in place starting from the root in the following sequence: dihedral

brace – R1 – vertical web –
R2 – vertical web... etc until
you reach the tip.

- 6 Glue the aileron
servo bearers in
place and
glue
the
top

sheeting
and top cap
strips in place.

- 7 When dry remove from
the board and carefully sand
the front flush and glue the
leading edge in place. Pin
back on the board to dry
overnight.

- 8 Now graft the
other wing on to
the dihedral brace
and servo bearers
by repeating the above
for the other wing. Use the
reverse of the plan to build
the second wing.

Make sure the two wings
always line up (have the same
incidence) throughout the
building of the second wing.

- 9 Make up the ailerons and
torque rods and fit to the
wings and add the tip blocks
to the wings then sand down
ready for fitting to the
fuselage.

Tailplane

- 1 Make both halves of the
tailplane, ensuring they
remain flat until the glue has
set.
- 2 Chamfer the roots and join
the two halves using the
template shown on the
drawing to ensure the correct
angle.
- 3 Sand down and set aside with
the wings and move on to the
fuselage.

Fuselage

- 1 Check your servos fit into the
fuselage and adjust the width
of the formers to suit if
necessary. Make up the
formers F2 – F5 as shown on
the plan.
- 2 Make up the two fuselage
sides (below the wing section
only at this stage) and fit the
1/64" ply and 1/8" liteply
doubblers in place, note the
fuz sides and 1/64" doubblers
extend down the side of the
hatches.
- 3 Add F2 to F5 inclusive to one
fuz side ensuring they are all
at 90°. When completely dry
add the second side checking
for squareness throughout.

A one metre span sports aerobatic model with aileron, elevator and motor control that is very simple to build. It is nearly all balsa and there are no awkward bends in it. You can use economy motors and economy radio gear, it's the right size. If you have mastered rudder/elevator models and want to try ailerons, this could be the one. If you are on to aileron models and wish to fly aerobatics, this is an good first aerobatic model. Robust enough to last. Light enough to bounce.

- 4 Make the liteply nose crutch
leaving a thin spacer of
material in between the two
"arms" to give rigidity
during building.

- 5 Make up the "nose cone" by
first cutting out F1 from 1/8"
ply. Fix this to an old motor
case and wrap tape around
the motor case to take up the
clearance space. Next cut
strips of 1/64" ply and soft
3/32" sheet and soak in water
for a quarter of an hour or so.
Now build up the "nose
cone" with successive layers
of ply and sheet as shown on
the drawing. Cyano is good
for this. Try and make the
joints of each strip occur in
different places. If the sheet
keeps splitting try fixing
sellotape to the outside prior
to wrapping around. When
dry, remove the motor and
sand roughly to shape.

- 6 Pull tail together and add
formers F6 and F7 in place (it
is important that these are the
same width to get the correct
tail plane incidence).

- 7 Pull the nose together and
"trap" the crutch in place.

- 8 Glue the nose cone to the
fuselage sides making sure
that the down thrust is
maintained. Any gap between
the nose cone and the fuz
sides should be taken up by
equal slivers of balsa on each
side.

- 9 When this has thoroughly

dried remove from the board and add the bottom
sheeting and planking and make up the hatches.

- 10 To prevent warping the nose, start the planking in the
centre then add planks alternatively on either side and
work round to the fuz sides, overhang the plank
slightly at the bottom.

- 11 To fit the bottom sheeting in front of the hatch, first
sand the up-turn shape in the planking and then glue
the sheeting in place, crossgrain.

- 12 Pin the fuz back on the board and check for
squareness.

- 13 Now glue the wings and tail plane in place, use PVA
or epoxy for this and make sure all is square and good
wood to wood joints are made.

- 14 When dry, add formers F9 and F10 and add the top
planking from the nose back.

- 15 Make and install the elevator tube and cable pushrods
as shown on the drawing.

- 16 Cut-out and fit top fuz sides in place and F10.

- 17 Next form the canopy by planking and add the top
sheeting and canopy blocks.

- 18 Remove from the board and add the tail block
roughly carved to shape and the spinner ring.

- 19 Sand the entire airframe down to smooth contours.

- 20 Carefully cut-out the air intake and outlet holes and
make the outlet "scoop".

- 21 Apply epoxy glass skinning to the inside of the flight
battery compartment and around the front underside
and the planking.

- 22 Give a final sand down ready for covering.

Covering and Installation

- 1 The original was covered with Solartex on the
fuselage and Solarfilm on the flying surfaces.
2. The Servos are simply screwed into place and the
receiver "velcro'd" to the hatch.
- 3 The RC battery should be fitted to suit the centre of
gravity. On the original this was just behind F5.
- 4 The flight batteries are held in place by a dowel
lodged behind the strip on F3 and rubber bands over
the hook on F4.



Flying

Assuming everything moves the correct way and by the right amount, head for the flying field. The original flies best with a Graupner Speed 600, Graupner 8 x 4.5 folding prop and 7 Sanyo cells.

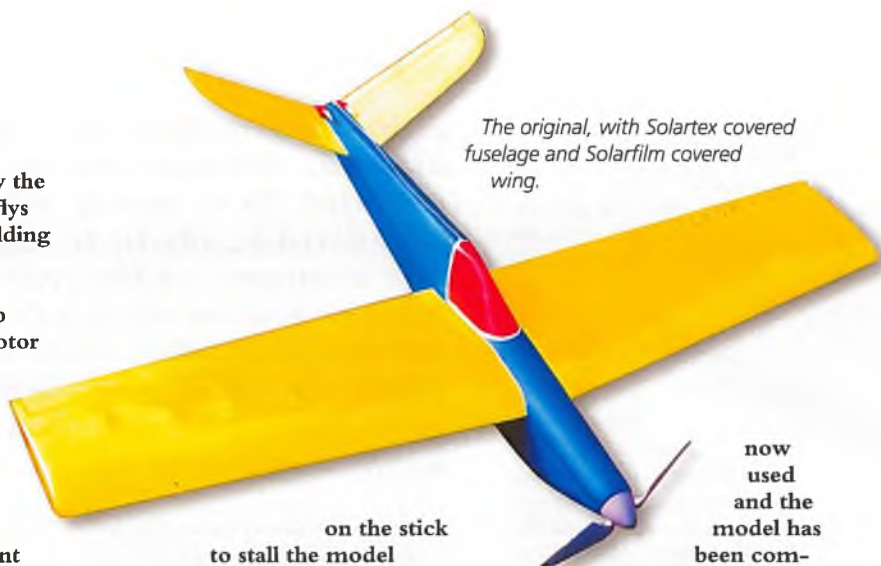
As is the norm with electric flight you will have to respect the power you have available. Any attempt to increase the climb rate too steeply will reduce the motor run and thus the flying time per charge; by careful flying and almost letting the model fly to its zenith (this can mean the edge of easy visibility) it is possible to get flights of 10 to 12 minutes. Having said that, Mini Mowta was designed for aerobatics and this is where it is at its best.

With a head wind it is possible to launch from a standstill. However, if the wind is light or non-existent it will be necessary to launch from a short run. Mini Mowta soon gets to a safe enough height for you to start throwing it about.

All the usual aileron and elevator manoeuvres are possible (except for continuous vertical ones that is!). With the E205 section the inverted performance is acceptable requiring only a small amount of down elevator to be held in.

My usual flight pattern is launch, climb to about 40 to 50 feet, buzz about at low level for 3 or 4 minutes doing aerobatics and low fly pasts then climb as high as possible on the remaining power and glide down throwing in the odd manoeuvre on the way using gravity as the motive power. Then land using any remaining power to "stretch" the glide if necessary. Total flight time is usually 6 to 7 minutes.

Landing is best done by coming in slow and easing back



The original, with Solartex covered fuselage and Solarfilm covered wing.

on the stick to stall the model onto the ground, the flying speed being quite low. Clearly, runway landings should be avoided!

Crash resistance has been tested (not intentionally) with heavy landings and the occasional cartwheel with only minor site repaired damage sustained. The original has been flying since the end of 1990 and is still going strong.

Postscript

This model has undergone a bit more development in that a Westbury Products BEC switch is

now used and the model has been completely

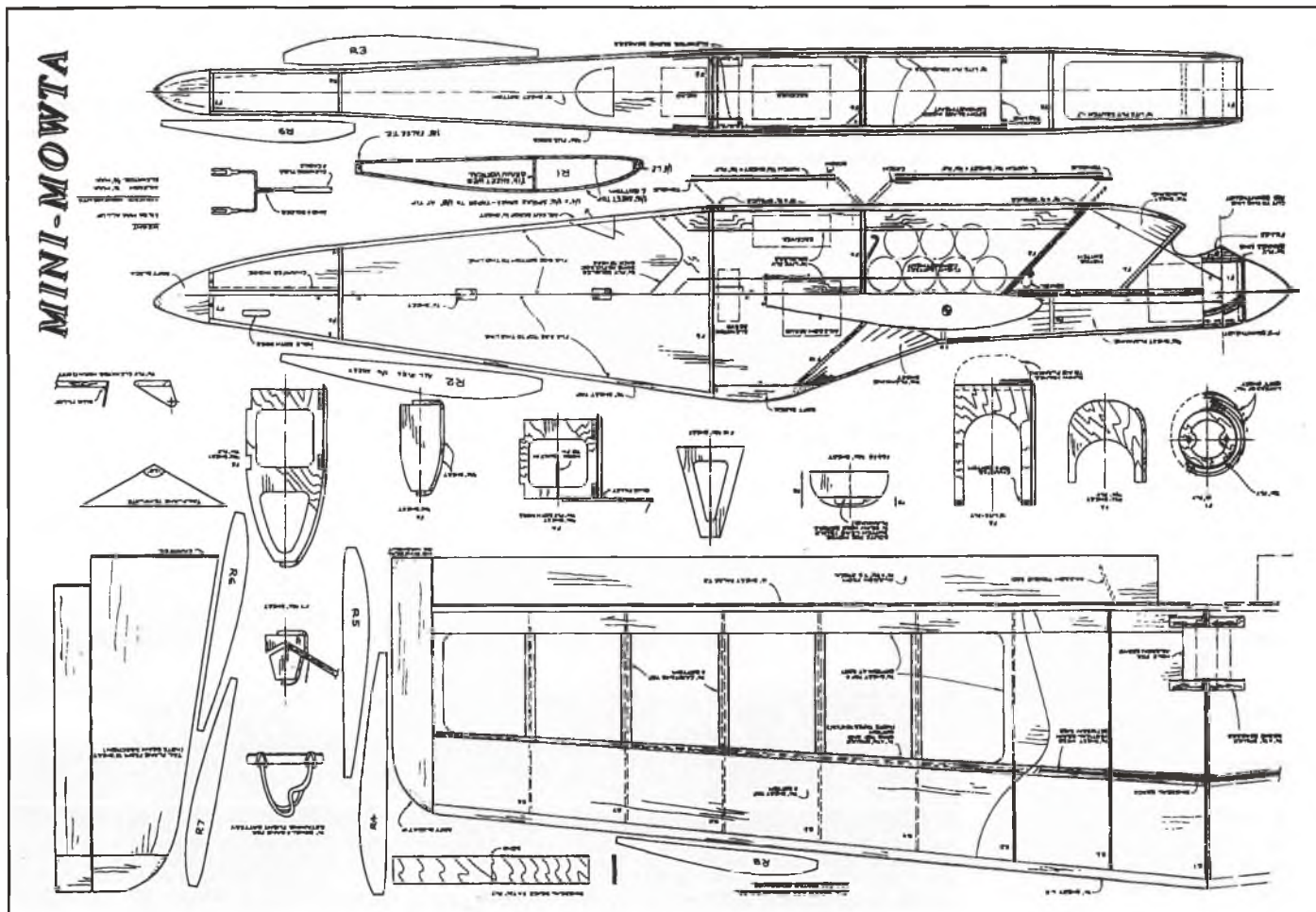
recovered using

glass cloth on the fus and Solarfilm on the flying surfaces. This has resulted in an even lighter model.

During the time this model has been around (some 6 years now) electric flight has come on in leaps and bounds, especially in the battery/connectors/motor control areas making electric flight for small aerobatic models much more viable.

If you haven't tried this size of model yet, give it a go - you just might enjoy it. Happy Landings

Copies of this plan, No. MW2582 are available from Electric Flight International (Plans service), Traplet House, Severn Drive, Upton-upon-Severn, Worcestershire, WR8 0JL. Price £5.50 plus UK postage £1.50.



Spruce Goose

flies again!



“When you decide to embark on a project as crazy as building a Spruce Goose, you don’t tell anyone until it has flown.” Martin Lagerstedt tells how he and his father Christer designed and built in Sweden a model of this unique eight engined leviathan, the original of which is now the centre attraction of the Evergreen Air Venture Museum, McMinnville, Oregon, USA.

Why Spruce Goose?

You may wonder how someone gets the idea to build a electric scale model of an eight engined flying boat. When I first saw a picture of the Hughes H4 “Spruce Goose” many years ago I thought that to build a flying model would be the ultimate challenge for a modeller and the only way to solve the problem of getting 8 motors running at the same time must be to make it electric. I had just started to fly electrics and I realised that this model was a very big step from the electric Playboy I was flying

at that time. I thought that there was no way I was ever going to build this model. Since then my electric experience has grown. I started to experiment with electric ducted fan models and the success I had with those models made me realize that

there are no limits to what model you can put an electric motor in. I started to think about the Spruce Goose as a possibility and during a vacation in Germany I invested in eight Speed 400 motors.

Research

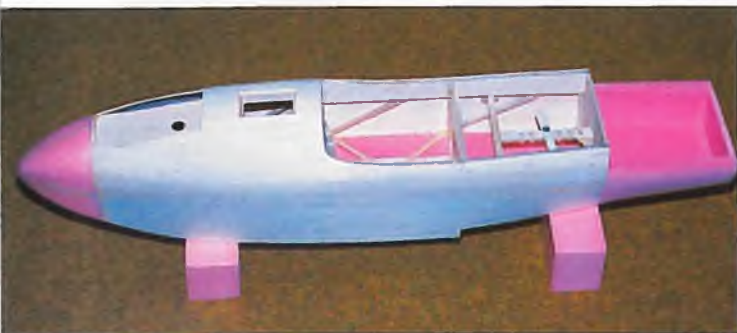
It was time for me to get some data. I found a company

Christer and Martin Lagerstedt with Spruce Goose.



Landing approach, all flying and location shots were taken by Sven Pontan.





The front part of the fuselage is built up with a framework of spruce spars and balsa formers strengthened with a mixture of glass, carbon fibre and some plywood.



Integral with the fuselage frame is a fibreglass tube for the battery, which is slid along the tube until the CG is correct and then fixed.

called AEROMAX in Germany that had a 3-view and photo package (This company is working together with Scale Model Research in USA). When I received this documentation I found that the 3-view was not just a simple drawing but it had many dimensions shown and the photo package was very good. One thing that struck me when I looked at the 3-view is that the fuselage is very streamlined, very little drag. (Look at the 3-view.)

When you design a model like the Spruce Goose there are a lot of decisions to make. First, you have to decide on the scale. Based on the physical size of the motors with their probable props and that they should all fit together on the wing, I calculated that a good scale would be 1:40. This gave us a wingspan of 2440mm and a length of 1670mm. With these dimensions it was time to see how much power we had and what weight we should aim at. Static tests with a Speed 400 7.2V motor and Graupner 4-blade 6 x 3 prop resulted in 275 grams of thrust on 10 to 11 amps. Eight motors would give a total thrust of 2200 grams. To get acceptable flying characteristics the target weight should be between 6000 and 6500 grams. If you think you can hit this target weight on a 2.44m big model with a hardware weight (radio, motors, batteries) of 2900 gram it's time to decide on the design and construction methods to be used.

Construction

My first intention was to make the whole fuselage from foam. After some discussion with my father we decided to do a mix and build the front of the fuselage with balsa. The reason for this decision was that it needed to be strong. I had a heavy 1.6kg battery in that part of the fuselage that I wanted to not move in the model on landing.

The front is built up with a framework of spruce spars and balsa formers strengthened with a mixture of glass, carbon fibre and some plywood. Integral with this frame

is a fibreglass tube for the battery; you can see this tube in one photo. (The battery is slid along the tube until the CG is correct and then fixed.) The bottom and nose is made of pink foam that has been hot wired and sanded to shape. After this the fuselage sides were sheeted with 3mm balsa.

The rear of the fuselage is circular in section and it tapers. To get the right shape I used a bandsaw and hotwire. When I was satisfied with the shape I took a kitchen knife and started to round off the corners until I had a round fuselage. The foam was then hollowed out with hotwire, for lightness.

After the front and rear of the fuselage was glued together everything was covered with thin fibreglass and epoxy, with extra on the bottom.

The fin and stab (tailplane) is built-up and sheeted with 1mm balsa.

The stab and fin is made removable for easier transportation.

Wing

The wing is built-up and in three parts for transportation. The middle part carries the 8 motors, with two plug-in wing tips with ailerons and tip floats (also removable). The wing section I used is a 17% thick Eppler 207. From the outer motor the section changes to a 13% thick Eppler 205. The wing spar is made from 3mm balsa inside a carbon fibre sock and epoxy. The result is a very light but strong wing spar. To keep the model as light as possible I cut lightening holes in all the wing ribs. This removed 1/3 of the weight of the ribs. A carbon fibre tube for each motor nacelle was glued in place in the wing to make the attachment of the long nacelles to the wing as strong as possible. Each motor nacelle was made from foam and then skinned with glass and epoxy.

Motor cowls were made of rolled (0.4mm) plywood and balsa. The wing is covered with Oracover.

The rear of the fuselage was cut with a bandsaw and hotwire, then hollowed out with hotwire.



The bottom and nose is made of pink foam that has been hot wired and sanded to shape. After this the fuselage sides were sheeted with 3mm balsa.



This could be the big one in Long Beach Harbor.



Spruce Goose taxis in fast after five minutes of flying.



Motor installation

The 8 motors are installed as two separate motor systems. The 4 inner motors are one system and the 4 outers are another. In each system two motors in one wing are wired in series and then wired in parallel with the two motors in the other wing. I therefore need 14 cells and one speed controller for each motor system. I have one speed control on the throttle function and the other speed controller on a spare function that I mix with the throttle function.

Testing

After 8 months of hard building it was time to do some taxing tests. My father and I selected a Saturday evening at the end of August for the tests. After the first power test on land it was time to put the Goose in the water. It floated perfectly and as I gave it some power it started to taxi. But when I added more power I noticed that something

was wrong! Water spray from the bow wave hit the inner motors. The result was that I didn't have enough power to get up on the step. After several full power tests I decided to bring her in. My father and I decided to solve this problem by adding some spray strips on the fuselage. I used transparent lexan for this and

Carbon fibre tube spars facilitate removable plug-in fin and tailplane surfaces.



they are almost invisible. I have spray strips on my Donald 4 flying boat and they are very effective.

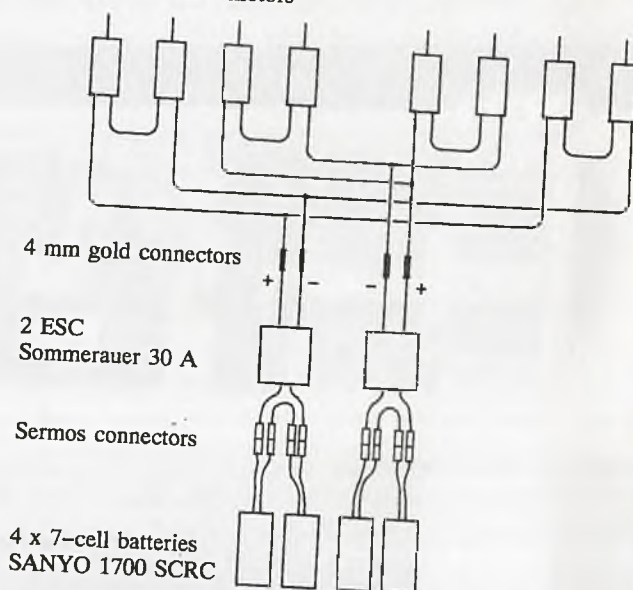
Success!

Three days later it was time to test the Goose again. When we left home it was a little windy so my intention was to only do some taxi tests. By the time we arrived at the lake the air was almost calm. When I opened up power it was obvious that the spray strips had solved the problem. The Goose went up easily onto the step and accelerated. It performed so well that I decided to try a short hop from the water. I aimed the model into wind and gave it full power. It went up onto the step and when I felt that it had enough speed I gave some up elevator and away it flew! My intention was only to lift from the water and put her down again but as soon as the Goose was airborne it started to climb. It had a lot of power so I

Hughes H-4 wiring diagram.

Hughes H4 wiring diagram

8 Speed 400 7.2 V motors



could throttle back a little. I let it climb to a safe altitude before I made a wide turn and flew back towards me. It was getting a little dark so after a few circuits in front of me I decided to land. I reduced the power and made a wide turn to line up for landing. It came down very nicely and the landing was a little bumpy but OK.

The following weekend I attended a float fly-in and I flew the Spruce Goose twice. So far I have not found any bad flying characteristics and I must say that it's a very fun model to fly. It has a lot of power so I only need full power for take-off. I am very surprised that it's so easy to fly. The Goose is very steady in the air and she responds nicely to rudder.

My flights so far have been about 5 minutes but the Goose has a lot of power left after I have taxied home.

One great thing about the Goose is the sound! Eight motors running at the same time creates a fantastic sound!

Summary

I couldn't have finished this model without the support and help from my father. I think that it is much easier to succeed in a project if you have someone to build with and discuss with. We share the same building space and that meant that he didn't finish his scale project (IC) last year. I think that it is his turn to use the building space this year. Hopefully his project will not take up as much time as the Spruce Goose did.

The Spruce Goose has been a very challenging project to build. A lot of things can go wrong when you design your first multi engine model. Wing sections, power requirements, construction methods, correct rigging angle of incidence. A bad decision for any of these things can make all the difference between success and failure.

Model Specification, Hughes H-4

Scale	1:40
Wingspan	2400mm (96")
Wing area	71sq.dm (1100 sq.ins)
Length	1670mm (66")
Motors	8 x Graupner Speed 400 7.2V
Energy	2 x 14 Sanyo 1700SCRC
Props	Graupner 6 x 3, 4 blade
Weight	6140g (13.5lbs)

There is a lot of space for servos, speed controllers and sockets for motor lead plugs under the wing.



Half the wing centre panel with lightened ribs. You can just see the black carbon fibre tubes for each motor nacelle, wiring to the motors and servo lead.

The Goose was built in 8 intensively busy months.

I can own up now! When you decide to embark on a project as crazy as building a Spruce Goose, you don't tell anyone until it has flown. My goal was to finish the Goose in time for my club's annual 'float fly-in' at the beginning of May. I didn't succeed with that but I decided to let the secret out and bring the model to that fly-in.

The day after the first flight I posted a message to 'EFLIGHT', the email list and to the newsgroup: 'rec.models.rc.air' with the heading "The Spruce Goose flies!!!" I never expected the response I got back. Yes of course, an electric model Spruce Goose is not a thing you read about every day but the interest the Goose generated was more than I ever dreamed of.

Another admission! All this hard work could have ended in a catastrophe. On the way home after the first flight I suddenly realised that I had forgotten to do a range check!

The BIG one

In 1942 Allied forces shipping in the North Atlantic was being decimated by German U-boats. Aircraft manufacturer Howard Hughes and shipping magnate Henry Kaiser persuaded the US government to finance the construction of a fleet of giant flying boats to scare off U-boats and in addition be capable of carrying hundreds of troops, big tanks or 50 tons of cargo - very big in 1942.

One caveat in the funding agreement was that this airplane must use in its construction no 'strategic materials' which meant 'no aluminium' which meant in 1942 - wood.

By February 1944 the urgent need was over, the US government cancelled the fleet but would take delivery of the one already part built 'HK-1' in 1948. The original \$18 million for three had already been spent so Howard Hughes spent \$7 million of his own to complete the one airplane in 1946. It was built mostly of birch, some spruce and gained the nickname "Spruce Goose" much to Hughes' annoyance, and the official title 'Hughes H-4 Hercules'.

It required eight of the most powerful engines available, 3000HP Pratt & Whitney R4360s, and these were probably not big enough. This aircraft, by far the largest the world had ever seen (and still is!) was regarded by many US officials as ridiculous. The wingspan of 320' (98m) is 50% larger than a Boeing 747. Hughes was determined to prove it could fly and on November 2, 1947, with a small crew and 30 reporters aboard he started the engines in order to conduct some taxi trials around Long Beach Harbor. He later dropped off these reporters, telling them that the first flight was scheduled for 1948 and he needed to conduct one more taxi trial. No-one will ever know what Howard Hughes' true intentions were but with himself at the controls during this next 'taxi trial' Hughes instructed co-pilot Dave Grant to lower the flaps and the H-4 became airborne, lifted 70 above the water, flew over one mile, achieved a top speed of 80MPH and made a perfect

Hughes H-4 Hercules Specification

Wingspan	320' (98m)
Tailplane	113' (34m)
Length	219' (67m)
Height	79.3' (24m)
Engines	8 x Pratt & Whitney R4360, 3000HP
Prop diameter	17' (5.2m)
Weight	200 tonnes

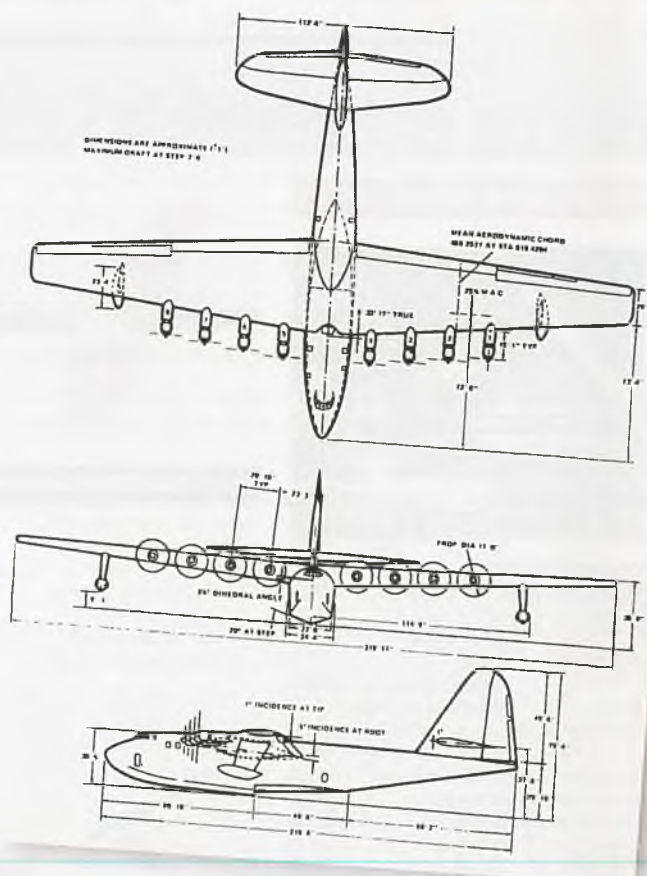
landing after less than one minute. It must have been an absolutely incredible sight! Hughes had proved that it could fly.

The H-4 was then parked in its climate controlled hanger for more than forty years. Starting in 1992 it was disassembled into 38 sections for removal to its present location at the Evergreen Air Venture Museum, McMinnville, Oregon, USA. This magnificent flying boat epitomizes so much of the "American Dream", the courage and determination of Howard Hughes, the conventional establishment opposition to achievement of any novel idea and a super example of what dedication can achieve. And best of all it makes a wonderful model!

Spin-off?

Design problems solved with the H-4 provided data for large aircraft years later, such as manipulating very large control surfaces, can you imagine a servo big enough for that? The H-4 would have carried a lot of fuel, much was learned about the storage and supply of fuel to eight engines. Hughes achieved with wood what many engineers would consider an achievement with a choice of metals; much was learned about construction with and the bonding and preservation of woods.

Some personnel started their careers with the H-4 and were still employed with its maintenance until they retired. It is now more than fifty years old. It has to be worth a visit to anyone who gets anywhere near Oregon.



The Hughes H-4 3-view on which Martin based his model.

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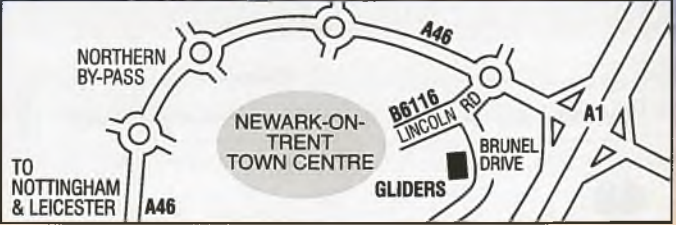
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Rating.	1700mAh	*2000mAh	1400mAh	1700mAh	*2000mAh	1400mAh
Weight	55 gms	50 gms	51 gms	55 gms	50 gms	51 gms
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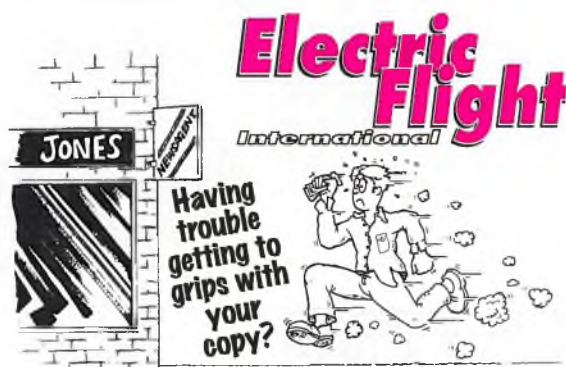
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EF0397

Diary Dates.

Plan ahead! Here are some dates for your diary.

If you wish your events to be included sent details to the editorial office by post, fax: 01684 594586 or E Mail: traplet@dial.pipex.com Include wherever possible: name of event, date, location, type of event and contact names and numbers. In the list below, unless otherwise stated, the event and address is in the UK.

March 23. BEFA AGM, Manor Hall, Sandy Lane, Leamington Spa, Contact Gordon Tarling. Tel/Fax 01895 251551.

March 23. The 2nd Great Southern Model Auction, Thornden School, Chandlers Ford, Southampton (J12, M3). SAE to Pete Dyke, 1 Valleydene, Dibden Purlieu, Southampton, SO45 4NG, tel: 01703 845898 before 9.30pm.

April 19/20. Nexus Spring Extravaganza, Old Warden, Beds.

April 20. F5D (North) TBA.

April 20. Exhibition of working models, The Silver Ring, Ascot Racecourse.

April 27. Glenrothes Fly-in (canteen open!) Electroslot and Electrobatcs. Contact: Colin Sparrow, tel: 01505 850242, email: csparrow@clara.net

May 18. F5D Middle Wallop.

May 18. Cumnock Electric Fly-in, contact Keith Reid, tel: 01290 550055.

May 24/25. Nexus Small Models day, Old Warden, Beds.

May 24/25/26. Kelburn Festival of Flight. Contact: Irene Paterson, Festival of Flight, Kelburn Castle & Country Centre, Fairlie, Ayrshire, KA29 0BE, tel: 01475 568685.

May 25. Blackpool and Fylde RCMS All Electric fly-in, fun fly and competitions, all types AULD, scale, vintage, etc. Contacts: P.Leech, 8 Hacklands Ave, Lea, Preston, PR2 1XY, tel: 01772 731614, or S. Craythorne, 9 Hampshire Close, Wilpshire, Blackburn, BB1 9LU, tel: 01254 248299.

May 25/26. Top Gun North, Elvington. Contact: Christine Hayton, 3 Tendergate Avenue, Knaresborough, North Yorkshire, HG5 9BQ, tel & fax: 01423 867144, mobile 0374 938341.

May 25/26/27. Radioglide 97, thermal soaring plus Electroslot and 30-Minute Electro. Sports Centre, Pitreavie, near Dunfermline. Contact: Colin Sparrow, tel: 01505 850242, email: csparrow@clara.net

June 1. Hayes Fly-In - Sunbury, Contact: Dave Chinery 0181 573 4687.

June 7/8. Nexus Scale Days, Old Warden, Beds.

June 15 to July 15. '97 Electric Duration Challenge. For more details contact Jerry Smartt, Rt.3 Box 300, Warsaw, MO 65355, USA. Tel: (816) 438 5682, fax: (816) 438 9573, or Dave Durnford, 2 Meadow View Road, Hayes, Middx, UB4 8EZ, UK.

June 22. F5D, Midlands, TBA.

June 28/29. BEFA International Festival of Electric Flight, Middle Wallop.

June 29. Montrose Electric Fly-in. Contact Ian Morrow, tel: 01674 840452.

July 6. Ebor Electric Fly-in and Electroslot. York Racecourse (Knivesmire). Contact Eric on 01904 422615 or Mike on 01904 489386.

July 6. BEFA Fly-In, Sunbury, Hayes site.

July 6. Malvern Soaring Association, open thermal and 100S plus 7 cell Electroslot. Upton-on-Severn, Worcs. Contact: Nick Neve, Eynhallow, The Purlieu, Upper Colwall, Malvern, Worcs, WR14 4DJ. Tel: 01684 561160.

July 12/13. Wings and Wheels Model Spectacular. North Weald Airfield, Nr Epping, Essex. (J7, M11). Displays, market, food, family entertainment. Pilots contact: Derek Foxwell, 0181 647 0607, Trade and admission

enquiries: Traplet House, Severn Drive, Upton-upon-Severn, Worcs., tel: 01684 594505, fax: 01684 594586, evenings/weekends: 0836 297168, email: traplet@dial.pipex.com

July 20. F5D, RAF Odiham.

July 20. Clyde Valley Flyers Electric Fly-in, Paisley (barbeque and refreshments) Electroslot and Electrobatcs. Contact: Colin Sparrow, tel: 01505 850242, email: csparrow@clara.net

July 26/27. Nexus Silent Flight Days, Old Warden.

August 2/3. Scottish Soaring Nationals, thermal soaring plus Electroslot and 30-Minute electro. Sports Centre, Pitreavie, near Dunfermline. Contact: John Walter, tel: 01292 560341, or Colin Sparrow, tel: 01505 850242, email: csparrow@clara.net

August 2/3/4/5. AMA Electric Nationals, Muncie, Indiana, USA, at the Acadamey of Model Aeronautics (AMA) National Flying Site.

Saturday Aug 2. A Sailplane and B Old Timer.

Sunday Aug 3. B Sailplane and A Old Timer.

Monday Aug 4. all provisional events, 1/2 A Texaco Old Timer, 1/2 A Sailplane, and Speed 400 Pylon Racing. Contact: Doug Ward, NEAC coordinator. 'National Electric Aircraft Council' is the special interest group that represents electric flyers to the AMA.

August 3. BEFA Fly-In, Leamington Spa.

August 9/10. Nexus Vintage Weekend - Old Warden, Beds.

August 16/17. Inter-Ex 97, Nederweert, Nederland. Contact: Modelvliegclub Nederweert, p/a Schoolstraat 6, 6031 CW Nederweert, Nederland. tel: 0495 634180., fax: 460044, internet: <http://www/jel.vissers@pi.net>

August 23/24/25. BMFA British Nationals.

August 23/24/25. Elvington Air Spectacular (see May 25/26).

September 7. Aberdeen & District Soarers Electric Fly-in. Contact Norrie Kerr, tel: 01224 3244722.

September 13/14. Nexus Festival, Old Warden, Beds.

September 14. Cumnock Electric Fly-in, contact Keith Reid, tel: 01290 550055.

September 19/20/21. KRC, Queen City Airport, Allentown, PA, USA.

September 21. F5D, RAF Wittering.

September 21. Linlithgow Open Thermal and Electroslot. Contact Tom Preston, tel: 01505 630573.

September 22 to 29. SAM champs, Las Vegas, USA.

October 18/19. Nexus Autumn Gala, Old Warden, Beds.

November 16th. BEFA Technical Workshop, Leamington Spa, Warks.

December 6/7. Elvington Christmas Show (see May 25/26).

For full details of the BMFA F5B League events from Mike Proctor, 8 Church Rise, Holtby, York. YO1 3UE.

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Graupner Messerschmitt Me 323

kit review by
Ian Dale.

Gigant



Box and most of the contents, a very complete kit, missing here is the plan. The six 280 motors and props are purchased as a separate kit of parts.

Silly question really!

I had been enthusing to the editor about an article I had seen on a Spruce Goose with eight speed 400's and electric multis in general, when I was asked whether I would like to review the new Graupner Gigant. There can only be one response....

The full size

The Gigant (Giant) started life as a heavy lift glider spanning nearly 55m (180'). The payload was no less than 23,000kg or a whole company of troops. It was not a great success because it required no less than three ME110's to tow it, which was a very hazardous exercise. An interim solution was found by joining two Heinkel 111 bombers together and fitting a fifth engine into the combined wings.

A practical heavy lift transport was still desperately required to keep the Axis forces supplied in North Africa and so the Gigant

was fitted with four and then six engines. Though it could now fulfil the role, it was something of a lumbering beast with a top speed of only 230KPH. However, many tonnes of stores were successfully flown by these craft but at very considerable risk.

Theoretically the type is an ideal electric model; lots of engines which is easy to do, a glider layout giving plenty of wing area, and a fixed but shrouded ten wheel undercarriage. As a bonus the opening nose doors provide an ideal way of changing the flight battery. However it is not elegant and is best described as "having character", if one wishes to be politically correct!

The kit

The imposing box has an excellent picture of the model finished in a desert camouflage scheme which was to prove useful later at the covering stage. Inside, one is presented with a very complete kit. The construction is entirely built up using spruce, balsa, ply and liteply. All the parts that can be sensibly die cut, are die cut, and to a very high standard. Separate sheets are provided for the fuselage and wing plans and two further sheets provide multi-lingual construction notes, parts list and photographs.

Vacuum formed plastic mouldings are supplied for the fuselage doors, engine cowls, nacelles,

undercarriage fairings and cockpit. These need trimming to fit but there are lines moulded in to help. All the other hardware that is required is supplied. Of particular note are the ten moulded wheels which only weigh 40g in total!

The six 280 size motors and props are purchased as a separate kit of parts. The beautifully moulded three bladed props are only 11 x 7cm and look as if they would be more at home on a plastic kit. Also provided are six precision hub and spinner assemblies and no less than eighteen suppression capacitors. There is plenty of soldering practice to be had!

Handling the Plastic Mouldings

There is a lot of trimming to do on the vac formed parts. Fortunately the plastic is very thin and a small pair of curved embroidery scissors allow for speedy removal of the waste material. On the cowls, doors and undercarriage fairings it was found easiest to use 'wet and dry', used wet, on a flat surface and to rub the part over the wet and dry as the final stage in trimming.

The moulded-in guide lines were found to be pretty accurate which helped considerably. However a fair amount of careful fettling and trial fitting is still required to achieve a good fit particularly on the nacelles. All wood to plastic joints were made using Deluxe Materials RC Modellers Glue which is absolutely wonderful stuff for this kind of work.

Fuselage construction

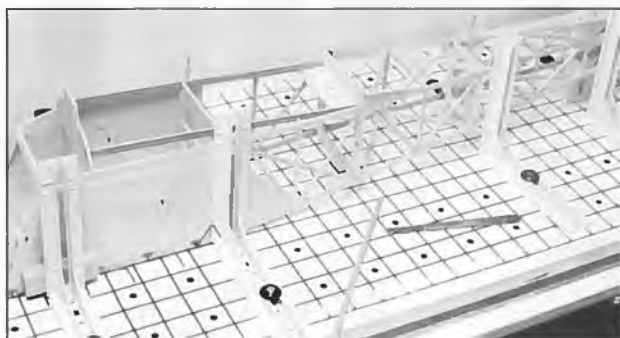
The fuselage is really just a slab sided box made from spruce longerons and balsa uprights and diagonals. If you have built a couple of rubber type models before it will be no problem at all. The accurately cut formers ensures that the structure goes together very quickly. A fuselage jig, although no means essential, does help.

I left the cockpit canopy moulding off until I had fitted the wing to the fuselage because this gives unobstructed access to former F2 for drilling the holes for the wing dowels. I also did not glue in the battery tray until the





The fuselage is just a box made from spruce longerons and balsa uprights and diagonals.



A fuselage jig, although no means essential, does help.

very end as this allows the axles to pivot and the fuselage to sit firmly on its flat underside when working on the model.

Tail construction

Again a very straightforward flat built up structure. As I am running out of room in the hangar I modified the tail slightly so that it bolts on and can be removed for storage.

Wing construction

The wing has polyhedral dihedral and is built in four sections. The construction is a conventional D box with spruce spars set into the sheeting so as to give maximum strength. The wing section is completely flat along the bottom surface so building starts by cutting and laying out the bottom leading edge sheeting, spar, cap strips and trailing edge. The ribs, webbing and false leading edge are then glued on top. What makes this a pleasurable process is that the webbing and ribs slot together so you don't have to mess around with endless small bits of balsa.

For the motor power, two heavy gauge wires are fitted into the wing to form a 'bus bar'. Lighter gauge motor wires are then tapped off the bus at each motor position. RC Modellers glue was used as advised in the instructions to insulate the soldered joints and hold the bus bars in position.

The final stage is to fit the top sheeting, spar, cap strips and trailing edge. I actually replaced the supplied sheeting as it was too heavy. Similarly the sheeting was also replaced for the built up ailerons with them coming out half the weight.

I must also admit here to one serious diversion from the kit instructions. No provision is made for any washout at the tips. With the tip chord about one third of the root chord and no visible change in the wing section I elected to build 4mm of washout into the outer panels as a precaution.

Motor nacelles

The front of the motor cans are glued with epoxy to a ply plate which are in turn screwed onto the liteply nacelle formers. These formers are cut such that they can



The tail is a very simple flat built up structure.

be glued to the sheeted leading edge of the wing. But the plastic nacelles have to be fitted over the nacelle formers before gluing to the wing. This proved to be a very fiddly job as it is difficult to get the motors perfectly aligned and with the 3 degrees down-thrust specified. The thought of six motors all pulling in different directions did not appeal.

The solution was to tack glue the nacelle formers in place when aligned using card templates. Then small pegs were glued into the leading edge sheeting each side of the formers to positively locate them. The formers could then be removed, the plastic nacelle slipped over the former and the assembly fitted back onto the wing guided by the pegs.

This could all be engineered to be a lot simpler and make for a more accurate assembly. It took the best part of two weeks of evenings to fit all the motors.

Covering

The instructions suggest that heat shrink film or Litespan type materials can be used. I used mylar and tissue for lightness and extra torsional rigidity. For a full explanation on this technique see George Stringwell's article "Add Lightness with your covering" in the March/April 1996 issue of EFI.

A little research indicated there is not a great deal of choice in colour schemes. Not being a fan of "can't see me" camouflage paintwork for flying models ("I last saw it above the tree line...") I chose to follow the box artwork and sprayed the model in desert colours with Tamiya acrylics.

This was the first time I have used acrylics and I found that they airbrushed very well in the freezing conditions of my garage! But I had a problem in that using only one coat of thin dope on the tissue meant that it was not sealed sufficiently for these water/alcohol based paints. Consequently the final surface finish is not as good as I would like in some areas although it's probably better than the full size!

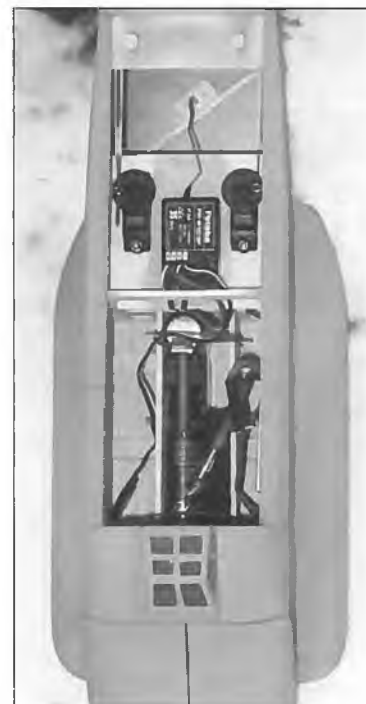
One further example of the



Vacuum formed plastic mouldings are supplied for the fuselage doors, engine cowls, nacelles, undercarriage fairings and cockpit, so all the difficult shaping is done for you.



The desert colour scheme made identification easy in the snow!



There is absolutely loads of room to fit the radio gear.

thoroughness of this kit is that the self adhesive decal set has masks for the canopy windows, a very nice touch.

Final Assembly

There is absolutely loads of room to fit the radio gear. I used Futaba 143 servos and R103F micro receiver. Motor control is by the recommended Graupner Pico Mos 33, and the BEC facility effectively makes the R103F a four channel receiver.

The only problem I had was that the plan recommends differential on the ailerons. But I could

not achieve it with the mechanical set up shown so I hoped that the washout would compensate.

The covered and painted air-frame without radio gear, motors and battery weighed in at a very creditable 23ozs (650g). With the radio gear, motors, seven 1700SCR cells and 1/2oz of tail-weight the model now weighed 54ozs (1530g). This is 4ozs (113g) less than the target all up weight stated in the specifications, which I presume included the use of the lighter 1400AE cells as recommended by Graupner.

The Flying

The model was finished one Sunday morning and that same afternoon we had near perfect conditions for test flying. It was however very cold and the desert colour scheme looked a bit silly in the snow! Final checks at the field showed everything to be in order, or so we thought, including the all important range check with the motors on.

With the motors and adrenalin going full throttle club mate George Stringwell gave the Gigant a perfect hand launch. It responded with a soggy climb to 10 feet and then a long descending left turn until the ground arrived and it scuttled down the bank at the side of the field.

This was not going to be a "it flew off the board" review! The Gigant was retrieved, some right trim dialled in and a little lead added to the tail. A second perfect launch resulted in no climb whatsoever but at least the descent was in a straight line.

Third time lucky we thought. So a fresh pack of cells where loaded up and George pulled off a third perfect launch and this time: Eureka! A smart climb out and straight into turbulence from the trees gave a few anxious moments. A hasty retreat to the back of the field was made into



You can get at the battery pack two ways.

smoother air. With the throttles eased back the Gigant started to behave in a stately manner.

It is a very distinct shape in the air and with that marvellous sound that comes from multiple motors on song it is most impressive. With numb fingers and adrenalin overload I eased the Gigant into the approach, throttled back and she went into a rock steady gentle descent. The landing was a perfect ten pointer in flurry of snow!

First Flight Postscript

On return to a nice warm workshop I checked the first set of cells which where in fact a brand new pack. The cause of the lack of oomph was found to be one cell welded the wrong way round into the pack! It was extremely lucky that the cell did not explode during charging. Being brand new and from a commercial source I had assumed the pack would be fine and had not checked this one item.

The lesson learned is simple. Take nothing at face value and double check everything.

Summary

Graupner describe this as a quick build kit and I think that is a fair description if you consider there are over 400 parts to assemble and some operations have to



Wiring for motors is built into a conventional D box wing.



Basic construction complete, it could be a glider!



be done six times! The fitting of the motors and nacelles is my only real criticism. If you enjoy building then you will find the Gigant very enjoyable.

From a flying point of view this model has clearly got a lot to offer. The motor and prop combination appears to work well, and the fact you have to throttle back to achieve a realistic speed should make 8 to 10 minute flights quite feasible with 1700 cells.

It is certainly not an aileron trainer or for that matter an aerobatic model. This is a model for atmospheric low slow fly bys, chandelles, and touch and goes all done with that magic multi sound. I am really going to enjoy getting to know this model. Well done Graupner.

My thanks to Gliders and EFI for the chance to review the Gigant and to club mates George Stringwell and Gordon Johnson for help with the construction, flying and encouragement.

Review model kindly supplied by Gliders of Newark.

TECHNICAL SPECIFICATION

Wingspan	1660mm (66")
Length	860mm (34")
Motors Graupner	6 x Speed 280
Props Graupner	3 Bladed 11 x 7cm
Cells	7 x Sanyo 1700SCRC-SP
Weight as built	1532g (54oz)
Wing loading	54.7g/sq.dm (18oz/sq.ft)



Thing-ohmy

Kit reviewed by Martin Bailey

SOAR AHEAD SAILPLANES

Background

The "Thing-ohmy" is a fairly recent addition to SAS's ever expanding, popular range of slope soarers and power models. As the name suggests, it is an electric model, based on their "Thing" series of flying wings. At Sandown I spoke to the ever-pleasant Alan Head, who explained that he had developed the model from the 1.5 meter "Thing" slope soarer, equipping it with the slightly larger "Power Thing" fuselage in order to accommodate the standard 7 cell nicad pack and Speed 600 sized motor. Despite having resolved not to buy any more kits, money changed hands and yet another large cardboard box found it's way back to "Bailey Towers".

Kit Contents

First inspection of the kit contents reveals relatively few components. However, this shouldn't be so surprising when you consider that the model has no tail and little in the way of a fuselage!

What you do get for your money is: A pair of pre-cut plywood fuselage sides, a bundle of good quality strip and sheet balsa and plywood, pre-shaped balsa parts for the fin and wing tip blocks, a fibreglass wing joining

bandage, a plastic bag containing fittings (horns/hinges/pushrods etc.), a "Thing" self-adhesive decal, and a pair of excellent quality foam veneered wings. The wings in my kit were amongst the best I've seen. There were no obvious flaws in the veneer, which seemed to be well adhered to the foam cores and all of the cut edges were nicely finished without any evidence of tearing or roughness. Also included in the kit was an A5 sized 8 page instruction book and an A3 sized sheet showing reduced scale side and plan views of the fuselage.

Construction

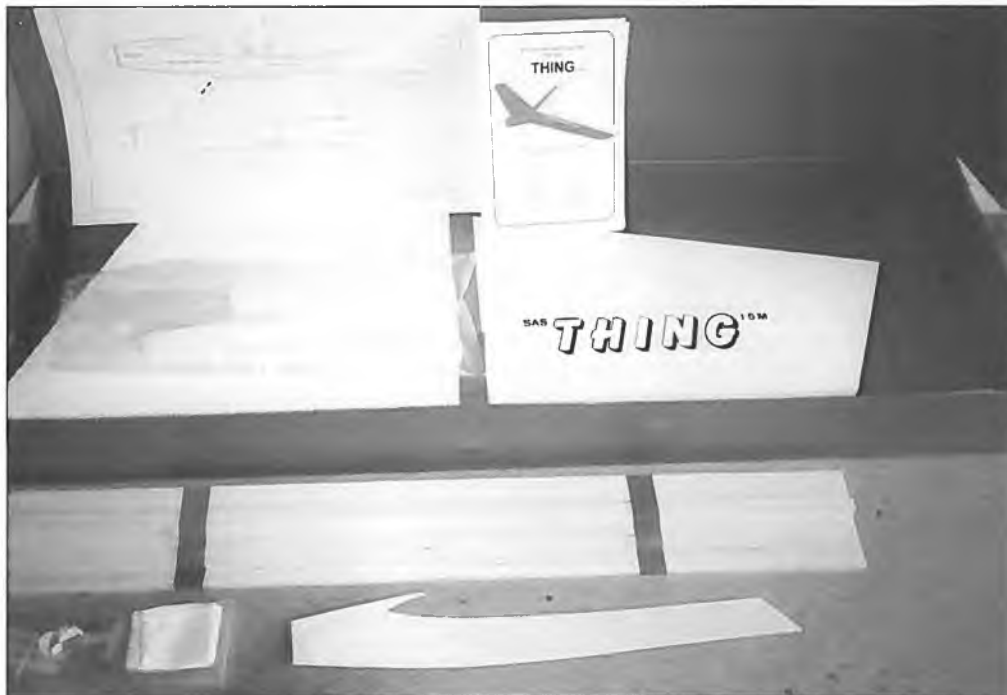
The leading and trailing edges and wingtip blocks are glued onto the wings and shaped to the

correct section.

Various rectangular and triangular strips are affixed to the pre-shaped plywood sheets, in order to form the fuselage sides. After drilling some cooling holes, these are then set aside whilst you tackle the first of two slightly awkward jobs that will be encountered during construction – the positioning of the servos!

The servos drop horizontally into a well that is cut into the lower surface of the wings and then each servo slides outwards into rectangular recesses so that you end up with the main body of each servo buried in the wings and the top section of the servos protruding into the centre well. I formed a "U" shape from a piece of wire to the same dimensions as my (standard sized) servos, and inserted it into my "Weller" type soldering gun in order to scoop out the foam. The holes are lined with balsa sheet and the wings can then be joined using epoxy resin, reinforcing the joint with the supplied fibreglass bandage.

After adding balsa reinforcing strips to the lower surface of the wing, the previously prepared fuselage sides are glued into place, trimming the wing cut-outs as necessary in order to achieve a close fit at the leading edge. The 3mm plywood motor bulkhead is drilled to suit your choice of motor and is fitted into place, bending the fuselage sides inwards as necessary. (a few razor saw cuts in the triangular reinforcing strips makes this job a lot easier). Further pieces of thin plywood are glued into position, forming the upper and lower front fuselage sheeting and then it's out with the razor plane



I first saw the model at last year's Sandown Park Model Expo. I spotted a futuristic looking flying wing which I at first took for a glider since it was circling at height. However, the "glider" then swooped down at a not inconsiderable speed and tore along the flightline performing a couple of four-point rolls before climbing almost silently away. Even taking into account the designer's ample flying experience and ability to show his models to their best, this was fairly impressive stuff!

and sanding block again, to remove the corners from the front section of the fuselage, producing a nicely rounded nose section. I added a further piece of 3mm balsa sheet onto the motor bulkhead at this point, to fill in the gap between the nose and my chosen prop driver/spinner.

The two pre-shaped fin parts are glued together and sanded to a streamlined section and the resultant assembly is epoxied into place, adding triangular reinforcing/fairing strips for extra security.

Three strips of polyethylene foam (supplied) are added to centre of the wing and the inside faces of the fuselage sides. These support and restrain the nicad pack and they seem to be a quite elegant solution to the problem of how to prevent the pack from moving under normal flight loads whilst still allowing it to slide free when subject to extreme forces (crashes to you and me!)

A thin plywood sheet is added, forming the lower rear fuselage sheeting and the fuselage is completed by gluing two small tongues onto a piece of plywood, forming a hatch that can be "sprung" into place between the front and rear fuselage floors.

Time now for the second awkward part of construction:- shaping the elevons!

Firstly, the 2 elevons are cut from a single 100mm wide sheet of balsa. They then have to be chamfered to a "trailing edge" section by planing away their undersides only. I found that the job was made a lot easier by marking the intended thickness on the rear edge of the elevons using a biro and then using double-sided tape to secure them on the building board before carefully planing them in a root to tip direction. Angle the leading edge of each elevon to allow for thirty degrees of movement each way and then trim them to the correct length.

Finishing

I decided to have a try at glass skinning the model and had problems in getting a satisfactory finish. The colouring agent that I used in the resin mix, instead of producing a nice translucent finish, left the model looking like a toddler's first attempt at finger painting. At this point I shed a few tears of frustration, let out a little whimper and kicked the cat. After several pints of anti-depressant at the local pub, I flatted back the surface as best I could and sprayed the model with white and red car cellulose.

Installation

The Kyosho "monster truck" motor was screwed into place and an Aero-naut 8 x 5 folder with matching 42mm spinner was added to complete the power train. Two JR 507 servos were positioned in the wing recesses. The elevons were top-hinged using Sellotape's "diamond" tape and were connected to the servos, utilising the supplied wire pushrods, quick-links and control horns. The receiver and speed controller were packed in foam rubber just behind the motor and the receiver aerial was run back to the starboard elevon where it was routed out to the wing tip, via a tube carefully recessed into the trailing edge strip. The flight nicad, as previously mentioned, is a friction fit in the foam strips. The illustrations show the pack installed at the extreme rear of the fuselage but I found that I had to move it quite a way forward in order to achieve the recommended balance



point. This repositioning is probably due to the extra weight of my glasscloth and paint finish, aft of the balance point. (Alan's prototype was covered in Solarfilm) I programmed my radio to give the recommended movements on the elevons and checked the weight of the completed model. Mine weighed in at 57 oz, compared to the prototype's 51 - 52 oz.

Copy date drew nigh, so undaunted by the sub-zero temperatures and the slight Easterly breeze we wandered across onto the field and a freshly charged 7 cell pack was installed into the model.

After a final check of the motor and radio, I applied full power and my companion hurled the "Thing ohmy" skywards. The power from the 7 cell pack and "Monster Truck" motor was more than adequate to haul the slippery airframe up through the low-level turbulence at an impressive speed. Once clear of the "bad" air, the model gained height rapidly and I performed a few turns in order to keep the model within the confines of the field. The control response was excellent, even on 70% rates and under power, the "Thing-ohmy" seemed to fairly hurtle around the sky! Closing the throttle produced a fast, positive glide with no trim changes being required. The model was slowed down and up elevator was progressively applied, to investigate the stalling characteristics. Hmm! — a bit of a non-event really. No wing drop was evident and the model just mushed downwards, with it's nose "bobbing" up and down slightly as it descended. After applying power and climbing out again, it was time to try the roll response. Full left aileron was applied and the model rolled 360 degrees in about 1 second (this still being on 70% rates!) The roll rate on the glide was checked and wasn't noticeably slower. With the daylight fading and the breeze freshening somewhat, it was time for a landing. A few more rolls and some steep turns soon had the model down to a reasonable height and it was brought round in a tight circuit, keeping the speed up in order to cut through the (increasing) low level turbulence. The "Thing-ohmy" behaved impeccably to the last, skipping off the top of a frozen tussock and sailing along quite happily for another 40 feet before sliding gracefully to a halt.

The model's second outing was, sadly, it's last! An old friend was visiting us over Christmas and I was keen to get his opinion on the model, particularly since he had some experience of aerobatic flying wing slope soarers! During this session, we both put the model through it's paces. Loops, rolls, reversals and bunts were performed with ease. Inverted flight was good, with little down elevator being required. With power on, the aircraft would easily climb away inverted and whilst gliding, the smallest of dives produced more than sufficient speed for the looping manoeuvres. High speed low passes were carried out, the model swooping almost silently past us (the lack of noise indicating a low drag airframe) and the excess speed was readily converted back into height.

Steve's summary of the model's flight performance was "This is great! I might just take it home with me!"

Unfortunately, these words proved to be the "kiss of

death" for the model! Whilst flying straight and level slightly upwind of us the model twitched a couple of times, as though suffering from some slight interference. Steven handed me the transmitter and the aircraft seemed OK as it was turned downwind. My plan at this point was to keep the model as close as possible and to land it immediately). Unfortunately, the model had other ideas and gave another couple of twitches before dropping into a full power, vertical roll. Closing the throttle and applying various control inputs had no effect whatsoever and the model struck the ground at sickening speed. The initial impact point was marked by the nicad pack and speed controller. These were still actually connected to the motor, which had been driven some six inches into the semi-frozen earth (it took us a good few minutes to dig it out!) The airframe had bounced off to a distance of twenty feet from the impact point and the receiver was found some ten feet past that!

The post-mortem highlighted some interesting points. The vertical impact had destroyed the nose area of the aircraft and had crushed the first couple of inches of both leading edges out to about mid span. To the rear of this the airframe was largely undamaged, suffering only minor chipping to the elevon tips. A better man than I might have attempted a repair job but

since I've never been entirely happy with a rebuilt aircraft I just decided to scrap it and build a new one instead. I don't think anyone need have any worries about the inherent strength of the model. I suspect that it's tough enough to just laugh at your average "arrival". As to the reason for the crash — It's either the receiver or it's crystal, neither of which work now. However, if one of these was the cause or effect of the crash, I suppose will never be known! and it was only my choice of a glass finish that made just one minor modification necessary, this being the omission of the recommended "slide-in" angled former just in front of the flight battery (because of having to reposition the pack for balance purposes).

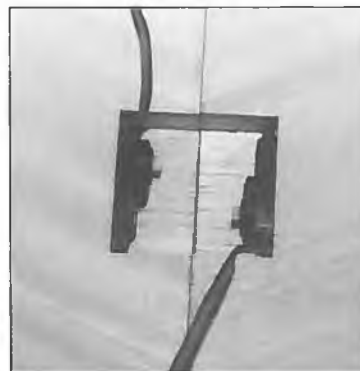
Summary

An interesting design, the "Thing-ohmy" is, to my eyes at least, quite an attractive and futuristic looking aeroplane. No problems were encountered during construction. Alan Head told me that his objective was to produce a "fun" model, capable of soaring and basic aerobatics yet able to accommodate standard sized radio gear and to be adequately powered by the ubiquitous "7 cells and speed 600". I think he's certainly achieved it with this model which flies incredibly well. As a bonus, the kit goes together easily and quickly and it isn't even very expensive! (current UK cost, approx. £44 plus P&P)

Overall — I think it's great and I'm DEFINITELY going to get another one. I'm just curious now how it would perform with a small cobalt motor? (and I'm sure there's room for ten cells in there!) Watch this space!

Credits: Steven Sheppard, assistant test pilot.

PS — For Animal Lovers, only kidding about kicking the cat! !



Model specifications

Span	1500 mm (60")
Length	725 mm (29")
Wing Section	unknown!
RC gear	Micron Rx. JR 507 Servos, Speed Controller
"Ken Hewitt/RCM&E"	
Flying Weight	(7 x 1700SCR) 1596g (57 oz)
Wing Area	45.9 sq.dm (5.1 sq.ft)
Wing Loading	35g/sq.dm (11oz/sq.ft)
Drivetrain	Kyosho "monster truck" motor and Aeronaut 8 x 5 folder
Drivetrain performance (static)	9700 RPM at 27A

Cells

There are many brands of motors but only one brand of cell used by F5B competitors. The standard battery pack for F5B flying is 27 x Sanyo N-1000SCR. The cells are end-to-end soldered usually in strips of 6 or 7 with bridging connectors soldered across the ends of the strips. Male and female connectors are soldered direct to the caps and cases of the cells. The Battery pack must not exceed 1100 grams in weight, including connectors.

Everyone uses matched cells, what else can you do to get the most out of your cells? The top F5B competitors this year had 'boosted' cells. They had a slightly higher operating voltage and when you have '27 times slightly' you have gained a noticeable advantage. The technique is no longer shrouded in secrecy but it is still a bit of a mystery. 'Orion' were I believe the first to discover that a cell's voltage and possibly its capacity can be increased by connecting it briefly to a high voltage source before it is ever charged. The cells were boosted by connection to a 'big' capacitor, not an easy task and reported to be first achieved with the help of a stainless steel spade! A lot of F5B

F5B news

by the editor

We all benefit from the gains made by competitors. It is worth keeping an eye on any developments to achieve more with the electric power systems. F5B pilots do their utmost to get "The Most" out of their models. Some of the benefits they accrue can benefit some of us immediately. All the advancements they make will eventually help all of us.

pilots are said to be working out how to boost their cells.

More from your cells

Eraldo Padovano, Italian F5B team manager since 1986 had also been wondering how it

might be possible to get a little more out of one's cells. He noticed in 1994 at Wangaratta that the USA team (who won the 'team prize' and one of their team, Jerry Bridgeman, won the world championship) were performing 4 legs per climb in the distance task whilst everybody else flew 6 legs, or more.

Eraldo used his own "little grey cells", did some of his own testing and was sure that this needed investigating properly. He has been kind enough to tell us how he did this and to send us the results.

"I decided in mid-1995 that it was time to do some accurate instrumented testing, with the aid of the Industrial Electronic Department of the Polytechnic of Turin, and testing began in October 1995. Calibrated instruments were set up to measure and record: voltage, current, temperature and time.

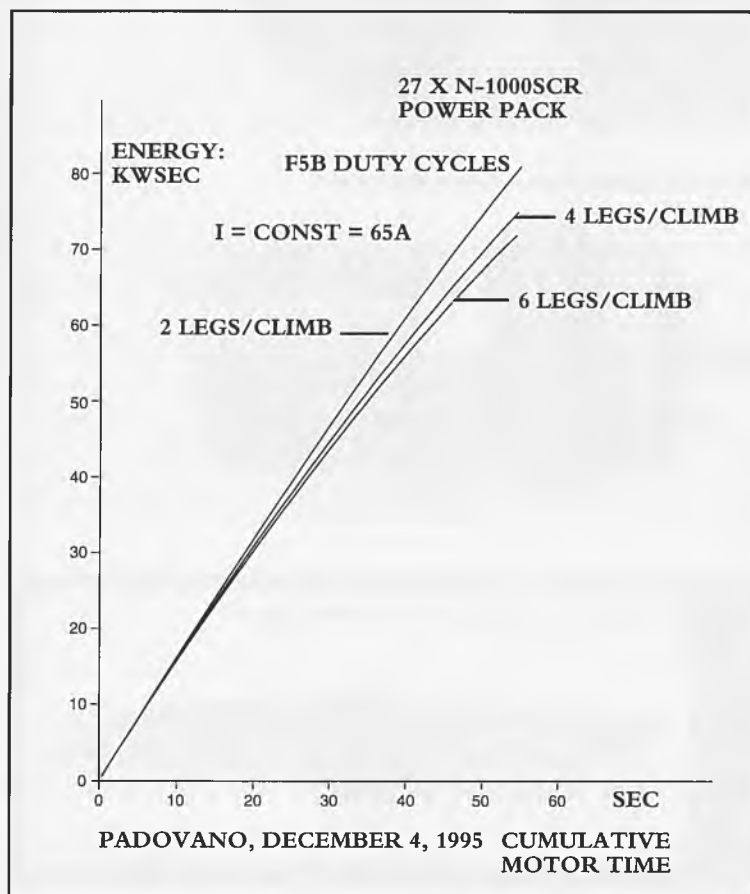
"The tests consisted of charging the battery, beginning at a controlled temperature of 22°C at 3A with a delta peak cut-off plus one 'boost' of 4 minutes. The temperature of the battery at the start of the discharge was controlled, always at 34°C. The discharge cycle replicated: climb, followed by legs with motor off, then climb, and so on.

"To be sure of consistent and reliable results I had to repeat each test many times and daily check the instrumentation. The total thickness of all the collected papers with readings, tabulated data, recorded diagrams of voltage versus the elapsed time is about half an inch!

"At the beginning of December I had the results in the form of this graph I have drawn for you. Flying 2 legs instead of 6 legs shows an increase in the output of energy for each climb of about 9.5%! Here, nobody believed me when I showed the results of my work. OK, but believe me when I say I was not surprised when I saw the Americans doing this, and the Germans too at Benesov. There is another advantage; when you fly two legs you spend less time gliding because you avoid all the gliding time outside base A.

"This has to be quantified soon with the aid of a S/W of flight mechanics, that does such calculations and is available to us."

Saluti, Eraldo Padovano.



Current Affairs.

So many products – so little space! We are still showing you products ‘discovered’ by the editor in the Czech Republic last year as well as those from the regular sources and a selection of those not at the Big Fair, reported earlier in this issue.

MORE GEARBOXES

Jastron A6 dismantled. Centre is the cup that mounts on the motor, still on the motor and with layshaft still in place. The larger diameter disc with output shaft resting on it is the centre insert with ball rear ball race for output shaft and the smallest black disc here is the front of the gearbox with mounting screws.



Illustrated here is just one of ranges of accurately made gearboxes for 400 and 500/600 size motors. The ratios ranged from 2.5 to 6:1. Almost all of them are the same diameter as the motor, the exception being this with a ratio of 6:1. The cases are machined from aluminium and all use four spur gears like the similar Ludwig/Simprop and Graupner gearboxes. As you see in the photo of the dismantled unit the output shaft uses two ball races. The editor's Czech is about zero but he thinks the product name is 'Jastron A6'.

The manufacturer is Jan Sedlacek, Cechurova 1892, 193 00 PRAHA-HORNI POCERNICE, Czech Republic.

Jastron A6, 6:1 ratio gearbox on a Speed 400 motor.



Lightweight folders

This is one of a series of lightweight folding props by 'F AIR' spotted in the Czech Republic. The red blades are plastic mouldings and so is the black spinner and spinner backplate. A useful feature is that the aluminium insert with collet fixing for securing to the motorshaft is removable and available in three sizes to suit 1/8" (3.17mm), 4mm and 5mm motor shafts. Available from F AIR, Vlastimil FAK, K Hajence 661, 391 02 Sezimovo Usti, Czech Republic.

F AIR, 230 x 120mm, 9 x 5" folding prop.



Small models

There are still few RC model kits available for the very small RC gear we can now obtain. There are however quite a few rubber and CO2 kits that convert easily – and they are the right weight. Here are two 'Modela' kits intended for CO2 motors and one 'Flying Styro Kit' for rubber.

The Modela kits are for builders. The 740mm (29") span 'Itoh' is a modern looking cabin monoplane with tricycle undercart and very open structure but the wing ribs are actually injection mouldings, to provide the builder with a precisely consistent wing. The 'Messenger' is a scale model of an early American biplane trainer with a span of 580mm (23"). Construction is all balsa 'stick and tissue' but items like wheels, dummy engine, wheel and wing mounting struts are moulded plastic. These could be very light electric free flight models and even light radio models. Manufactured by: Modela s.r.o., Brezinka, 538 41 Podhorany u Ronova n/D, Czech Republic.

The other lightweight is made from vac-formed self-skinned polystyrene sheet with vac-formed nose and wheels. It is supplied with a rubber motor and plastic prop. This prop is the heaviest item in the kit and the rubber is not far behind so an electric motor and battery may not increase the weight. This one could take radio as well because the wingspan is 780mm (31"). It comes with decals saying 'Flying Styro Kit' but other models have this logo on their boxes implying that this is a brand name rather than the name of this product. Perhaps it was the first in the range, all these parts are actually sold in a polythene bag. Manufactured by: Flying Styro Kit by spol s r.o., Obfanska 60, 614 00 Brno, Czech Republic.

Interested importers should contact the manufacturers. Builders can contact The Electric Aeroplane Company, who have a few.



All plastic 'Flying Styro Kit', see 'Small models'.



Modela kits, see 'Small models'.

ROBBE TIGRA

You were first shown this model when it appeared at Nürnberg almost one year ago. It is now available and very smart it looks too! Urs Leodolter who has been high in the list of world class F5B pilots since he was in his teens and an aerobatic champion in his own country is credited with a lot of the work in this model.

The wing profil is MH 43, a section already used in fast pylon racers and recommended motors are Robbe 420/8 driving direct a 10 x 6 prop, or Sports 420/5 Planeta or Pro 330/5 Planeta with 12 x 12 props.

For all these combinations a 12 cell pack is recommended.



The Robbe Tigra.

Dakota

The DC-3 and its military derivative C-47 is said to have changed history. It almost invented air passenger transport and is one of the favourite subjects for flying model twins. This is not the first DC-3 kit for electrics but it may be the easiest to build. Velkom have produced a very comprehensive kit. If you still talk to pilots of IC models, tell them there is a version for 2 x 1.5cc glow motors. Suggested power plants are 2 x VM 24/12 motors and 14 x 1700mAh cells, or 2 x Speed 600 motors and 14 x 1000mAh cells. When the editor photographed it in August it was not in volume production or for sale or he would have purchased one but it should be by the time you read this.

You will see in the photos an epoxy/glass fuselage, veneered wings and tail, vacuum formed engine nacelles and other parts awkward to carve and bags of components like wheels. Wingspan is 1810mm (71"), length 1150mm (45") and weight 2.3 to 2.6kg (5 to 5.7lb) according to power plant, wing section is NACA 2412.

At the time of the photographs no prices were available and outside the Czech Republic they would be somewhat different anyway. Enquiries to the address below and please notice that the kit address is not the same as the motor address. Velkom Model, Na Betonca 114, Praha 5 Radotin, 153 00, Czech Republic. Tel: ++42 2 64 37 731, fax: ++42 2 64 37 732.

Vac-formed Dakota engine nacelle.



Velkom Douglas C-47 Dakota sits on a box with its nose pulled off to permit removal of battery pack.



Dakota kit components.

GRAUPNER CFK FOLDERS

The range of superior Graupner CAM Gear Props and CAM Folding Props continues to grow and for pilots that require really strong folding props there is the CFK series made with continuous carbon fibre, woven carbon and epoxy. There are two sizes of CFK props available so far: 36 x 24cm (14 x 9.5") and 38 x 20cm (15 x 8").

Some sizes are duplicated in 'Gear' 'Folding' and 'CFK' so check the sizes and type before you buy, you need the right type and it can make a big difference to the price.



CFK Folding Prop, you can see the extraordinary standard of finish. What you cannot see in this photo is the woven carbon showing through the transparent epoxy resin.



Eric Leadley with 'Plankton'.

PLANKTON

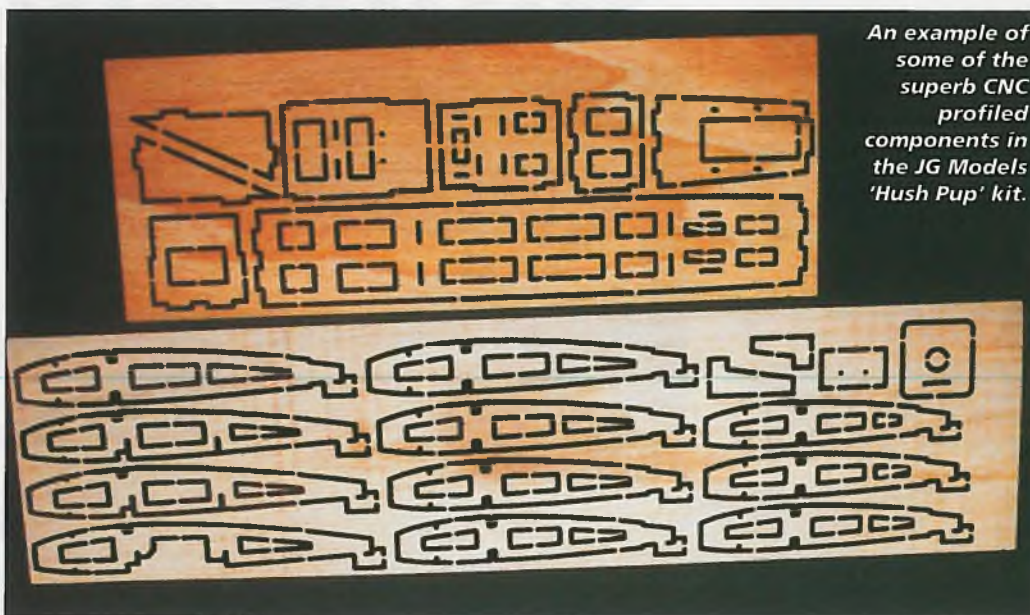
Eric Leadley of EDL Plans designs new models about as quickly as we publish new issues of EFI. His latest is a flying wing plank appropriately named 'Plankton'.

His intention with this one was to have a model that would be able to use a number of different power supplies, i.e. motors and batteries. He wished to keep the weight down so that he could also use small motors, so it has open framework and laminated tip outlines. Instead of LE sheeting he has used the same system for stiffness as he used on his Lazy Bee, covering the LE area with heavyweight tissue and dope which makes for a very stiff, light wing. The main spar is of spruce strip with vertical webbing and the main covering is Solarfilm. Eric says it 'flies as steady as a rock and circles up in the slightest of lift'.

Wing span is 64" (1620mm) and chord: 11.5" (290mm). Airframe weight is 14.5oz (392g). Standard gear fits and a separate sheet is included to show how to fit the controls if you have no electronic elevon mixer. The following power supplies have been used in this model. Speed Gear 500 and 600 with 12 x 6 and 12 x 10 props. Direct drive 600 with 8 x 4.5 prop. Speed Gear 400 with 12 x 10 prop. Two Speed 400s with 6 x 5 props. Three Speed 400s with 6 x 5 props. Keller 22/12 with a 12 x 6 prop. All these on 7 sub-C cells except the Speed Gear 400 which used 7 x 600s.

HUSH PUP

'JG Models' is a new name. Proprietor John Griffiths has started his range of models with an electric aerobatic model for 600 motors, called 'Hush Pup'. This is a builder's kit but everything is provided, you get a lot of wood for your money: £47.50 in the UK, plus postage. All shaped components are CNC cut for you, making construction the only task. There will be a full kit review, construction and flying, in the next issue.



An example of some of the superb CNC profiled components in the JG Models 'Hush Pup' kit.

South Downs Designs have released their first plan, of an electric powered V tail model glider. Their intention is to create a sports type model glider which will serve both as an electric soarer and a light wind slope glider by means of a detachable electric power pod. Full size plans which consist of two A1 size CAD generated sheets are now available along with three A4 size self adhesive template sheets.

The template sheets are to enable the modeller to simply cut out and stick former templates, wing ribs, etc., directly onto sheet material and cut out as required.

South Downs Designs tell us the model flies well from the flat and off the slope, with or without the electric pod. The model uses the Graupner 'Benny' electric power pod which houses a Speed 400 motor running off seven 600mAh cells. Full details are given on the plan. The plan and template sheets cost £7.99 plus £1.50 postage and packing. Details are available by enclosing a SAE or contact by phone or fax.

South Downs Designs, 25 Milton Court, Milton Road, Worthing, West Sussex, BN11 3NN. Tel & fax: 01903 205031.

ASPECT 400



South Downs Designs 'Aspect 400'.

MEGA



All the Mega bits, see text.

Karel Matyas does not only manufacture Mega motors. He makes and sells a lot of other items of use to electric fliers. You will see in the photo, on the right of the display board his regular motors, starting at the top; Mini series, Midi series, S series, L series, FAI series and finally the Pattern 24 motor.

Top left are displayed two different types of gearbox, each with the option of five ratios. Below these are aluminium prop centres with five different spacings for prop blades, according to your requirements for clearance to fold on different diameter fuselages.

Also offered are two prop centres with plus or minus 1.5° pitch change when you are fine tuning for performance. The three blade centre could be useful too if you do not have space for two long blades. The editor purchased one of these from Karel in 1994 and finds it most useful (but you do need to buy an extra pair of blades!). In the bottom row are three collets for three motor shaft sizes and two small relay switches for 15A and 35A use.

Availability: check with your Mega dealer, Modellhaus in the UK, or Karel Matyas, Zahrebska 27, Brno 616 00, Czech Republic.

The RowanAir Sunbeam is a big brother to the similarly winged 'Spider Glider' reviewed last year. Sunbeam is more versatile too. It has been designed to accommodate standard size radio gear, use a direct drive 540 or 550 motor and a 7 cell power pack.

All this makes it a good trainer, or you can build the aileron version and use it as an aileron trainer or real fun machine. 'Fun options' are available like the lighting unit for night flying and the 'piggy back' glider cradle to carry the 'Sunlight' glider.

Available from: RowanAir, 27 New House Lane, Gravesend, Kent, DA11 7LP. Tel & fax: 01474 322226. Price £34.95 plus £3 P&P.

Sunbeam

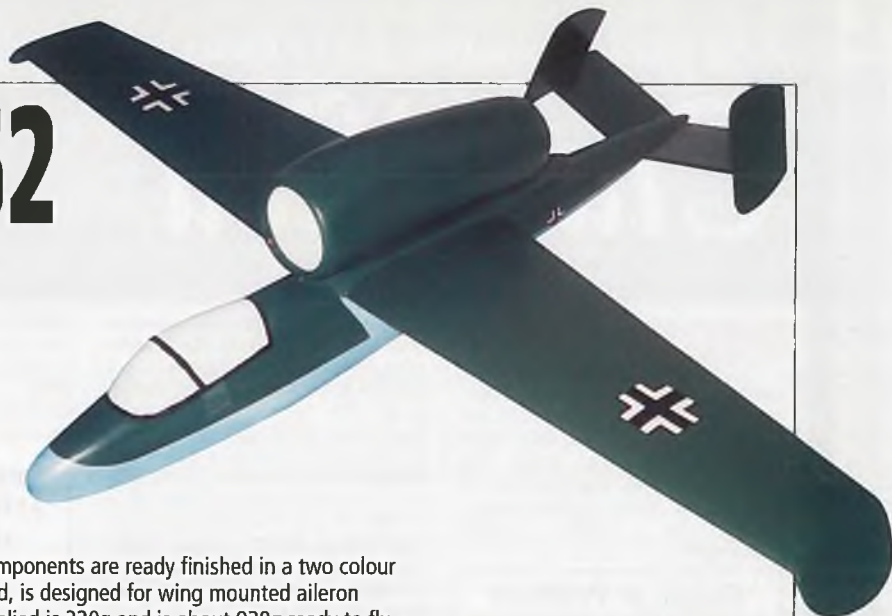
RowanAir Sunbeam



Easy motor installation in the Sunbeam.

Heinkel He 162 Salamander

This WW2 jet is the choice of many for a first jet model and is similar in layout to the plan feature Henschel 132 in this issue (just in case you were getting confused with spelling and numbers!). This 970mm (38") span model is designed for 400 motors and fan units. The fuselage and wings and jet pod are hollow moulded epoxy/glass and the tail unit balsa sheet but all components are ready finished in a two colour scheme. The MH32 section wing has control surfaces already hinged, is designed for wing mounted aileron servos and is claimed to give excellent performance. Weight as supplied is 320g and is about 930g ready to fly. Available in the UK from: Brain Anderson, 206 Hilda Park, Chester-le-Street, County Durham, DH2 2JX.



Heinkel He 162.

FVK Models

Brian Anderson imports into the UK models from FVK Modell, Germany, but will export them anywhere. They were busy last year and offer some interesting new models or additional options for existing ones.

The Elektron is now offered with a GRP fuselage. This ready-built model with Solarfilm covered wings and ready hinged rudder and elevator is an excellent introduction to electric flight and involves no building. The model just needs a Speed 400 motor and RC gear installing and you are ready to go. Span is 1.5m (59") and weight about 600g (21oz) depending on equipment used.

FVK Elektron.



MINI SPITFIRE

This model is designed for Speed 400, 480 Turbo or LRP 400 motors (and some even fly them PSS on the slope). Fuselage and wings are both moulded and tail surfaces shaped and epoxy pressed.

The model is supplied painted camouflaged, with blue undersides and green top surfaces, you add your own brown (or grey) upper colour. It is not silver like the one in the photo. The wing is designed for aileron servos in the wing and ailerons are ready hinged.

Wing retaining screw plate and motor mount is fitted, all you do is install RC, motor and fly. This is electric flying made easy. Wingspan is 800mm (31") and weight as supplied is about 200g. Available from Brian Anderson.



Mini Spitfire.

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HITEC Focus 4 combo, 2 mini servos, 3 standard servos, Micro-Star 20 BEC/B speed controller, 2 sets 8.4v Sanyo SCRC nicads, Speed 600 BB motor, fast charger, trickle chargers, hardly used, £190. 0116 2787456 (Leics).

ASTRO Mini Challenger already built, covered in Fibrefilm £30 ono. Astro 035 motor with Astro spinner hub etc. £40 ono. S. Jardine, 5 Robin Hood Way, Kingston Vale, London SW15 3PW.

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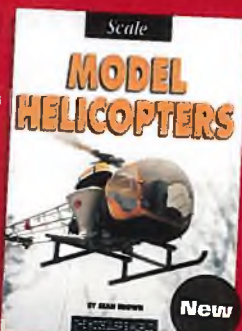


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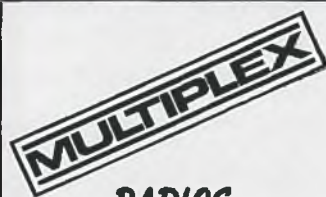
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