

Electric Flight

*The Magazine for
Switched on Modellers*

International

January/February 1997

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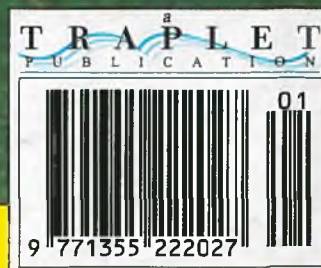
Ducted fan Henschel 132 Plan Review

Graupner 700 Geared and Aveox Motor Tests

Junior 60 and Substitute E Kit Reviews

KRC, Aspach, Inter-Ex Event Reports

ELECTRIFYING A SIG KADET SENIORITA





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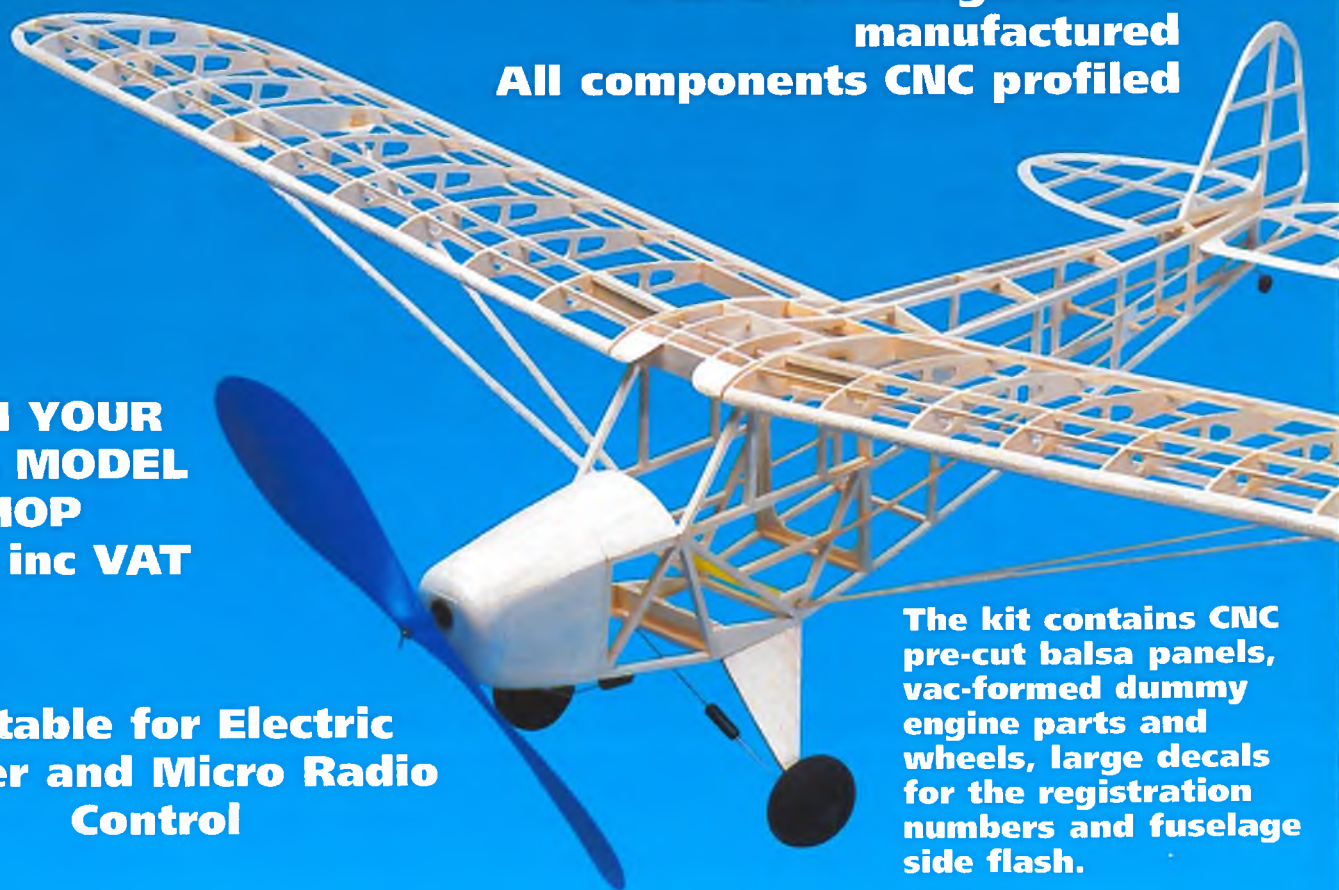


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Contents.

Editorial	4
It is 1997!	
Cover Story	6
Twelve engined Dornier Do X	
Australian Sport	10
Conversion of a reliable IC trainer	
Motor test	14
Graupner Speed Gear 700 2.7:1 9.6V	
Inter-Ex	17
Only the unorthodox is permitted	
KRC 96	22
Exciting electric in the USA by Dereck Woodward	
Quiet scale	28
Advice on charger safety and model covering	
Scale for electric	32
Planning your next model	
Aspach 96	34
New model developments in Germany	
Junior 60 kit review	43
Vintage kit for electrics	
Henschel 132	46
Plan review for a ducted fan aerobatic trainer from Sweden	
Pylon Racing	51
Test of an Aveox brushless motor	
Letter from New Zealand	54
New old models for the Spring	
Substitute kit review	56
Fun lightweight or trainer	
Current Affairs	60
New products	
Classified Adverts	64
Bargain Basements	
Shopper's Directory	65
Where to get it	
Next Issue	66
Coming soon!	



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Editorial.

Happy New Year! ...to all of you.
'New Year Resolutions' I am told sel-
dom last long but the start of the new
year is a good time to plan ahead. For
most of us it is the middle of the 'off season' so it is the
building season to the more disciplined amongst us who
have time to build. There is a variety of models and
equipment for you to peruse in this issue; you will be
doing your own planning for the year, so I want to tell you
what you can expect from us.

Planning

"The good thing about forward planning." One boss of mine often told me (and he was the company's Product Planning Manager) "Is that you can change them!" This way 'Five year plans' got changed every month. At first I thought this was crazy. A lot of the design work I was doing was 'shelved' or just went in the bin but what irked me most was the fact that every month I spent days laying out by hand (the only way in those days!) charts and graphs of... never mind; what is important is that I got the message.

Planning involves time and office equipment, no major expenditure on capital equipment or materials or commitment to others. I later worked for one company that ONLY designed products that were unlikely to be needed, but if they were we just opened a cupboard and pulled out an appearance or working model that I had built; then things began to hum.

It's the same with our models. We think, we design, we plan, then we decide what we can afford to build and fly. Don't spend too much time planning or you won't get the opportunity to fly in 1997.

This year

The important 'message' I mentioned above was that it was still possible to change. This is still true as I edit this magazine. I need to keep an eye on what is happening and redirect what we provide for you to read. There are many thousands of you out there with



Dennis Tapsfield's Miller Special, plan available soon.

similar interests and requirements. We satisfy the needs of the majority but we try to provide for as many minority interests as we can too. Thankyou for your letters that confirm what you like and the ones telling us what you don't like, or what you want but don't get, each is as important.

So where are we going in 1997. I have always wished to provide guidance for beginners but had hoped that we would not need to repeat any 'How to start' articles, you only learn once and as soon as you have learned, "The best thing I ever read" becomes boring and best kept as a separate reference book. But I still get asked for beginners guidance and suitable models. There will be more beginners models, please help others to build and fly them.

Two trends had advanced faster than others last year. Ducted fans are really beginning to work, and

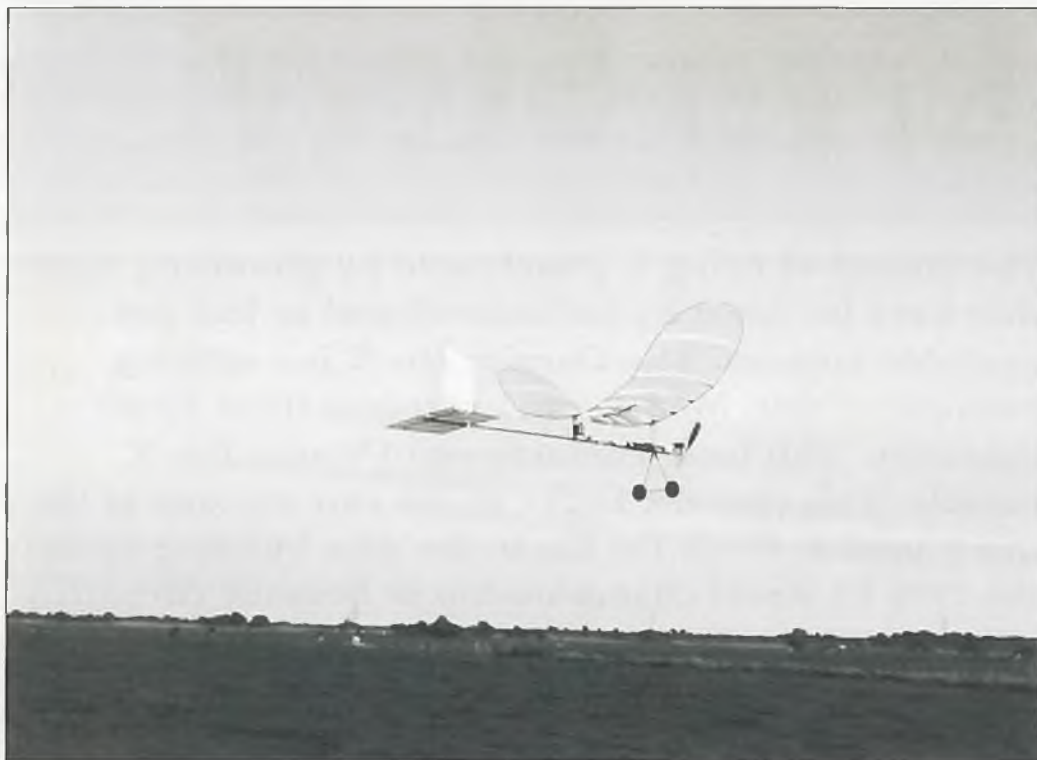
more important, commercial units are available. One was a few years ago, a few were two years ago and now there must be more than twenty. There are regrettably few kits or plans available. We will rectify this. In this issue is a stand-off-scale Henschel 132 that we know flies well on what is still the most available fan unit, at the right price, uses a low cost motor and there are others you may use if you wish. In the next issue will be plans for you to build your own 600 or 700 powered fan units if you are reluctant to pay for commercial units and more expensive motors.

The other advancing trend is indoor and micro outdoor RC electric models, made possible by the availability of micro RC gear. We have shown you models and micro gear before and there is more in this issue.

That looks after beginners and the more adventurous, what about the majority? Most of the content will continue to include scale mod-



WHY NOT TAKE OUT A SUBSCRIPTION?



**John Adams minimalist
lightweight constructed
mostly of kite sticks.**

Union servos for rudder and elevator on 'closed loop' systems and a Simprop Nano receiver.

The objective was to build an indoor model at reasonable cost with all materials bought in the UK, this was achieved and the end result is a model that flies at little more than walking pace. The first flight was on one of those evenings when the air is perfectly still, the person launching the model has to walk slowly to avoid damaging it and the model is not launched so much as 'placed' in the air.

This pair are big and RC. Most indoor models are free flight and much smaller, if you have one, bring it along.

Language

The English language is one of the few devoid of gender for nouns and accents on letters. We get used to strange pronunciation, 'English' is such a mix of languages over the last two thousand years that Brits from different ends of the UK (or even different ends of the same town) will differ in their preferred pronunciation and some regions have enough different vocabulary tagged on to their dialect that speaking English with foreigners is sometimes easier!

This is certainly so at international model meetings where Standard English is usually the common language and certainly the second language of most competitors. This was so at the F5B world champs in the Czech Republic and although many of the Czech organisers spoke good or at least some English, many did not, so I used my instant interpreter Veronica quite a lot. She attempted to correct my pronunciation and get me to remember how accents over letters should sound. The Czech language has more accents than I have ever seen. You will see in this issue, mention of the Palicka motor. The 'c' in Palicka should have "a smiley face over the C" as Veronica described it. Well, my computer has a lot of accents that I have not ever seen in use anywhere, but it does not have this one! This is a long way of apologising for not including any Czech language accents. If I cannot insert all of them to get it right, then I won't insert any! Apologies to those of you that think I have missed some out.

1997 is going to be a good year for electrics!

els of all sizes and one or several motors (two with six or more in the next issue) and more scale plans will be available for popular model subjects and less common ones like the 'Miller Special' by ace designer 'gone electric' Dennis Tapsfield. We will still follow F5B and F5D competition to glean whatever product developments will be of use to the rest of us. We will always have some Vintage content, more of what we have becomes vintage anyway and there is still almost as much to learn from old models as there is from new ones. If you think there is something missing, please write/fax/email the editor.

Model Show

This may help your planning! You may live in the UK (or are visiting) or in western Europe and you may have got this copy of EFI before the end of 1996. Consider visiting 'The International Model Show' at Olympia, London, from December 29th to January 4th. There is always FF, RC and CL indoor flying in one of the side halls and there will be a strong contingent of electric fliers there. As this is written, weeks before the show, there is no timetable for model flying but Thursday 2nd Jan is the late closing day, which gives more time for model flying. There will be a lot of electric fliers there on that day and very



**Dave Ridgeway's indoor
model is so light it can even
carry a pilot.**

probably the day before and the day after. Your editor will be there and many other contributors to EFI and QFI who fly indoor models, or like this guy, flies models indoors.

If you have an indoor electric model, bring it along. Small models, the slower flying the better, are OK in Olympia. Two models shown here have already flown outside on very calm days. Neither is small but both have flown indoors too. I am assured these will be there.

Dave Ridgeway's weighs 8oz (227g), it uses one servo for rudder with 'kick up elevator' to maintain height in turns (old trick dating back to the days of single function on/off radio) and this works quite well. Span is 48" (1220mm) x 9" (230mm) chord. The motor is a

KP01 with the 6.25:1 gearing from a KP02 driving a pusher prop. Maximum current used is about 2.5 amps so duration is considerable and so far Dave has not run down the battery.

Dave Howe has sent me details of John Adams' model - also unnamed. The structure is mainly carbon fibre tubes of various sizes, mainly 2mm and 3mm diameter (from a local kite shop) with balsa ribs and a balsa platform for mounting radio gear. Span is 48 inches (1220mm) with an 11 inch (280mm) chord and an all up weight of 7oz (200g)m. Various coverings were considered, even 'Clingfilm' but the final material used was mylar condenser film which weighs 3g/sq.m. The drive train consists of an electric toothbrush motor, with a home-made 4 to 1 reduction gearbox, controlled by a Gordon Tarling 'Zippy 10' and powered by 7 x 150 mAh cells, the propeller is from a Kyosho all foam model, 7" diameter and unknown pitch. Radio gear used is two

SEE PAGE 39 FOR DETAILS

History

Dr. Ing. Claudius Dornier wished to carry large numbers of passengers in comfort and safety and at speed and with economy, for great distances, such as across the Atlantic, a feat so far only achieved by pairs of, or solo brave pioneer record breakers.

There was no selection of very big engines, the most powerful commercially available were about 600HP. For this reason the 1929 Do-X needed twelve and the single Do-X built tried three different types from 525 to 640HP. It was beset by enough problems to prolong its 33,000km transatlantic round trip over two years.

When it was built the Do-X was the largest aeroplane in the world. It had a wingspan of 48m (157') and length of 40.05m (131') and maximum flying weight of 48,000kg (47 tons). It had a top speed of 210KPH and although intended to carry 70 luxury passengers with a 14 person crew, on one occasion it broke all records in 1929 by lifting 169 crew and passengers (including 9 stowaways).

It seldom bettered an altitude of 500m (1600'). Engines were not super-reliable in 1931 and 12 hard working ones added to Do-X's problems. It ended its days where it had started on Lake Constance (Bodensee).

The model

If the original Dornier Do-X suffered from lack of power, this model certainly does not. The original struggled into the air and never got very high. It was always flown very carefully with the highest regard for passenger comfort.

Designer/builder Juraj Tinka of the Czech Republic certainly does not believe in 'authentic scale-like

Cover Story.

The history of flying is punctuated by promising types that were let down by underdeveloped or just not available engines. The Dornier Do-X is a striking example of this. Models can overcome these small liabilities. This issue contains two Dornier Do-X models. This one, the larger of the two was one of the many models flown for fun in the days building up to the 1996 F5 world championship at Benesov Airport.

Dornier Do



This sort of flying would not have encouraged airline passenger transport.





Juraj Tinka reaches in for a battery change.



28 and 14 cell battery packs.

It was a long walk back to the charger with a model this size.



flight patterns! He flew it like any lightweight sports model, including very non scale aerobatics.

This model is not small. It spans 3.5m (138") and weighs 12kg (26lb) but the control system is very simple: ailerons, elevator and motor speed control. This writer, who will do anything to simplify the control of a model (!) avoids the need for a rudder if ailerons are fitted: big models though, he usually finds benefit from rudder controls and on a few occasions has regretted the lack of a rudder. Not Juraj Tinka! When questioned about the lack of a rudder on so large a model he took no time to reply. "Rudder! Why do I need a rudder when I have ailerons?" His exuberant flying of this model certainly confirmed his argument for no rudder.

The first time I saw it flying it was already airborne. I hurried across the airfield thinking it could not be far away because it was maneuvering in a very lively manner. It was long walk, you will see from the 'Man with model' photos just how massive it is.

Power

The twelve motors are Speed 500s driving 7 x 4 props. Each runs, in effect, on 7 cells via a strange mix of series/parallel wiring from two battery packs, one of 28 cells and the other of 14, fed to the

motors by two speed controllers. That is a total of 42 x 1700SCRCs, 2.35kg or 5 pounds. That is a big battery but its percentage of total weight (20%) is not high, it is equivalent to a 7 cell pack of 1700s in a 2kg (4.5lb) model.

Construction

Juraj cut, carved and built the entire model from white polystyrene foam. It is all covered with Modelspan and painted with white acrylic paint. Acrylic paint can be thinned with water but it dries off to provide a light, durable and resilient skin, good for models, but you must thin it sufficiently. This model is straightforward in its construction but it is big, so the

monster took three months to complete. For transport, the fuselage is in two parts and the wings in three. It still takes up a lot of space in a car.

Flying

It looked easy to control, very nimble for such a big model. Juraj has no intention of ever flying from water, he told me it was not designed for operation from water and he does not wish to fly from water! It takes off from a 'dolly', power is no problem at all. The two speed controllers are part exposed in the wing centre section. They are of course JETI controllers because Juraj manufactures these.

Two air cooled controllers feed all 12 motors.



International

VOLANT Ref: MW 2448 A good looking 'pattern' ship for geared hot motors. Designed by Dave Durnford, wingspan of 52" and a 4 function radio. *Plan Price Code: M*

A.....£3.00	J.....£7.50	S.....£12.00
B.....£3.50	K.....£8.00	T.....£12.50
C.....£4.00	L.....£8.50	U.....£13.00
D.....£4.50	M.....£9.00	V.....£13.50
E.....£5.00	N.....£9.50	W.....£14.00
F.....£5.50	O.....£10.00	X.....£14.50
G.....£6.00	P.....£10.50	Z.....£15.00
H.....£6.50	Q.....£11.00	
I.....£7.00	R.....£11.50	

CORSAIR Ref: MW2445 Span 760mm, weight 580g, motor speed 400/7.2V (direct drive) and 7/8 cells, radio 2/3 function. Another superb plan by Heino Dittmar, the Corsair is incredibly agile on 600AA cells giving a high £'s to fun ratio. Price code: E

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Nov/Dec '94
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Intergride '94 report -
Mettlenheim (interesting
German models) - HP
42 - Graupner Mini-
Viper - kit review - ZY-
400 Electro slot 400 plan
review.



Issue 2 Jan/Feb '95
F5 World Champion ships -
Fans without Formulae -
Caproni 140 kit review -
Vaga bond kit review - KRC
1994 'the big fly in' - How to
fix a 400 gearbox S.Africa



Issue 3 Mar/Apr '95
FREE Sushi 400 Plan -
Australian Sport - Crasch Test
dummy kit review - BARCS
League & F3J - Feigling plan
review - How to apply Lite-
span - Quiet Rotors.



Issue 4 May/June '95 De Havilland Moth Minor Heinkel He219
twin - SMD Soft Switch - How to build a Probe ammeter -
Balsa & 400's FX35 Digital - New Models at Nurnberg.



Issue 5
July/August '95
Props and airflow
research. Reviews of the
RVF Kitten kit, the Dart
Kitten plan. Crasch test
dummy part two. Quiet
rotors, an analysis of the
Avro Lancaster and the
story of the RFB
Fantrainer 400.



Issue 6 Sept/Oct '95
DIY electronics. Reviews of
Gruman F6F Hellcat, ZY
2400 Electroslot plans & the
Kyosho Stratus Sports kit.
Fans without formulae,
micro jets and improved
charging. How to design
your own small charger and
motor tests on the
Hectoplett & the Robbe Pro



Issue 7 Nov/Dec '95
Reviews of the Robbe
Dash, the Apex Mite 400,
the King Bee, the Climmax
and a Chipmunk plan. We
look at models in the US &
some research into airfoils



Issue 8 Jan/Feb '96
Reviews of the Hammer
E Aerobatic plan, a
Messer schmidt Bf109E,
Piper Club, Flux Electro
and Mini-Wizard. Guide
to electric flight part
three & pylon racing - a
look at where we're at.



Issue 9 Mar/Apr '96
How to power a
big model. Nurnberg 96
show report. Motor test
on the Kyosho 05 & FA1.
Adding lightness to your
model! Scale bi-planes &
vintage models.



Issue 10 May/June '96
Reviews of the Aeronaut Panafly kit, the
Cox Bearcat and the Horten Vc plan.
FREE plan of an SE5 WWI bi-plane. Test
data from the field of Pylon racing. How
to rejuvenate your battery packs and test
work on the Kawanishi H6K flying boat.

Issue 11 July/Aug '96
Kit reviews on the EMP
Algebra Ee Vee 205 and
Graupners Junkers Ju 52.
Plan features on the Dornier
Do 17 V1 and Kawanishi
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electric flight models and
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Australian Sport.



Ron Smytn's Avro 558 and English Electric 'Wren', both 1/15 scale, see text.

Letters

Doug Marsh writes from New Zealand about his pioneering interests in electric flight. He is a member of the Palmerston North Aeronauts which has around 80 members, only 4 of whom are interested in electric flight. Half of the rest are mainly interested in gliders and the remainder in sports and scale, with only a few CL contingent and no FF.

He first became interested in electrics in 1974 whilst on leave in the UK. He started with an Astro 25 ferrite motor and 16 cells in his own design 'Astro Fli', based on Phil Kraft's Kwik Fli' of that era. Weight was 5lb 4oz and it would ROG from grass with a 9 x 7 prop. In a visit to the USA in 1978 he purchased a geared drive unit for the Astro and built up a 7' 'Miss America' old timer. He says this was his most successful flier with 136 flights logged when he sold it.

He then went on to an Astro 40 cobalt and 20 cells in a model based roughly on an Astro Hog (appropriate name!). This flew reasonably well and employed a 2 speed control via battery tapping. He also dabbled with smaller 540 ferrites on 8 cells in a scale Fairchild and Short Skyvan, as well as an Astro 05 in a RCM 'Wasp'. A MAN 'Fred's Special' followed using a Speed 600 and Graupner 8 x 4.5 folding prop but Doug didn't particularly like the smaller models.

At present he has 2 electric models. One is a 1/16 scale 72" Hawker Siddley airliner with two direct drive Astro 05s, 14 sub-C cells and SM4 throttle (replacing two OS19s from a previous configuration). The other is a 73.5", 9lb Fairey Spearfish (a prototype 1945 torpedo bomber that came between the Fairey Barracuda and the Fairey Gannet). It uses an Astro 40 and 20 cells and his own retracts. He

Paul has received a number of letters from Australian and overseas friends with reports of their electric ventures and views and advice to other beginners. More electric fliers are gathering information from world wide web sites (and some www users are discovering electric model flying!) so some sites are listed for you to check out. This is Paul Rossiter's last regular column, he is re-locating away from model flying but he may write some special feature articles for us in a year or two. In the next issue we will welcome a new Australian correspondent.

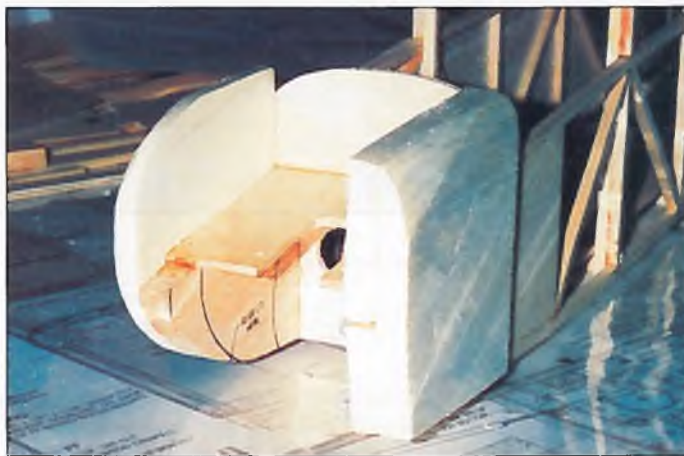
says that both fly reasonably well. As his next project he has drawn up plans for an 81" span twin tail Czech design which will use two speed 500s and titanium gearbox-

es. I look forward to hearing how it turns out.

Dave Whitten has written from South Australia about his Model-Tech Mustang that he flew last

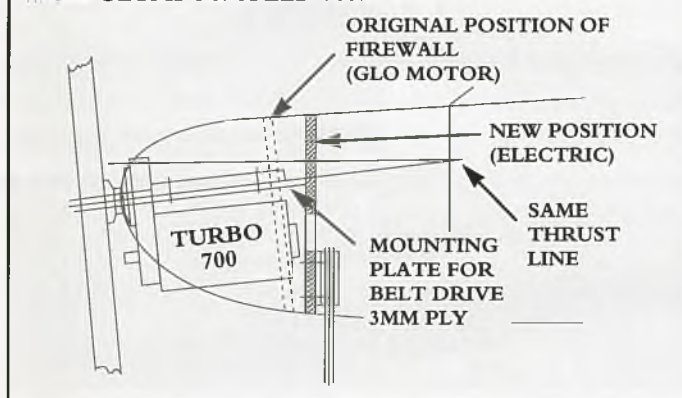


Inside the cabin.



Modified nose under construction.

SENIORITA STORY, STEP 1: MODIFICATIONS TO THE FRONT END OF SIG KADET SENIORITA TO TAKE OLYMPUS/SPEED 700.



Easter at the national rally. The PSS kit was modified to take an old Astro 15 ferrite and 11 x 1700 cells. He uses a Fleet FPS 27A controller with BEC. As we saw at Wangaratta, the model flies really well (a photograph appeared in a recent EFI). He also writes that Geoff Henning has built a Messerschmitt Bf109 with a 9.6V Speed 700 on 10 cells and Mike Schneider is putting together an EZ Pilot F-82 twin Mustang. We await details on how they perform.

Dave Tapp also writes from South Australia saying that he and Mike Schneider are building up a couple of 1/6th scale Focke Wulf Ta152 H1 models (961 span) which should be ready for the next Easter national rally.

Alan Wall writes from NSW in Australia about his exploits with the original FM Electric Hammer design using a Speed 700 and 10 cells. He is now interested in revamping it to use the Olympus belt drive set-up described in my Hammer-E article. He flies a Porterfield Collegiate (with ailerons) from the Astro kit and is interested in trying it on floats. He has built up a Proctor Antic powered by the Astro 25 from the Collegiate but has yet to try it out (after all that work that he and a friend have put into it!). He lives on a 100 acre property and has his

own mown strip with a small slope available on a nearby property!

Ron Smyth writes from Sunbury in Victoria, Australia and is a contributor to RCMN. He has redesigned his 1/5 scale Avro 558 (published in RCMN) to take an Astro 15G and reports that it is very successful. He has also designed a 1/5 scale English Electric 'Wren', originally for an OS 20 but now powered (much more successfully) by an Astro 15G. Both models weigh 6lb and are shown in a photograph.

He is now working on an electric/glow Fairey 'Fox'.

His club is holding its first electric event on August 25.

Fraser Argue has written from ACT (Canberra-land) and has been experimenting with various forms of foam construction in electric gliders. He and his sons are now trying out ducted fan units and we await hearing more about their results with interest.

Conversion to electric flight of a SIG Kadet Seniorita

The SIG Kadet Seniorita is a traditional built-up trainer with proven excellent flying characteristics. The model has a 63" span and 12"

Aero*Comp results for SIG Kadet Seniorita/Speed 700 combo

DATE: 08/02/96	TIME: 22:27	UNITS: ENGLISH
MODEL: EXAMPLE	MOTOR: GRAUPNER SPEED 700	
	TURBO 9.6V (#3308)	
1.	NUMBER OF MOTORS	
0.120	MOTOR RESISTANCE (OHM)	
0.000650	DYNAMO CONSTANT (VOLT/RPM)	
0.429000	GEAR RATIO	
12.00	NUMBER OF BATTERY CELLS PER MOTOR	
12.00	NUMBER OF BATTERY CELLS IN AIRCRAFT	
1400.0	CELL CAPACITY (MILLIAMP-HOUR)	
1.30	CELL VOLTAGE (VOLT)	
0.004	CELL IMPEDANCE (OHM)	
0.015	WIRING RESISTANCE (OHM)	
1.	CIRCUIT TYPE = SERIES	
2.	NUMBER OF BLADES PER PROP	
11.0	PROP DIAMETER (INCH)	
7.00	PROP PITCH (INCH)	
1.	NO. OF WINGS = MONOPLANE	
63.00	WINGSPAN (INCH)	
0.00	WING MIDSPAN (INCH)	
12.00	WING CHORD AT ROOT (INCH)	
12.00	WING CHORD AT TIP (INCH)	
1.44	WING THICKNESS (INCH) [12.0% OF CHORD]	
1.02	AIRFOIL = CLARK-Y [FLAT BOTTOM]	
4.	FUSELAGE = ROUND NOSE	
23.43	FUSELAGE AREA (SQ IN)	
3.	LANDING GEAR = GEAR DOWN	
2.	RUNWAY = 1" GRASS	
240.	RUNWAY ELEVATION (FEET ABOVE SEA LEVEL)	
82.85	TOTAL WEIGHT (OUNCE)	
17105.0	MOTOR RPM AT FULL THROTTLE	
7338.0	PROP RPM AT FULL THROTTLE	
24.5	MOTOR CURRENT AT FULL THROTTLE (AMP)	
14.1	MOTOR VOLTAGE AT FULL THROTTLE (VOLT)	
41.4	THRUST AT FULL THROTTLE (OUNCE)	
3.4	THRUST DURATION AT FULL THROTTLE (MIN)	
344.3	MOTOR INPUT POWER AT FULL THROTTLE (WATT, PER MOTOR)	
244.5	MOTOR OUTPUT POWER AT FULL THROTTLE (WATT, PER MOTOR)	
71.0	MOTOR EFFICIENCY (PERCENT)	
0.65	OPTIMUM GEAR RATIO FOR MOTOR/BATTERY/PROP SYSTEM	
7804.3	FULL THROTTLE RPM (PROP) AT OPTIMUM GEAR RATIO	
5.25	WING AREA (SQ FT)	
5.25	WING ASPECT RATIO	
15.8	WING LOADING (OZ PER SQ FT)	
36.0	TAKEOFF DISTANCE (FT)	
2.4	TAKEOFF DURATION (SEC)	
18.8	TAKEOFF AIRSPEED (MI/HR)	
9.3	THRUST DURATION AT TAKEOFF AIRSPEED (MIN)	
48.6	MAXIMUM AIRSPEED CONSIDERING PROP ROTATION (MI/HR)	
40.2	MAXIMUM AIRSPEED CONSIDERING AIR DRAG (MI/HR)	
372000.	REYNOLDS NUMBER OF WING AT MAX AIRSPEED	
278.5	MAXIMUM RATE OF CLIMB (FT/MIN)	
9.8	CLIMB ANGLE (DEGREE)	
955.4	MAXIMUM ALTITUDE AT FULL THROTTLE (FT)	
8.4	MAXIMUM LIFT-TO-TOTAL-DRAG RATIO	
5.2	MAXIMUM GLIDE DURATION (MIN)	
8.6	MAXIMUM TOTAL DURATION (MIN)	
	AIRCRAFT IS EXPECTED TO FLY	



Completed nose for Olympus and Speed 700.



SIG Kadet Seniorita on the airstrip ready for her maiden flight.

chord giving a wing area of 5.25sq.ft and a 0.25 glow motor is recommended. Construction is light and strong making it an ideal candidate for electric conversion using a Speed 700 motor. As noted in my article describing the 'Hammer-E' sport aerobatic model, this motor works very well with an Olympus belt drive and simple adaptor on 12 to 14 cells. Crunching the numbers through the Aero*Comp program produced the results given in the table. These show that the wing loading would be a reasonable 15.8oz/sq.ft and the rate of climb a good 278ft/min using 12 cells and a 11 x 7 prop.

Theory into practice

In order to test the suitability of this set-up for a beginner, a friend of mine Jim Mitchell had a go at building up a kit and making the necessary modifications for electric power. His only other aeromodelling experience was helping his sons put together a glow powered trainer and he had not yet learned how to fly an RC model. I now hand over to Jim to describe the operation.

"The conversion of a glow plug model for electric power turned out to be relatively easy once the basic requirements were decided upon. The major decisions were what type of power unit to use and where it would sit relative to the glow power unit. Paul's calculations showed that a Graupner 9.6V Turbo 700 running on 12 to 14 cells (2 packs of 6 or 7 x 1200 or 1700mAh) and a 11" or 12" dia x 6" or 7" pitch prop and 2.33:1 belt drive would give good performance.

Once the power unit was decided upon it then became a simple task to overlay an outline of the unit onto the plans of the SIG Kadet. This gave us the new position for the firewall, 12 mm rearward from the original position, with a new ply mounting plate for the Olympus/motor unit, care being taken to maintain the correct thrust angles (see diagram). The nose gear bracket was mounted on the rear face of relocated firewall which was installed vertically and not tilted forwards (to provide the required downthrust in the glow installation). This also meant that the fiddly nosegear bracket wedge was no longer needed. The

required downthrust was obtained by proper location of the ply Olympus mounting plate. Two 19mm holes were drilled in the firewall below the motor to allow for wiring and cooling of the components mounted directly behind.

From here it was simply a matter of constructing the model following the excellent plans and instructions supplied by the manufacturer, though the wing joint was boxed across one extra rib to that shown on the plans for extra strength.

Before the fuselage frame was completed, it was necessary to consider the location and weight of the battery pack and the fact that during a heavy landing the pack might crash through the bottom of the fuselage. To overcome this, a tray of LITE ply was glued inside the fuselage bottom and the pack held in place with velcro strips. This tray was long enough to allow for adjustment of the battery position to correctly balance the plane. This tray needs to be glued in place before the top crossmembers are positioned. In our case the tray was long enough to also mount the speed controller on it directly behind the firewall, keeping the wiring as short as possible. Use the full width available as this will also stiffen the fuselage.



Jim Mitchell bands on the wing.



Paul Rossiter checks the radio.



Three pretty senioritas! And the balsa one is ready for covering.



Speed 700 and modified Olympus installed. You can see built-in side and downthrust.



View of motor and speed reducer from underside. This view also shows noseleg and retaining screws.

The cabin area was also modified to make use of a balsa wind-screen with the dash area removed to allow forward access to the steering horn set screw. The servos were installed in the original position except of course the throttle servo was no longer required and was replaced with the excellent Ai/robotics FX35 Digital speed controller. Lightweight wheels were used to keep the final weight as low as possible.

It was then a simple task to complete the construction, install the hardware and check the operation of the radio and motor systems."

The real test

Jim had done a great job and the model was very straight and true with the correct CG location. With nothing else to do we met at the flying field, charged the batteries and took the mandatory deep breaths. Jim and his whole family was lined up to watch. Needn't have worried. On full throttle the model took off after a dead straight run of about 30ft and proceeded to climb out with hardly any control input whatsoever! After a climbing circuit the motor was 'throttled' back and it flew around like an ideal trainer,



Jim Mitchell carries back the Seniorita after a successful first flight.

turning smoothly on rudder and only requiring a small opposite rudder (if at all) to straighten it up again. After around 8 minutes the cells (an old set of 12 x 1400s) were beginning to sag and so I glided it in for a lovely landing and roll out up the centre of the field. It's amazing how much a great model makes the pilot look good! Jim's grin went right around his head at this stage and his family all looked quite relieved. They had finally gotten the kitchen table back.

On the second flight Jim and his sons all flew a couple of circuits with some assistance and I had fun throwing it around a bit. I think that their rapid success vindicated

the original decision to go bigger than the standard 540 - 600 sized trainer. The model turns more slowly, the glide is not so critical and it just seems generally more forgiving. The larger model is also easier to see at distance. Also, and quite important for new chums at the field, the model is not at all out of place in the pits or on the flightline, looking just like any other trainer except that it isn't all covered in sticky oil.

All in all a very successful exercise and one that I would recommend for any beginner.

Some interesting web sites

There are now a number of interesting world wide web sites dealing with topics of interest to electric flight modellers. Most of these provide directories to other sites, so go 'surfing'!

Wings'n'things. Interesting information and catalog:

<http://www.wingsnthings.com.au/~wingsnt>

M. Selig homepage:

<http://uxh.cso.uiuc.edu/~selig/UIUC>

Astro Flight homepage 'High Voltage':

<http://loke.as.arizona.edu/~ckule-sa/flight.html>

Tower Hobbies:

<http://www.prairienet.org/business/tower/tower.html>

ACE Hobbies:

<http://www.ace-hobbies.com>
Ken Myers - 'The Ampeer' (including Keith Shawis articles):

http://ourworld.compuserve.com/homepages/i_fly_epower
<http://members.gnn.com/KenMyers/homepage.htm#TOP>

Aveox:

<http://www.aveox.com/index.html>

British Electric Flight Association (BEFA):

<http://ourworld.compuserve.com/homepages/BEFA/>

Speed 500/600/700 data:

<http://ourworld.compuserve.com/homepages/gbonartz/speed600.htm>

Speed 400 data:

<http://ourworld.compuserve.com/homepages/griggssbill/>

Traplet publications (EFI, QFI):

<http://www.traplet.co.uk/traplet/>
RC websites index:
<http://www.bucknell.edu/~chron-str/rc.html>

Aerofoils:

<http://rampages.onramp.net/~micheleb/hanger.html>

Props etc:

<http://www.mat.uc.pt/~pedro/nci-entificos/Software.html>

Till next time... Paul Rossiter.

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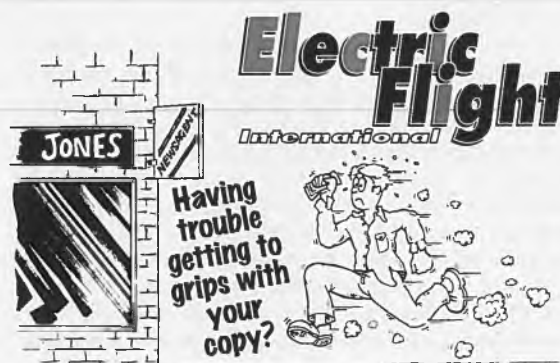
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Motor test

Graupner Speed Gear 700 2.7:1 9.6V

(Gearbox with Speed 700 Turbo motor)

Mike Payne builds a lot of scale models (he already has several designs in our Plans Service). Motor choice has always been a problem with a new design and he has always been searching for more suitable motors for his fleet of scale model vintage de Havilland aircraft. Static tests by the editor provide figures that may provide further guidance for your choice of a suitable motor for your next model.

Motor selection

I have been interested in acquiring a geared 700 motor for a few years and was very pleased to get the offer of testing for EFI the Speed Gear 700 2.7:1, especially as I did not have to do the bench tests. My plan was to fit it into my DH Moth Minor as this has never had an ideal motor in place. This has a span of 1.85m (73"), and weighs 2.2kg (4.8lb). I have previously used a Keller 25/10 and a direct drive Speed 700. Both of these motors were successful, but used 10" props and did not seem the best solution. I was warned (after bench tests by the editor) that this motor needed a 14" prop to deliver adequate power. This was ideal as it is close to scale size for the Moth Minor.

Speed 700 BB Turbo, Speed Gear 2.7:1 700 (with similar 700 Turbo motor), Keller 25/10, and a Speed 600, there is a large size difference between the Speed 600 and the Speed Gear 700.

Installing

The Speed Gear motor has a 3 screw fixing and so new holes needed to be made, and then testing could begin. The first flight confirmed that there was adequate power but there was a problem with radio interference, so the flight was aborted. I had become used to motors with suppression fitted! While Speed 400's, 600's and many other motors have capacitors fitted, Speed 700's do not. With 3 capacitors fitted the interference disappeared.

Flying

The motor now pulls the Moth Minor around very satisfactorily. It has a characteristic noise to it, which seems to be similar to other Speed Gear motors. The large diameter prop gives plenty of power and pulls the Moth Minor around loops easily. I did not notice too much of a problem with the motor having to speed up when the model was diving. Flying about with some aerobatics, and slowing up for a more accurate scale speed, gave me flight times of about 8 minutes easily. This compared to around 4 to 5 minutes for the



This motor easily fits inside the Moth Minor's nose.

direct drive 700, and 5 to 6 minutes for the Keller. The Speed Gear 700 gives 4900 RPM at 20 amps.

Looking at the motor, it is very big compared to the motors I usually use. The photo compares its size to a standard 700, a Keller 25/10, and a Speed 600. You need a reasonable amount of nose space to fit it into. Scale models like the Moth Minor should be fine. It gives plenty of power for these applications and will work well on 10 to 14 cells. It advertises itself for 8 to 12 cells, I am not convinced that you will get adequate power out of it with 8 cells, and the Speed 600 would seem to be a better solution. For 10 cells, however, there is no obvious ferrite motor. If you are able to cope with 14" or 15" props it will give you a good range of power. I



did try it with two 11 x 7 props to make up a four bladed unit, this seemed to give similar power. The only problem with this, is that they do not form a flat unit, but this would suit a scale model of the Walrus where the 4 bladed prop is a similar arrangement double 2 bladed prop. Has anyone made 3 or 4 blade adapters for Aeronaut propellers?

How to cram in 14 cells and a large motor, Mike's next project for the Speed Gear 700 is this minimalist aerobatic model, this light weight structure should give a good performance.

have a good rate of climb and help in the vertical manoeuvres.

This motor is a very satisfactory unit for 10 to 14 cells, and it will turn propellers in the range of 11" to 15" giving excellent power output with good efficiency. It should fit into many larger scale models, and also provide power for a variety of sports models, as it does not seek to draw large currents, you can use it with inexpensive speed controllers. An alternative may be a brushless Plettenberg!

For 14 cells, the Speed Gear 700 turns an 11 x 7 prop satisfactorily. This now gave me hope of a good power system for an aerobatic model. EFI have already produced an aerobatic model, the Hammer E which uses a similar geared 700, and I have now begun producing a minimalist aerobatic model for 14 cells and this motor. I anticipate that it should give a very lively performance. The 11" propeller should give good traction, and be small enough not to act as a brake when the speed increases. The power to

weight ratio should enable the model to

Static tests

The static tests (bench tests mentioned above) were carried out by the editor with three battery packs: 10 x Sanyo N-1700SCRC SP, 8 x Sanyo N-1400SCR and 7 x Sanyo N-1700SCRC SP. Before each test the packs were charged at 3A to 10°C above ambient and cooled. On test the motors were run gently up to max power and run until the initial voltage drop had occurred and settled. It took about fifteen seconds for the high voltage to drop and steady. After each motor test the pack was cooled and recharged. All these tests were carried out on the same day at a reasonably level temperature. The motor/gearbox and Graupner props were kindly supplied for test by 'Gliders' of Newark.

Prop	cells	RPM	thrust(g)	volts	amps	watts	g/w
folders:							
Graupner	10	5,300	1200	11.4	20.8	237	5.06
CAM GEAR	8	4,600	960	9.5	16.7	159	6.04
14 x 9.5	7	4,300	785	8.5	14.1	120	6.54
Graupner	10	6,100	890	11.8	14.5	171	5.02
CAM GEAR	8	5,100	720	9.9	11.9	118	6.10
13 x 7	7	4,600	580	8.8	9.9	87	6.67
Aeronaut	10	5,100	1120	11.6	17.2	200	5.60
14 x 8.5	8	4,700	890	9.6	14.3	137	6.50
	7	4,300	710	8.6	12.0	103	6.89
RFM 210	10	4,500	1600	11.1	24.8	275	5.82
19 x ?	8	3,900	1200	9.3	19.1	178	6.74
	7	3,800	1010	8.4	17.1	144	7.01
Zinger wood							
14 x 6	10	5,000	1150	11.4	19.9	227	5.07
14 x 10	10	4,700	1185	10.9	25.0	273	4.34

Conclusions (from tests)

Measurements are self explanatory but to quote the obvious! In the air the motor will 'unload' to run at higher voltage and lower current. 'g/w' is grams per watt which is a sort of index of efficiency. You will see that in every case this efficiency improves with a lower cell count which is of course a lower voltage. The corollary is that when you throttle back to cruise you do not only extend the motor run because you are burning less energy (watts) but you are operating the motor and prop in a more efficient band, so you get even more for your amps.

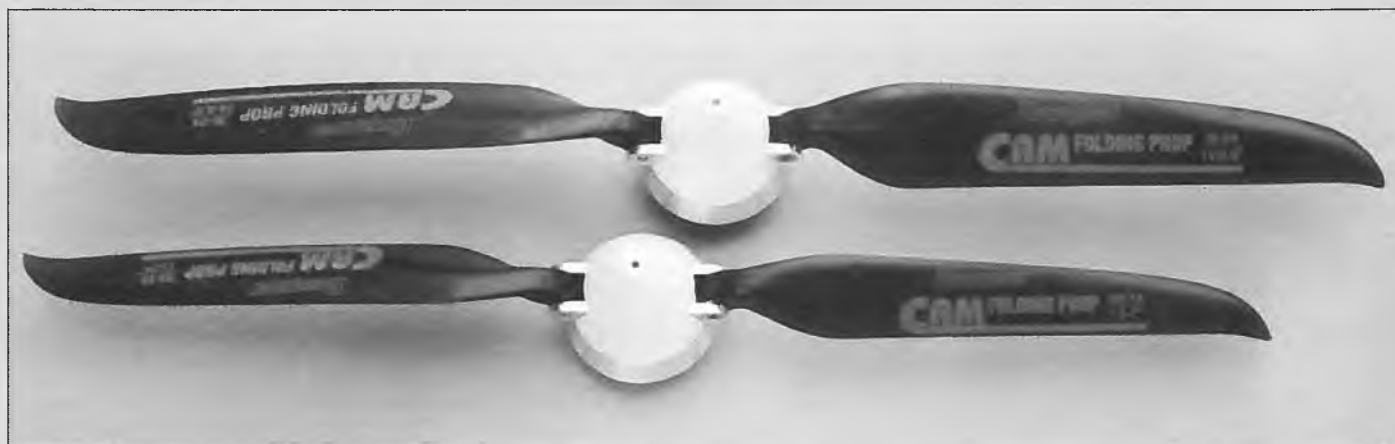
The maximum efficiency for this motor, quoted by Graupner, is at 11.8A. These tests confirm this (or maybe this figure confirms these tests!) if you look at the g/w on 7 cells for the Aeronaut 14 x 8.5. 12A is very close to max efficiency and the g/w reading of 6.89 is the highest obtained here on 14" props. Don't compare apples with pears though, 11.9A (even closer) on the Graupner 13 x 7 shows less efficiency than at 9.9A. This is of course an index of efficiency of prop and motor/gearbox combination, so thinking props, does not even mean that the 14 x 8.5 is superior in performance to the 13 x 7. It is here but there are "horses for courses" and the editor has found in similar tests with more powerful motors on direct drive and also with geared smaller motors that the 13 x 7 is superior to the 14 x 8.5. Different props suit certain models. Try all these on your model and select the best, also try others of similar size. Prop tuning ('selection' to most of us) is more an art than a science! The RFM 210 performs best of all although a bit away from the motor's quoted 'efficiency band' but it really is a glider prop (compare size and revs).

The level at which you can usually work motors safely is at about twice the current for maximum efficiency. We would therefore expect to run this motor at about 24A.

The tables give very favourable results in this band.

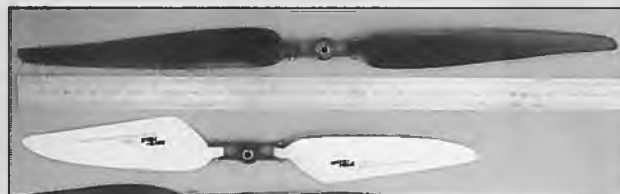
It is justifiable to wonder if this motor/gearbox is worth using on as few as seven cells. If you are using only 87, 103 and 120 watts you may be wise to use a geared 500 or

The large 14" prop is a suitable size for this 1.85m model.

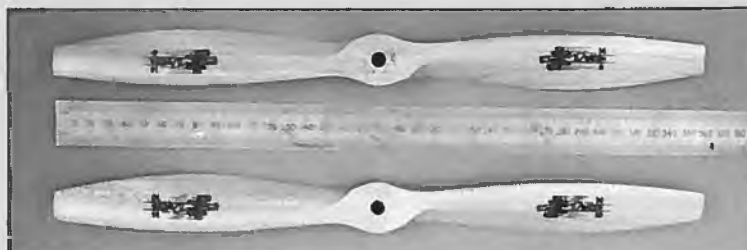


The Graupner CAM folding props tested, 14 x 9.5 (36 x 24cm) and 13 x 7 (33 x 18cm).

600 motor which is quite capable of delivering these levels of power at a lower weight. For this reason the fixed Zinger wood prop test readings are not included on less than 10 cells as these props are more likely to be used on sport or scale models and the folders are more likely to be used on gliders which may benefit from cruising at lower throttle settings.



The Aeronaut 14 x 8.5 and RFM 210 which performed well.



The maximum power used, 273 watts, implies that the cell count could safely increase. 25 amps 'flat out' is four minutes motor time on 1700mAh cells. Mike's intention to use 14 cells and a much smaller prop for his aerobatic model may well put his motor in a similar power

Zinger wood 14 x 6 and 14 x 10 props are lighter than plastic ones and may be the choice for some vintage and sports models.

band. I will test it and deliver some readings by the time he reports on that model's performance.

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INTER - EX 1996

Steve Webb reports on this (almost) all electric fly-in where any type of model is permitted, provided it is not conventional. This year's event was held again at the Ostrach model flyer's club which is not too far from Lake Constance.

Upon arrival at the (well signposted) site on the Friday evening, most creature comforts were already set-up, with running water, portaloos and even (most generously) beer and a barbecue for the early arrivals. Showers, for those camping, were arranged at the local sports hall for the two days of the event. Whilst some were erecting tents, greeting old friends or making new ones, several people took the chance of an evening free to prepare models and/or funfly before the event the next day. There was a bit of a breeze which, it was hoped, would die down the next day.

Saturday dawned clear and still

and again, a few pilots had time to test fly. Gliders and electrics do not disturb sleeping campers! Transmitters were called for at about 10 o'clock and the fun began in earnest. There were no real rules other than logical safety considerations - just fly as you want when you are ready and your peg is free. A form is filled in with a description of your model for the benefit of all present and the flight commentator. A positive peg system is used - one numbered peg per competitor, per channel in use, is given upon registration (DM20 - about £9 per entrant) and these are lodged on the board to fly. In this way, no-one has to ask "Who has got the peg?" There are no long queues as there are several frequency bands in use. I

Gerd Lang's foam and glass Fly lost its prop and broke the gearbox during test flights.

only had to wait to fly on one occasion.

Where does one start when describing an event of this type? Which model do you single out for description and for what reason? A selection of models are pictured here, there were too many names and models to show them all here. These signified for me the best of the experimental world. As usual, the weird and the wonderful turned up in abundance. Sauntering up and down the pits or flight line, there is the previously experienced mix of wonder and admiration for the people whose ideas couldn't have been bettered by Salvador Dali on acid! It seemed that there was a much greater emphasis upon electric flight in Germany than there was in Holland last year but, as it was explained to me, there is a real problem with noise in Germany.

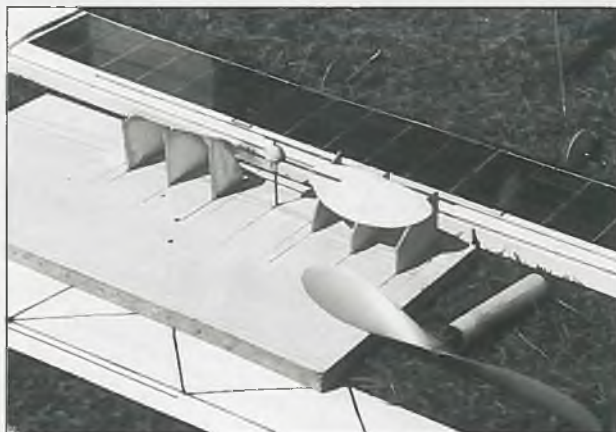
The hoped for reduction in wind strength did not materialize and it was occasionally a little gusty (and chilly in



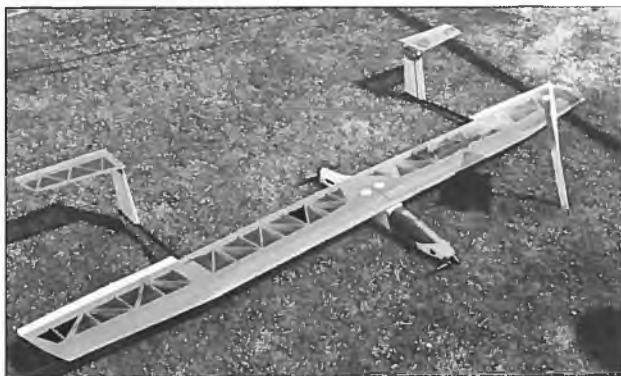
Dr Sieghard Dienlin gives scale to his NanoSol that will ROG on 1.8 watts of shaft power.



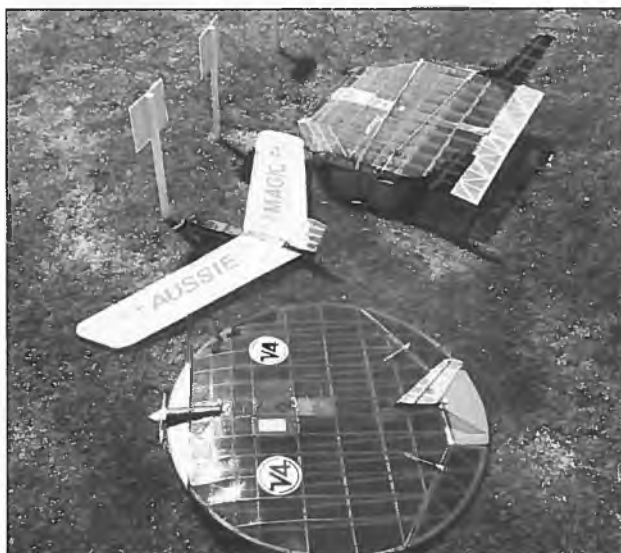
Michael Kellermann's Speed 400 delta with components held on with Velcro.



Carbon reinforced indoor and solar wings for NanoSol with motor pods and prop building jig.



Twin Speed 600 push-pull model flew very well and was very aerobatic until it broke up in flight.



Bob Meyer came all the way from Australia with his models.



Not electric, but Wil van Loon's glider won a cup for best flight quality.



Alfonse Gabsch tried three strands of silicone rubber to get his 6m Horten Wing of the ground. The attempt failed. Last year the glider version flew, but briefly.

the evening) but having said that, although I fly exclusively electric, I was surprised by the ability of some of the smaller models to cope with the wind. Only the most flimsy of models waited for calm conditions and the only moment when there was no flying, was when press photographs were taken on the strip.

Peter Haas attended with his unnamed multi winged device. This flew on several occasions in three different configurations: a) a triplane consisting of three 2.7m jedelsky wings, b) a multiplane with a further twelve 1m wings from a kit aeroplane called First Flyer strapped to a carbon fibre boom strut arrangement, and c) finally with a pick-a-back delta wing strapped to the top of the array. This monster skeletal aircraft, constructed from what looked like carbon fibre fishing rods and pushchair wheels, was powered by two neodym Speed 700s geared 2.5:1 with 14 x 9.5 Graupner CAM props running on 36 cells. This aircraft flew all weekend and once airborne, completely ignored the wind. Even when the multiplane configuration was attempted and successfully achieved, despite nearly being blown over twice at takeoff, the wind actually helped in the end. As the aircraft was lined up at some 50° to the runway, it almost hovered to the ground in the limited space available between the spectator safety barrier and the rough grass off the strip.

Talking of coping with the wind, Bob Meyer came all the way from Australia to claim the prize for furthest distance travelled, with his collection of speed 400 powered models. As we all know by now, these small models bounce and tumble (often



The underside of Fred Ludwig's Speed 400 powered ornithopter showing the delicate drive arrangement.

with impunity) if they do happen to come in a little roughly and in general, if the worst comes to the worst, a dab of glue and/or a little sellotape will soon put matters right for another flight. All the unusual models flew well - especially the model called Aussie Magic with its forward swept wing. Not everyone makes a new model every year for the event and you would be daft to go all that way and not take something that you could fly for fun. This pilot was no exception and a delightful little 280 powered model called the Dutch Old Timer coped well with the wind and was no slowcoach in the air.

There was very little in the way of carnage apart for a major disappointment for one pilot - I am ashamed to say I didn't get his details - when his magnificent push-me-pull-you twin motored 10 cell flying wing disintegrated due to flight stresses but boy, was it going when it broke up. Amazingly aerobatic, it had been giving very good displays until, maybe, the stick was pulled back just a little too quickly. He had a broad grin on his face as he went to pick up the pieces which probably hid the internal anguish.

Michael Kellermann flew what has to be the simplest Speed 400 powered model yet seen. Basically, it was a triangle of white foam, edged with balsa and covered in a 3 ply tissue (obviously) available in Germany and favoured for its strength and lightness. With the components stuck to the top surface with velcro and elevons controlled by mini servos, a cover was placed over the works for streamlining and the whole thing floated off

into the breeze quite happily. Not the fastest model at the event but very definitely flyable and a lot of fun.

Fred Ludwig's previously seen Pteradon had company this year in the form of a superb ornithopter powered, amazingly, by a speed 400! This model, which spanned about 1.5m, had a very convincing built in whistle which operated as the "bird" flapped its wingtips. With rudder/elevator control, the flight was very good and, whilst the model did not achieve much more than a few tens of feet above launch height, the several flights it made were very definitely successful. Referring to the bounceability of lighter models, this bird, at one point obviously got hungry as it cleared the spectator safety net and headed, whistling and flapping furiously but blown by the wind, straight for the restaurant marquee. Those unsuspecting diners who weren't actually watching the progress of this beast were surprised to have the contents of this creature's stomach added to their dinner as batteries and radio bits rained down into their food when the model hit the entrance to the marquee. The damage to the airframe was minimal and speaks volumes for the construction of a model which has to be light enough for unorthodox flight and strong enough to withstand the stresses of flapping wings.

Talking of strong models, Dr Sieghard Dienlin had improved on last year's solar powered model, the MicroSol, and exhib-

Rolf Schmitt's 'Pushy Bear' for American Formula 1 class racing.



Peter Haas readies his multiplane for flight. Model got overall prize for 'audacity'.

ited his NanoSol or, in non solar slowfly form, the NanoFlyer. The NanoSol, at 159.5g (5.6oz) coped amazingly well with the turbulence once it was in the air. This model is most endangered when it is actually on the ground, due to the chance of it being blown away! Entirely solar powered, with no backup battery, this model will happily ROG

when the sun is strong enough. Sieghard monitors the sun's strength with a meter via a tiny little socket let into the side of the aircraft. When the sun is high enough and adequate solar power is recorded, you are OK to go. It perhaps doesn't bear thinking about, but this model has a fully proportional speed controller (and needs it!). In indoor form, you just change the wing, substitute the weight of the solar cells for a few nicads and buzz happily around the hall! The wing is not Jedelsky, although constructed in a similar manner, with maximally flat area for the cells and a few ribs to hold the form. The carbon





First time for Inter-Ex at Ostrach, Steve Webb's own Thoth is now sorted, stable and easy to fly. Cross coupled flaps and elevator all act in the same sense for roll control.

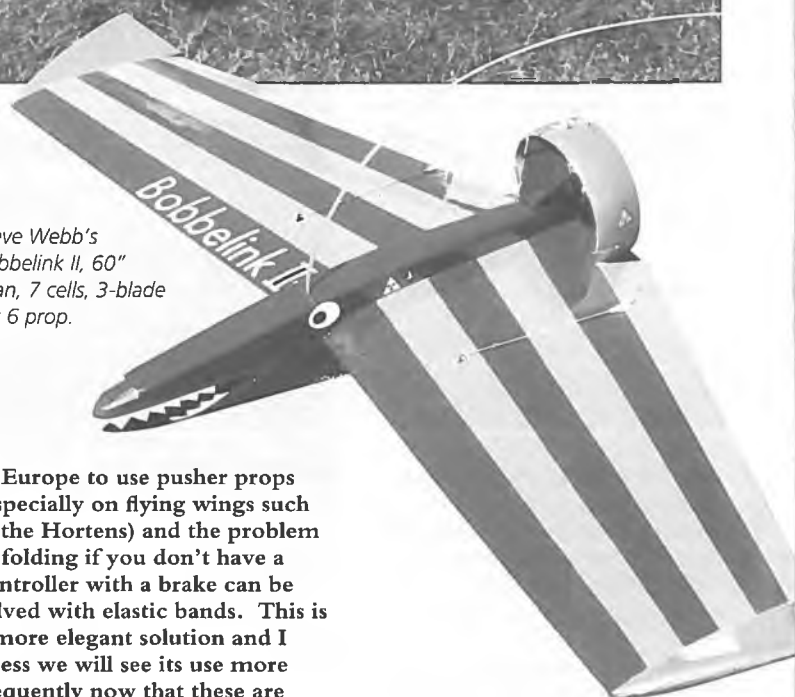
fibre reinforced solid balsa wing is so thin, you can see daylight through it!

To describe this marvellous model fully would require an article in itself but simple ideas like the cranked, push on motor mounts which only require rotating to change the sidethrust all help with final trimming. Sieghard sells components for this form of flight and one product is a propeller design or optimisation program for slowfly models. EasyProp is windows based and will calculate the efficiency of propellers based upon user dimensions and a selection of airfoils. Those familiar with indoor flying have probably all wrapped bits of wet balsa around tin cans and baked them in the oven to form prop blanks for final shaping. Effective though this method is for microgram rubber models at a few tens of RPM, when the prop is rotating at some 1040 RPM and has to make the best of only 1.8w shaft power to loft the solar cells, then you need all the help you can get. Sieghard's efforts are deservedly due to appear in the 1998 Guinness book of records.

Jupp Wimmer (again) had a new model and was effectively en-route to the Val di Fassa meet, also with his latest glider creation. Whilst Jupp's Inter-Ex model was not electric powered it would be churlish not to mention the achievement in getting this model airborne. The biggest problem was getting the 38cc petrol engine started (where have we heard that before?). The aircraft had experienced one brief hop on a previous occasion when the CG was found to be incorrect and the model suffered some damage. It was repaired and the motor moved forward and, on this occasion, flown successfully by Eric van den Hoogen. Like the country bus in Jake Thackwray's song of the same name, its progress was uncertain. At one point, people scattered in all directions and a couple of unsuspecting bystanders leaning on their bikes on a nearby path didn't know where to run as this giant machine wavered this way and that on final approach, quite undecided as to who it should land on but Eric expertly brought the wayward machine in to a perfect landing. Well; he would! On completion of the flight, the sight of Eric and Jupp delightedly dancing about and slapping each other on the back was alone worth the ferry fare.

I was fascinated by a new folder hub for two and three bladed props which Alfonse Gabsch had with him. Again, this was a victim of my forgetfulness and I didn't get a picture of the real thing so a diagrammatic sketch includes the salient points. It is commonplace in this part

Steve Webb's Bobbelink II, 60" span, 7 cells, 3-blade 6 x 6 prop.



of Europe to use pusher props (especially on flying wings such as the Hortens) and the problem of folding if you don't have a controller with a brake can be solved with elastic bands. This is a more elegant solution and I guess we will see its use more frequently now that these are available.

Norbert Schilling again tried to fly his free flight helicopter with speed 400 motors in the rotor tips but with similar results to last year. He also brought along a rotary model which he attempted to get off the ground. Unfortunately I did not witness the unsuccessful event and I don't really know if it would work at all. The speed 600 motor was geared to a huge paddle inside the winged cylinder. The torque of the rotating paddle caused the cylinder to roll along the floor, with the aim of attempting lift, due to the rotation. The machine broke up twice, at both attempts, but it was a brave effort. Again, not much cost but a lot of thought put into the design.

Gerd Lang brought along a nice speed 400 flying wing on 8 cells and 7.2 volt motor. It coped very well with the wind but his Speed 600 powered Fly was not so lucky. The Graupner gearbox

in the head broke on test flight and he had no spares with him. With wings constructed from flexible plastic honeycomb material which was covered in glass, it quite looked the part.

My own models seemed insignificant in comparison to others' models. The WiNG DiNG was my fun fly model for the event - constructed to see how quickly and simply a flying wing can be made. It is essentially a recycled Galaxy Models' Aerojet. I threw away the fuselage, swept the wings back and put a 6V Speed 400 at the back with 7 cells up front to balance it. It goes quite well but I buried the antenna in the wing too close to the motor and it suffers interference which I haven't yet cured. C'est la vie. Bobbelink II was a refined attempt to examine the stability of a 10° forward swept wing with -1.4° anhedral and no fin. With no prizes for effort, this again is a cast off slope soarer.



Norbert Schilling's rotating wing rolled along the ground by torque reaction of geared a Speed 600 attached to a paddle in the hub.



The writer's wife Mara, with WiNG DiNG, 7 cells and Speed 400 powered. Thin wings result in low drag.



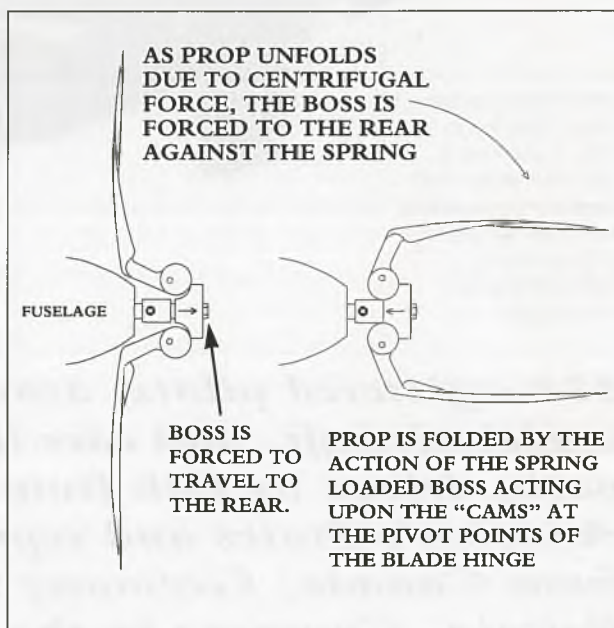
Solitaire, solar assisted model ready for take-off. Solar panels not fitted but can be rotated for maximum efficiency. About 4m span.

It is an SAS Cygnus wing which had progressed through an intermediate stage as an unflown canard before it reached this final form. The Mark I was first flown by Pete Barrow (Modellhaus) at Hayes this year and Mark II has an improved thrustline/reflex set-up. It uses a shrouded three blade Tornado 7 x 6 cut down to 6 x 6 and the

motive power is a Mega Mini 7 on 7 cells. If you keep it moving, it does what it is told and is surprisingly agile and stable but; slow it up to land in gusty conditions and it is anybody's guess as to which way it will tumble if you do stall it! The Thoth is not new - it was first flown in Nederweert last year but was a first for Ostrach.

Each entrant was asked to vote for best model (construction), best flight and best idea over the course of the weekend and cups were awarded for originality, design and construction, flight qualities and "querdenkerkop" or queer thinking. It is a shame when you can't enjoy the prizegiving hilarity when all the jokes are in German but the visual humour and the international modelling language make for great fun in any case. The prize for best overall experimental entry was given, quite justifiably, to Peter Haas. Wil van Loon got best flight award for his four winged canard cum tandem cum watchamacallit glider. As far as I remember, Hans Berndt got best construction for his much improved Henson Steam Carriage and Fred Ludwig received an award for his ornithopter. Each participant gets a certificate and a bottle of wine and this year, every entrant was entitled to select a ticket for a lucky dip with prizes ranging variously through a Robbe Puma 40, a Klaus-Dieter Horn 2.4m LS3 glider kit with glass fuz, several on board computer monitors, multi station battery chargers etc., down through modelling materials, T shirts and the modern day equivalent of sixpenny balsa gliders. I couldn't believe my luck when I won the LS3! At my first Inter-Ex, I came away with a LARGE pot of glue for best crash of the day...

So what has been left out? An awful lot I am afraid. Several participants brought along models which had been shown before and were improved in their flight characteristics and this demonstrated a continuing commitment to their involvement. In an effort to encourage more English participation, do I mention the excellent food ranging from breakfast, through to morning (and afternoon) coffee and cakes, through several lunch menus, (all served on china crockery, no paper plates allowed - for environmental reasons) through to the evening barbecue with accompanying side dishes? Throughout the event, various beers, soft drinks, ice creams, sweets etc are constantly available. Do you mention being woken on Sunday morning by the sound of gas burners and then watch as a couple of balloons land in the field? The family atmosphere and lack of officialdom? The lovely countryside to drive through or stop at en route? I could go on. Do come along. Participation doesn't have to be expensive. Just be a little different or just come for the fun. We stayed on overnight on Sunday this year, for another evening of chat and a few more beers. On Monday, we said our goodbyes and left others still fun flying at the excellent site. We will be back!



Prop folding mechanism. Alfonse Gabsch's new folder hub for the two and three bladed props he used.

KRC '96

Keith Shaw's 60" span Stearman in knife edge - even the display is modelled after a full sized airshow, as Keith flies this Astro 60 powered beauty in a way that makes you want to sell the squealers and buy cells!



by Dereck Woodward



Somewhere in Eastern Europe, back in the fifties? It was hard to catch Dave Ribbe's MiG in action - it is so reliable that he just wanders out to fly and there's nothing to hear as it whistles past.

224 registered pilots, around 275 model aircraft. 400 cars in the car park, driven by folk from thirty of America's States and representatives from Canada, Germany and Great Britain. Coverage in the local paper and on the local evening TV news.

Statistics!

"Stats" like that are generated by few model aircraft meetings. Those represent the 1996 KRC Electric Fly - a spectacular demonstration of the fact that electric model flight has moved on from the province of the few to becoming a leading activity in aeromodelling. "KRC" to most American modellers stands for the world's largest gathering of electric flight enthusiasts, it also stands for "Keystone RC Club".

Yes, this is a club meeting, one that's grown some. Seventeen years ago, seven members of the KRC Club invited three friends to come along to their field and fly their electric powered models. Mid September was chosen as they wouldn't be too bothered by noisy models. They all had a great time - so they decided to do it again next year when a few more came...

A few more have been coming every year. So many more that they have outgrown three sites! The hosts for KRC 1996 really understand flying - the event is held on the Queen City Airport, just outside of Allentown, Pennsylvania. Queen City hosts other model meetings and a balloon festival as well as operating a busy general aviation business and even cleaned out a hangar for a Saturday night dinner with a T-6 (Harvard) and a Stearman as backdrop. The hangar came in handy on Sunday when rain drove the traders indoors for what must be the world's biggest and best electric flight model shop! Electric flight owes Queen City Airport a great deal, one and all, we thank you.

Thankfully, this superb venue can stand expansion - at least twice this year's numbers - so it's "home" for now.

The KRC club pitches in to run this showcase, with a business-like organisation team.

Everything moves along smoothly, but the meeting still looks and feels like an amiable club gathering. Much to the organisers' credit, this is still a modellers' flying meeting. Too many events here are either thinly veiled airshows, with trade teams performing for a paying audience or large model events restricted to IMAA members only - KRC is still an honest-to-goodness modellers' get-together. Keep it that way KRC - it is great!

The majority of flying is RC, but free flight and control line activity prove that whatever model you fancy can also fly quietly.



A real innovator in sports electrics is Dave "Turbo" Dantonio - this is Jodie, his wife, as "Turbo" got his nickname by being hard to catch! Jodie poses his "Electro Jet", a sleek 54 oz. twin that flies in a way a simple wooden box usually doesn't. This model is nearly two years old, gets spectacular performance from two MEC Turbo 10 motors, 3.8:1 "Leisure" long gearboxes and 16 cells. From a hand launch, she flies around eight minutes with sparkling aerobatics. Model was in negotiation for a kit deal, this is still undecided. Perhaps we'll see a kit or plan one day - the model is delightfully simple.



Bottom of the "Electro Jet" - motors don't get better cooling than this. Model is just a basic high winged box at heart, add a 'T' tail for effect, toss in the very efficient twin pusher arrangement and watch it go!



"KISS" principle motor mount on Dave Dantonio's Electro Jet. That's Leisure's long gearbox, with an MEC Turbo 10 motor and carbon fibre drive shaft to a 9 x 7 pusher. Two of those and 16 cells give the 54 oz all wood Electro Jet sparkling performance.



For KRC '96, Dave Dantonio converted a 'slimer', as they say here. Posed by Jodie Dantonio, this "Force 1" is straight from the Balsa USA kit of Laddie Mikulasko's 40 powered delta. Dave fitted an Astro motor, 9 x 5 prop and 16 cells. Apart from fitting the electrics, she is straight out of the kit box and flies as fast as she looks. The slotted prop noise is distinctive, we all knew when she took off.



Fin detail on Jerry Smart's monster "X4 RX". That's a standard sized servo! There's also a receiver and nicad dedicated to this and the elevator servo in the fuselage just ahead of the tail.



What do you get if you cross a Lazy Bee, a Boeing 314 Clipper flying boat and a Fox Moth - this! Thayer Syme stretched the Bee wing a tad, added nacelles for Astro 035 motors with Leisure 3:1 'boxes and drives the lot from 14 x 1700mAh cells. The wing is wooden, the body is glass skinned blue foam and the UC is fibreglass and carbon fibre laminations. Didn't fly at KRC, but has flown off land and water. Whimsy abounds in electric flight, we haven't learned to build everything the same yet.

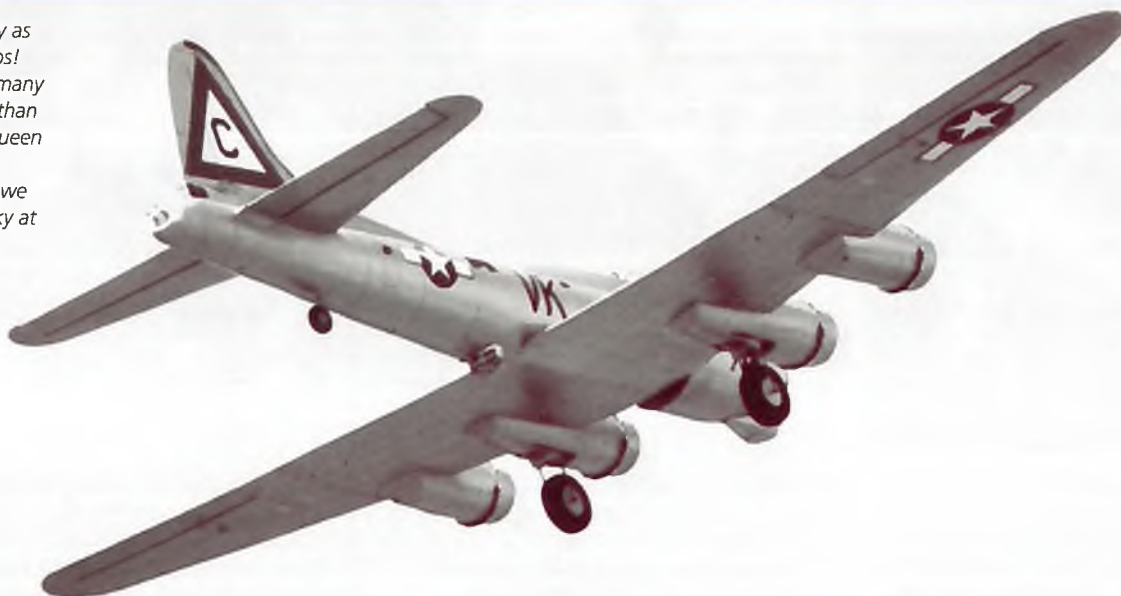


Huge, graceful and novel - Jerry Smart turned a "Sailaire" glider into his "X4 RX". Power is a "New Creations" reworked Astro 90, a 20 x 12 German "RASA" carbon fibre prop and a Kruse 2:1 gearbox, with two packs of 30 1700's in parallel! Electricity is consumed at a mere 15 amps - she can stay aloft for a while. The unusual name? Well, she has four receivers! Rather than using long servo leads, Jerry has a RX, servo and nicad pack on each spoiler, on motor control and - slipping slightly - rudder and elevator.



An American meeting wouldn't be complete without a yellow Piper Cub. George Gurney, from the intriguingly named town of State College, Pennsylvania, brought this lovely example. She's 72" span, an Astro 15G, twelve cells and a 12 x 8 prop do fine. The wings are rigged like a real Cub, with struts taking the load as per full size and a servo in each wing half. Though George hasn't weighed her, she felt lighter than many glow powered Cubs this size - a common phenomena. One thing is missing - the ugly cylinder and silencer that hangs out of many Cub cowls!

B17's were nearly as numerous as Cubs! Here one of the many whispers, rather than thunders, over Queen City. In one exhilarating slot, we had two in the sky at once.



One of the meeting's highlights - Keith May's B17. Keith makes his living in composites, so moulding an entire B17 was easy for him. The wings are white foam with glass fibre skins, the nacelles are moulded onto the wing skins and the hollow fuselage is also fibreglass. Even the fabric control surfaces are moulded 'glass, with the fabric ridges moulded in. Flies effortlessly on 28 cells and four "Goldfire" ferrite motors turning 7 x 6 Zinger wood props - hardly state of the art but Keith says they work just fine and the price is great. As we all know what the outside looks like - here's the inside, where one servo opens the bomb doors half way on half throw - full throw releases a salvo of bombs off the vertical rack in the centre. Retracts are "Spring Air" on the mains and a Robart mechanical tailwheel unit.



Electric models last well - this is the wing of a Bob Kopski "Skyvolt" I spotted in the pits. Every pilot gets a decal as part of a signing on kit. This Skyvolt did better than mine - lost in a mid air with someone who didn't know left from right hand circuits.

An English modeller would feel at home - competitions are low key affairs, the flying slots are random with up to six models, fast and slow mixing it in the sky. The only flying demonstration to stop the show is done by Keith Shaw, a modeller like the rest of us (albeit a very good modeller...), no traders or manufacturers causing airtime to be lost to club fliers.

Right behind the flight line, many of America's traders in electric flight goods set up shop, making this the place to stock up, from a brushless motor to motor mounts and electric model plans. Behind that, a huge parking area where those 400 cars looked rather lost. Going beyond the field, one arrives at the day before! Larry Sribnick, of "SR Batteries" and a driving force in the development of electric flight, sponsors and runs a day-long seminar on electric flight on the Friday before flying starts. This year Larry outdid himself - by arranging for a corporate rate at the local Allentown Hilton Hotel! This meant that a superior hotel room but ten minutes from the flying site cost Sue and I about the same as a clubmate of mine paid for a motel right alongside a busy railway track and a lot further away. This was a great deal, the hotel was huge, so many benefited.

Another event was the Friday night indoor session at the Hilton. This replaced the popular KRC Night Fly - Queen City Airport operates at night and it was assessed as too dangerous to have night-flying models airborne with full sized traffic around. Though the room available was too small for indoor RC, some electric FF



Happy John Chapis poses his "Pollutionless Pig" in front of one of the hangar backdrops - an all-black T6 trainer. The "Pig" is a 60" span light weight with 560 square inches of wing that has flown with motors from an Astro 05G and eight cells to an Astro 25G on fourteen, at weights from 54 to 80 ounces. John, about to launch "Classic Cut Models", aims to marry old style structures for lightness and strength with laser cut parts that fit! "Rubber Powered Models on Steroids" sums up John's modelling philosophy - build to fly, not crash. I hope we see more of them in the future.

made successful flights. However, a certain British magazine writer showed that "old age and cunning outdoes youthful skill and enthusiasm" by effortlessly flying two indoor profile rubber powered models in the tiny space available!

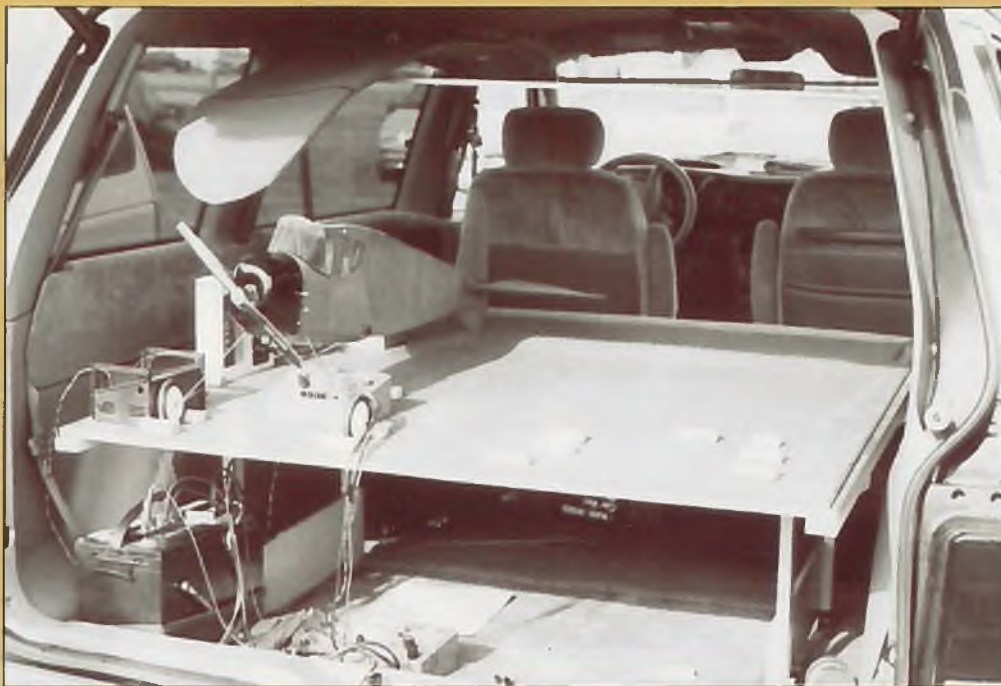
So - what's happening ?

If there are any trends in electric flight, they will show up at KRC. Here's a rapid run-down of what made this year's event.

Models - a welcome note is that electric fliers rank high amongst the innovators. American 'noisy' flying sites are awash with cheap ARTF's, clone sports models and a small number of very large plastic models that are all much the same. Now try to find any number of similar models at KRC.

Many folk are flying lower powered electric soarers - the seven cell direct drive glider around six feet span is the way most enter electrics. These are hand-launched, which is fine for many. The number of sports models built around that package is rising - the "Amptique" is very close to a soarer with an undercarriage, while the Great Planes "PT-E" and Goldberg "Mirage" look just like traditional high winged trainers, though both are cleverly optimised for successful electric flight on low power.

"Vintage" or "Old Timer"



The mag is titled "Electric Flight International" - who mentioned RC? Tom Davies, from Rosalyn in Pennsylvania, bought this control line model for \$20.00 at a flea market (no, that doesn't make it a flying flea market!). Soon after, it lost the 40 glow engine and gained this DeWalt drill motor. 14 x 1000mAh cells provide the urge, an 11 x 5 mates with the 5mm shaft via a Graupner adapter. On 70 feet of line, her 65 ounces took off rough grass and flew fine for around four minutes.



Drive train of Tom Davies' electric CL model - straight conversion of a model bought as a glow powered job for \$20 works well. To start - just flip the switch! A fuse takes care of any nose-over (or crash!) and 14 x 1000 cells drive that 11 x 5 prop through a big DeWalt electric drill motor.

Above: Electric modellers are ingenious - George Gurney's Cub travels around in this van. Bear in mind that American vans are well appointed people movers, not scruffy furniture haulers. That carpeted shelf fits in the rear bench seat retainers, keeping four seats for use. Chocks to restrain fuselages are secured by Velcro hooks that lock into the carpet, while wings hang from roof rails clipped into the headlining trim and tools go under the shelf. A 12V battery for charging flight nicads is topped up from the alternator while driving. That's what I call a civilised field box!



Model of the meeting? Dave Ribbe is a quiet guy who just ambles out to fly this staggering MiG 15. All balsa, an Astro 40 and 21 cells driving a modified BVM fan rotor, retracts and a performance straight out of Korea. From the lazy acceleration of a typical early jet to field long slow rolls, and all the way out of the other side to a rolling circle - this is a joy to watch. There are rumours that a plot is under way to produce a publishable plan - model's structure is described as "you better like to build"! This model does all a jet should, but quietly.

models are popular - from seven cell 'sports' models to some really fierce competition versions - Karl Benson had his new 85" "Playboy", still in the trimming stage, for 23 cells on its Aveox 1412Y motor, Robbe gearbox and a 17 x 15 Aeronaut prop - pulling 50 amps! The model is for competition use in the popular limited motor run events. Attitudes being more "laid back" over here has resulted in a lot of vintage designs developing sensible RC versions. These make excellent trainers and delightfully versatile sports models for those happy to fly the right way up

Moving up, the only kit to appear in any quantity was the Bob Kopski designed "Skyvolt". This is a plain looking high wing box-type model that performs way beyond its looks. I lost mine in a mid-air to someone who couldn't tell left from right in the circuit - on my model's fifth flight. With an Astro 05 geardrive and nine cells turning a 10 x 6 prop, it was tuning up into a really high performing sportster. I counted some five other Skyvolts in the pits over the weekend, including one that had been blown up a touch to take a bigger Astro unit. Unfortunately, it wasn't that good as a kit though Bob's design shows that he knows how to design for low weight and efficient flight.

Then we get to the high end. Many do their own designs, though models are 'modified' from glow (or even petrol!) power plans with totally different insides. One or two models have been converted straight from noisy to quiet power and work well - Thayer Syme had a lovely Tiger Moth from Gordon Whitehead plans, it was nearly finished when Thayer got close to flipping a coin over noise or peace. The quiet option won and he's never regretted it. On the other hand Dave "Turbo" Dantonio

took a 40 powered delta and built it from the box apart from a 40 by Astro, not Moresnort Inc.

At this level, Astro's black and gold motors still rule. Nowadays they are as likely to be sitting on a belt drive reduction unit from Model-Air Technology as their own metal gearboxes, but they are still deliver the goods for the thirty plus cell model. Some in the twenty cell bracket use the DeWalt drill motor - cheap, easy to service and powerful.

For the hi-tech - the brushless motor has to be considered. Current players are Aveox and MaxCimm, though Astro have just announced theirs, aimed squarely at the sports at around "only" \$200 - little more than an Astro straight drive and a decent speed controller. It is also some two thirds the cost of its rivals. The brushless motors are certainly showing up as versatile power units - one motor and controller could last a modeller through many years and many different models.

One fact that becomes evident to all who stick a toe into the electric flight pool is a saying of

It wouldn't be KRC without the King - "King Crimson", that is. Keith Shaw's monster flying wing delights crowds every year, regardless of whatever stunning new creation Keith brings along. 138" span, retracts, elevons and steerable nose gear - no hidden fins either. Under that sleek finish beats the heart of a pure sports model - a quartet of Leisure ferrite motors and long shaft gearboxes with 28 cells drive this elegant overcast with authority.

Don Bosquet walked off with best multi-wing with his Curtis NC-4 - any wonder? Model is a compact 62" span, 600 square inches lift 66 ounces through 16 x 650 cells, four Speed 400 motors and hand made 6" props This work of art flies with all the docility of a good trainer - even her transport cradle is a work of art.



Keith Shaw's - "Buy cheap, buy twice". Most of us have a charger that tops out at seven cells, or maybe will limp along at a low rate charge on eight or nine (yes - my hand went up with the rest!). While few will buy a 36 cell capable charger when not sure that they'll like quiet flight, limiting oneself to seven cells does cut out the really exciting stuff. Similarly, many of us have a splendid collection of cheap can motors!

Perhaps experienced fliers with an open mind can now go away, plan an project and know that it is going to work well. No need to bother re-inventing the wheel by buying seven cell gear - you want to build a forty sized sport plane, KRC is the place to go find out just how to do it.

The Fliers

Strangely enough, KRC draws a surprising number of spectators from the noisy side. These folk cannot fail to go away impressed with the progress that has been made. If your view of electric is that it is all slow gliders, then you see Keith Shaw fly his 82" Bearcat - with flaps and retracts through field long rolls and huge loops, watch Dave Ribbe's MiG 15 and its display of effortless and quiet flight and

generally note that far more models than ever seen on the noisy fields are flown utterly routinely and quietly with electric power.

They come from far and wide - Rolf Schmidt came all the way from Germany to win "Best Technical Effort" for his flying wing. As with so many, I never did catch up with Rolf - far too many fliers and models, just a day and a half to try and capture it.

One feature of KRC that has become a tradition is the All Up, Last Down comp. This is just what it sounds like and is not won by a glider pilot who can find thermals - it is won by guys who can get a motor run that the glow power pilots could envy! John McCullough cruised around for 1 hour, 43 minutes and 4 seconds to win this year. His model is totally unremarkable apart from some colossal nicads that are switched between three cell parallel and six cell series configurations by mechanical switches!

Now take a look around the photos. The captions are longer - I've tried to pack in enough details so they can add to the knowledge base on electric flight. One thing is certain - club sports level electrics are here, performing well and getting better.



You want BIG? This is Keith Shaw's latest - an 82" span, 15 pound Grumman Bearcat. Yes - 15 pounds, including retracts and 36 x 1700 cells to feed an Astro 90 and Model-Air Tech belt reduction unit. Monokote finish is scale, from an aircraft that flew airshows in the 1950's. Flies with all the authority of the real fighter - except that this one doesn't sound like a lawnmower in action!



- Or perhaps you'd rather have SMALL! John Fleming, from Syracuse NY, delighted us at the Friday night indoor session in the Allentown Hilton (now there's a place to indulge in aeromodelling!) with his "Thistle" all balsa pusher. A Kenway motor drives a 3" prop on the awesome power of two 50 mah cells. They also drive the steady LEDs on the wingtips and the flashing red on the motor pylon - "Thistle" does night sorties too.

Charger ON/OFF

Well, OK, perhaps that is an exaggeration, but many chargers do spark when the connection is made and I have never felt very happy about it. Given the risk of explosion and acid, (admittedly rare but not unheard of), I do not understand the lack of an ON/OFF switch on many chargers. My experience is with Astro chargers so this may not apply to yours, but if it does, read on.

The pictures show an Astro 112PK charger with a 5A@125V ON/OFF switch from Radio Shack. This should work on any charger. I have charged 28 cells at 4 amps through this switch with no problems. At this load, the current from the source battery will be 20 amps or so, but the switch is fine as it's 5A@125V rating is for switching rather than carrying current, and we switch on before we start the charge.

I took the face of the charger off the box, found a space close to the input wires, between the circuit breaker and the fan, and drilled a slightly undersize hole. I then enlarged it with a round file to an exact fit and centring and mounted the switch. The red wire had gone straight to the circuit breaker but with a quick 'snip, strip and solder'

The Astro 112PK charger with a Radio Shack 5A@125V ON/OFF between the circuit breaker and the fan.

Quiet Scale.

Dave Grife's quarter scale Travelair Mystery Ship.



Before I start in about some of the scale models I've seen over the summer, there are a couple of other things, one for scale builders but the other for all modellers whose chargers are hooked up in a shower of sparks.

it now goes through the switch and the fireworks are over.

Scale covering

I have done a fair bit of experimenting with various covering materials over the years. Silk and dope remains my

favourite but aside from the expense and smell, it isn't always the best choice. Films are great in terms of lightness and high gloss finish, but that finish may not be suitable or the colours available may not be right. Iron on fabrics are easy to put on but don't give as much torsional rigidity as

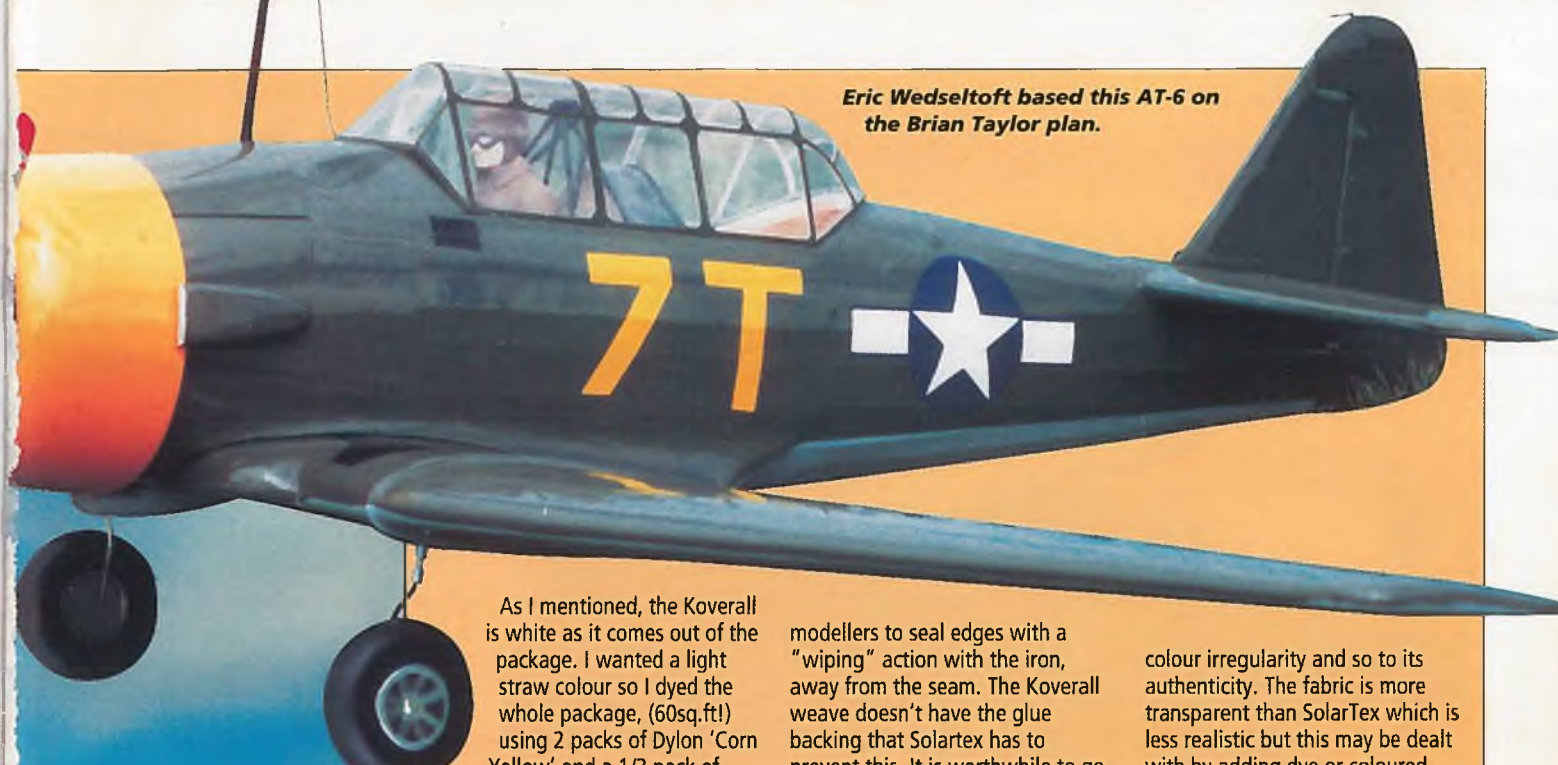
MonoKote, as well as being a little heavier. If we dope them to add rigidity, the weight builds up. This means that

we can build in the stiffness, (and add weight), or add weight with the dope. You have to decide if this will be significant for your application.

The photo shows two coverings. The fabric on the left is Antique Solartex straight off the roll. The wing in the middle is doped Antique Solartex on a wing, but with a difference. I have always found plain Antique to be too uniform and unrealistic. Once the wing was covered, but prior to doping, I went over the fabric with wood stain. This was lightly applied with just a trace smeared on a paper towel. I used some cherry and

And it doesn't look out of place on the control panel.

There is just enough space for this switch.



Eric Wedseltoft based this AT-6 on the Brian Taylor plan.

As I mentioned, the Koverall is white as it comes out of the package. I wanted a light straw colour so I dyed the whole package, (60sq.ft!) using 2 packs of Dylon 'Corn Yellow' and a 1/2 pack of their 'Desert Dust' (a brown), all according to the instructions. The effect is one of slightly paler, slightly more transparent, Antique Solartex. This was lucky as I am using it on a large Nieuport 12, (1915), which had a paler linen colour than was common later in the war. A darker colouring would probably require another package of the yellow and all of the brown.

I dried it on the line outside and it ended up very wrinkled. I did try ironing it at a very low heat, (don't forget that this is a heat shrink material!), but it seemed to be shrinking a little so I abandoned that idea. I just put it on wrinkled and used heat to shrink once everything is attached. Don't forget that more BalsaRite is needed on the edges of the overlapping pieces.

Try to make all cuts and trimming with a very sharp knife or pair of scissors. The edges fray fairly easily and this is worsened by the natural tendency of most

modellers to seal edges with a "wiping" action with the iron, away from the seam. The Koverall weave doesn't have the glue backing that Solartex has to prevent this. It is worthwhile to go over the edges and trim loose threads with an X-acto.

Once it is covered, you can start doping. I went over all edges with two coats of dope to start sealing them. (I used SIG brand dope for everything but other brands would work fine.) Then I brushed three coats of slightly thinned dope to seal the weave I thin the dope a bit, (10 or 20%), as I find that it brushes out better. Two coats of low shrink dope virtually fills the weave and I lightly sand the edges smooth. A coat or two more on any 'fuzzies' and a third coat overall to be sure. I then masked and sprayed the markings and followed this up with a sealing coat of low shrink semi-flat clear over everything.

At this point the fabric still has a 'zip' to it if you run your fingernail across it but it is completely airtight.

The dye is somewhat soluble in thinners so there is a subtle migration of colour on all surfaces which nicely adds to the slight

colour irregularity and so to its authenticity. The fabric is more transparent than SolarTex which is less realistic but this may be dealt with by adding dye or coloured dope to the clear or by making the third coat a light spray of pale tan. I did not do this so can only speculate.

Weights

OK, the obvious question is about the total weight of this method. Based on a top wing area of 5.75sq.ft, Koverall and BalsaRite added 2.6oz for the fabric and the first sealing coat weighed 0.6oz. The next two coats weighed 0.3oz per coat. Therefore the basic 3 coats of clear dope added 1.2oz. Adding a finish coat of flat added another 0.3oz for a total of 4.1oz for 11.5sq.ft of surface. (Note that a lot of the weight of a doped finish is in the thinners which evaporate. My wing lost 0.3oz in the 8 hours between my finish coat being touch dry and that evening – all the thinners continuing to gas off.)

MonoKote would weigh approx 3oz for the same area, (and look terrible on a WWI airplane!). Solartex would weigh 4.5 to 5oz but needs the staining to age it. I don't know how well it resists dirt without anything else put on. Any readers with first hand experience? Also, I'm not sure how much torsional rigidity it would provide, whereas a doped finish tends to be quite stiff.

The result above is based on clear doping. What about colour coats? The wing in question has 4 roundels of 12" dia (sprayed on using masks). This equals approx. 3sq.ft or 1/4 of the total area. The 4 roundels added 0.1oz to the total weight, suggesting that, properly applied, coloured dope needs be

oak stain but I'm sure other stains would be fine too. Experiment on a piece of scrap first, but just remember that 'less is best'. If you get too much on, thinners will remove the stain. Also be careful not to get it under the seem as it will show up as a darker streak.

Generally the faint streaking should be chord wise on the wing and vertical on the fuselage. This should be understated so that there is just a hint of the streaking. It should almost give you an unconscious sense of colouring.

'Koverall'

The fabric on the right is a 1.5oz/sq.yd polyester available from SIG as 'Koverall'. It has no adhesive and is white as it comes out of the package. It is meant to be put on with dope or with a brush-on adhesive like 'BalsaRite'. It is this lack of adhesive that is largely responsible for the light weight, (and probably its cheapness). On open framework aircraft, like WWI, this is a lot of "wasted weight". It also needs to be doped to seal it.

Antique Solartex and SIG 'Koverall' – see text.



**De Havilland Beaver
built by Jim Small.**



The Pond Racer flies!

only slightly heavier than a coat of clear. Again, I used SIG dope which covers quite well.

If we consider the slight weight gain for the huge increase in authenticity, I don't think that many will choose film just for the weight saving. Two or three ounces increase in a 4lb airframe is negligible.

The model is almost finished and I will include some photos next time of it is completed, (I hope).

Model photos

I went to a couple of fun flies this summer and the following are some of the models I saw.

The first picture is an airborne shot of the 1/4 scale Travelair Mystery Ship belonging to Dave Grife of Coldwater, Michigan. This was fully described here several months ago so I won't go into the details. This plane came in second in 'Scale Monoplane' at the Toledo Exposition last April. Dave flew it originally with scale, (non-functional), rigging and it felt like it needed a couple more cells. Without the rigging it performs superbly. It just serves to underline the effect of drag.

The next picture is a Balsa USA 1/4 scale Piper Cub belonging to Don Guthrie. This much modified model is powered by a geared Astro 60 swinging an 18 x 10 prop on 30 x 1700SCRCs. It weighs 17lb but as that is on 12sq.ft it is a floater. I know of a number of this size Cub being flown with geared

40s and 20 cells! I am sure that they are a bit lighter but it does illustrate just how little power can fly a light airplane.

The fellow trying to climb into his 1/4 scale clipped wing Taylorcraft is Mike Stewart of Lehigh, Penn. It is powered by an Astro geared 90 on 36 x 1700SCRCs. It weighs 16.5lb and has 1300sq.in of area, (9sq.ft). It uses a Master

Aircrow 20 x 10 at about 33 amps but half throttle is quite sufficient to fly it well. I believe that Mike used Coverite 21st Century fabric for covering.

There is a pair of photos of a Pond Racer built by Scott Black of Montreal. Scott finished this nearly two years ago but couldn't steel

himself to test fly it for a long time. This summer he decided that it would fly or die! As he was preparing it for the test flight it was noted that one spinner was buzzing. When it was suggested that he might remove them for the test flight he replied, 'It goes with everything. You wouldn't want to be buried in your underwear, would you?' With that fatalistic attitude it was launched, two hands/two booms, and flew like a charm! I think that it is the first time I have ever seen someone actually jumping up and down for joy at the end of a successful test flight. The plane has a pair of direct drive Astro 035s on 12 cells, (600SCRCs for the test flight only -

Piper Cub by Don Guthrie.



1000SCRs normally). It has a 59" span but only 305sq.in to carry 53.5oz. Some very interesting engineering in this one.

Another one of Scott's airplanes is the red de

Havilland Twin Otter he is holding. This is done in the markings of one flown by his father years ago. After trying geared Speed 400s and not being happy with the marginal performance, he re-motored it with a pair of AP29s geared 3:1. A pair of APC 9 x 6 props draw 13 amps each from, I think, a 7 cell pack. They turn 7300RPM and fly the 51oz plane with ease. I didn't write down the wing span, but the area is just 330sq.in (Doesn't this fellow realize you need big wings to fly those heavy electrics?)

Another great de Havilland airplane is this Beaver built by Jim Small of Halifax, Nova Scotia for Vic Walpole, the original sparkplug of the Electric Model Fliers of Southern Ontario. This 72" original design weighs 6 1/2 lbs and is hauled along nicely by its Keller 50-24 on 18 cells. It is great to see a Beaver that actually looks like a



Mike Stewart inside his 1/4 scale clipped wing Taylorcraft.



Pond Racer built by Scott Black.

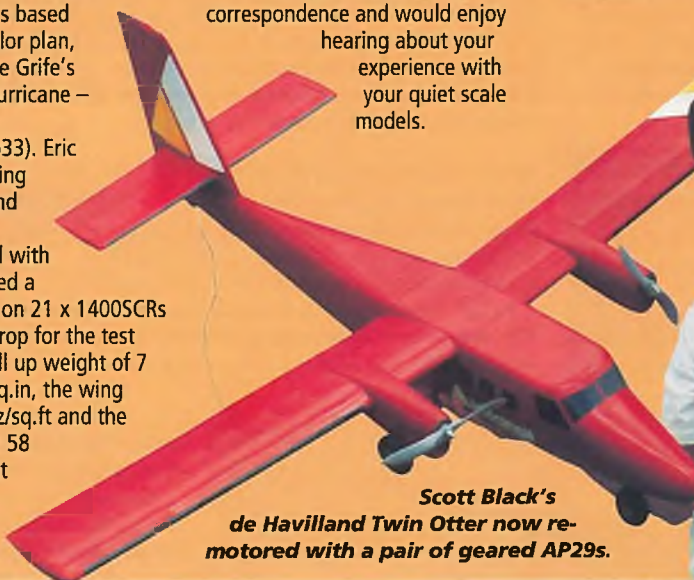
Beaver rather than some cartoon version. Last is the AT-6 of Eric Wedselt of Palmerston, Ontario. This was based on the Brian Taylor plan, (just as was Dave Grife's Mosquito and Hurricane – EFI

Jan/Feb 95, p33). Eric built a D-tube wing with capstrips and a stringered fuselage covered with MonoKote. It used a geared Astro 40 on 21 x 1400SCRs with a 12 x 11 prop for the test flight. With an all up weight of 7 3/4 lb. and 660sq.in, the wing loading is 27.3oz/sq.ft and the power loading is 58 watts/lb. The test flight was smooth and uneventful.

Even the retracts worked flawlessly.

As always, I welcome any correspondence and would enjoy hearing about your experience with your quiet scale models.

Martin Irvine, 1331 Rockwood Drive, Kingston, Ontario, Canada, K7P 2M8.



Scott Black's de Havilland Twin Otter now re-motored with a pair of geared AP29s.



Scale for Electric.

Winter approaches, or is already here. What are your modelling activities over the winter months? Certainly for the most of us flying is restricted to a few times over the drier, less windy weekends. Perhaps it is a time (or should be!) to get that new project under way, or perhaps refurbish a favourite flown during last season, ready for the springtime.

Robin Andrew's new model is a 62" span Boeing P-26. The 7 1/2 lb model features traditional construction and nylon covering. It flies for 6 minutes on 18, 1700mAh cells feeding a Pro 736/8 motor, direct drive turning a 14 x 5 prop. At Pillerton, Robin donated a magnificent cup for the annual best scale model won this year by Geoff Leigh with his Komet 163. Thanks Robin - this trophy alone should be enough incentive to build something better in scale for the season ahead.



Below: Those long, warm summer evenings will soon come around again. Here is Mike Chaplin of the Cricklade model club with his scratch-built Wellington successfully test flown this year and beginning to log up quite a few missions. Mike is in the throws of completing the model and adding the insignia. Two Speed 600 ECO motors, 8 x 4 Slim Props and one 8 x 1700mAh pack. Is it time to ditch the sweater and diesel Mike for clean electric flight?!



Above: Not quite finished for 1996 but it should be around next year, is this Ryan STA by Stan Craythorne. Built from the Sig kit, it spans 72" at 1/15 scale. Stan has installed a Keller 100/9 motor which swings a 14 x 6 prop at 10,400RPM fed by 24, 1700mAh cells controlled by a Gordon Tarling Zippy 40 speed controller. The weight so far is 11.5lbs and there are still more rivets to add!

Below: Derrick Bates built this Blenheim from the Model Designs plan. It incorporates a wealth of detail including a removable UC. Derrick changed the ECO motors for two Speed 600 7.2V BB ones to give adequate power to cope with the one pound overweight. It still returns 4.5 minute flights with the single 8 cell, 1700mAh pack.

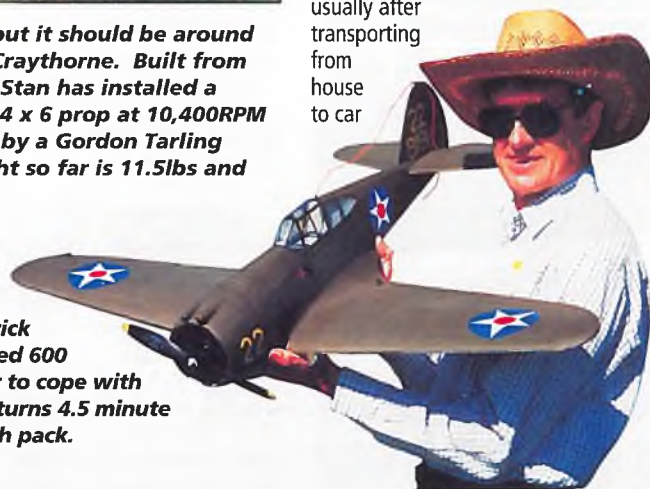


Where it's warm

With the airframes 'back in the hanger' my models undergo a thorough service which comprises an inspection of all the moving surfaces and their hinges and linkages. Detach the control at the servo end and check for free and full movement of the elevators, ailerons and rudder, inspecting each hinge for signs of fatigue.

I am finding that with the minimal vibration levels experienced with electric flying, the airframes are better equipped to give a longer life, this despite the fact that they are often more lightly built in the first place. To keep things running smooth it is worthwhile to re-check the balance of the propeller.

Over a season's use nicks and grazes can accumulate to cause an out-of-balance, hence the need for re-checking. I also remove the motors and apply a spot of oil to the plain bearings (thin machine oil) and inspect the integrity of all the battery plugs and sockets. The airframe is given a good cleaning down and I sand smooth the various dents in the leading and trailing edges that have appeared, usually after transporting from house to car



Robin Fowler with his fine flying Curtiss Hawk 75A, the forerunner to the Curtiss Tomahawk. The 50" span model weighs just under 3lb and carries 8, 1700mAh cells powering a 540 motor through an Olympus belt reduction to a 11 x 7 Kavan prop. Model is an all built up fabric covered open structure.



season's use? All that it should require is a wiping down of the sticks around the gimbals to remove dust and grass etc.

With all the maintenance work done on your model(s) IT IS time to start that new project. Perhaps a little inspiration can be gleaned

Martin's only modification to the standard Baronette kit was the provision of a battery box, neatly accessed after removing the dummy Gnome cylinders. Speed 700 Turbo motor with 16, 1700mAh cells and 2:1 reduction belt drive unit. The 71b model flew well at the Pillerton Hersey.

and back again, and then forgotten about! I reinforce severe bruises with thin cyano and smooth down with fine sandpaper.

Above: Martin Bailey, with his electric conversion of the Flair Baronette.

Storage

The battery packs are discharged via a cyclor to their safe minimum voltage and stored, not forgetting the transmitter pack and receiver battery if you are not using BEC.

Have you noticed how your transmitter remains free from the usual castor oil grime after a



Left: The things people do to my designs! Dave Durnford built this two seat training version of the Fw 190 based around the Model Designs plan. Model successfully flown in the UK only to be broken at Aspach, Germany following an equipment mix up. Nicely posed photo Dave, complimented by the dummy prop.

from the models shown on these pages taken during last season. Thanks to all of the readers who have written to me this year, have good Christmas and I will see you in 1997 (definitely with my Hurricane, honest!).

Below: Malcolm and Kevin Saunders with Kevin's two seat version of the A-10 Thunderbolt. The model features a beautifully engineered sprung retractable undercarriage and working flaps. This is a true ducted fan model with two Electro Jet units spooled-up by Speed 600, 12V Turbo BB motors wired to 21 cells. This gives the 8.25lb model three and a quarter minutes motor time.

Peter Wilkins of the Grantham club with his FE8 pusher. The 52" span one piece model was scaled up 30% from a 1956 free flight design and is powered by a Speed 600 motor through an Olympus 2:1 belt reduction. It uses 7 cells and an FX35 speed controller with motor, rudder and elevator controls.



ASPACH ELECTROF

"Die tollkühnen Männer mit ihren fliegenden Kisten"



Jean-Paul Schlösser's F-16 close up. This 900mm (35") span 1.8kg (4lb) model uses an Aveox motor and Schwedtfeger Ø89mm fan that runs on 10 to 12 x 1000mAh cells. Jean-Paul produces a moulded kit, contact him at Jean-Paul Schlösser, Engelseweg, 3B, 5705 AB Helmond, Holland.



How to launch a jet model. Ralf Dvorák's 'F-104' available as FMT plan MT-1105. Construction is balsa and ply with foam wings and this 580mm (23") span model weighs 744g (26oz) and is powered by a Speed 400 6V motor on 10 x 500AR cells.

For the 7th time

Aspach Model Flying club in conjunction with "Modell" magazine held the prestigious electric scale meet at their club site, located to the north-east of Stuttgart.

Whilst awards are made for each scale category e.g. best fan-model, best civil, best military type, etc (decided by a panel of distinguished judges including Heinz Keller of Keller motor fame) the meeting is primarily seen as a place to view and exchange tips and technology, plus meet and greet old and new friends alike.

The spectator turn-out is excellent, not surprising given the excellent facilities for the family including some very fine German cuisine provided and served by the ladies of the host club.

Add a good representation of traders, with particular emphasis on electric flight products; you only need good weather to complete the ingredients for a "wunderbar Wochenende!"

A trend (if one were to be singled out this year), was for the ducted-fan model. No less than 46 types were present and judging by their performances, the electric-jet has truly matured. The latest range of fan units e.g. Schwedtfeger, now attract many converts from the IC brigade. Their superior performance is particularly noticeable when compared with first generation systems, akin to the progress made from early Whittle/Jumo jet motors to latter day offerings!

Hans Bühr with his MiG 29 and Jean-Paul Schlösser flying an F-16 were particularly impressive. The model-jet industries are now working fast and furious to support budding jet-jockeys by providing a range of kits and parts, these generally more suited to the experienced constructor and flier.

Experimentation is still very much in evidence and worthy of

A truly international participants from Netherlands, Italy, country Germany registered to fly day to Sunday. If you per pilot (many b of the number and Report and photo Stockinger.



Jean-Paul Schlösser F-16, the Best Jet yet!

mention was the significant changes made by one flier to a standard Robbe 'Gnat' ARTF kit. These included the coupling of ailerons with elevators for a vastly improved aerobatic performance.

The diversity of model flown was great. Paul Meider and

LUG MEETING 1996

("Those magnificent men with their flying machines")

onal gathering this year, with Austria, Switzerland, The y, Britain and of course host . At least 104 pilots were during the long weekend - Friday assume an average of 2 models brought more!), you get some idea d variety of models present. s from Dave Durnford & Franz



Messerschmitt P.1101 built by Dirk Juras. 1.4m (55") span, weight: 1.54kg (54oz), motor: Speed 600 BB 8.4V, fan unit: Eco Fan 2, power pack: 10 x 1000mAh. The original not quite finished P.1101 was captured at Oberammagau by US troops early in 1945, shipped to the USA and was eventually modified, completed and flown as the Bell X-5 on June 20 1951, almost ten years after construction had commenced. In 1942 so few had faith in swept wings and gas turbine engines - a pity, or a good job, depending on where you were living in 1945!



Stephan Dolch gave impressive displays with their ultra-light Saalflug (Indoor) models, in the outdoors. At the other end of the model spectrum, Jurgen Schmid's 12 engined 'Dornier X' flying boat made exciting spectator viewing as it was bungee launched via a supporting dolly.

Enough text, look at the photos and data, inspired? See you at Aspach next year.



Just a part of the 'Jet Jockey' paddock at Aspach.



A-7 Corsair by Dirk Juras. Span is 930mm (37"), weight is 1.44kg (3lb 3oz) and a Keller 540 motor drives a 5 blade Ø90mm fan on 8 x 1700mAh cells.



Lockheed P80 'Shooting Star' by Heino Dittmar with 2 x Speed 400 6V motors. Heino built the fan unit with the two motors, each driving its own Ø65mm impeller, one behind the other, both in the same tube. Power is from 10 x 1000mAh cells, wingspan is 1.11m (44") and weight 1.35kg (3lb).



Reinhard Bartl's 'Mirage 3' (the big one). Wingspan is 1.2m (47") and weight 4kg (8 8lb) and it uses a Plettenberg 355 motor. Construction is from balsa and foam.



Douglas X-3 Stiletto by Reinhard Bartl. This astonishing looking model is big, spanning 2.2m (87") and weighing 11.5kg (25lb). The two motors are 355 series Plettenberg Evolutions operating on about 50 amps each from a total of 60 x 1700mAh cells (presumably 30 per motor). The X-3 was built in 3 weeks and uses an Eppler 174 airfoil, an attempt to fly at Aspach was unsuccessful. Ah well - back to the drawing board - or bank!



This is the elevator control on the Douglas X-3, one servo per surface.



Then rear end of the Douglas X-3 with built-in charging sockets.



Hans Bühr has made a few of his own fan units. He has made another pair, this time with 4 blade Ø90mm fans that run at 31000RPM! The two Lehner 27/18/14N motors are each mounted on 7 stators in his MiG 29. They run on 16 x 1000mAh cells in this 980mm (39") span, 2.5kg (5.5lb) model.



Jurgen H Schmid built this 1/20th scale 'Dornier Do-X' from foam. It weighs 7kg (15.4lb), spans 2.4m (94") and is ROG 'launched' from a dolly with the aid of a bungee.



Close-up of the Do-X flying boat, showing just some of its twelve 400 motors and APC 7 x 3 props. These run on 44 x 1200mAh cells.



'Heinkel He 280' available as a kit for the experienced builder and flier (see earlier issues). This model uses two Speed 400 6V motors with 'Malten impeller units' on 10 x 1000mAh cells.





'Extra 400' by Theurin Wiepuieol. Wingspan is 1.5m (59") and weight 1.7kg (3.74lb). A 3:1 geared Speed 600 Race on 8 x Sanyo 1800mAh cells drives a 10 x 6 prop.



'Coke' by André Srowig from Heidelberg. Span is 500mm (20") and weight 360g (13oz). A Speed 300 geared 2:1 drives a 15 x 15cm (6 x 6) prop.



The Messerschmitt Me 262 is the WW2 favourite aircraft of many aviation enthusiasts. This big model by Reinhard Bartl flies on two Keller 90 motors with Bauer fan units and 34 x 1700mAh cells. The wing is epoxy skinned and contains retracts by 'Hawe'. Wingspan is 2.14m (84") and weight 8kg (17.6lb).



A kit for this 890mm (35") span, foam construction 'Pampa IA 63' is available from Siegfried Glöckner, Lange Str. 77, D-76307 Karlsbad, Germany, for 229 DM. It uses a Speed 400, 8 to 10 cells and weighs 650 to 700g (23 to 25 ounces).



Paul Meider calls his light 250g (9oz) 800mm (34") span model 'No Name'. Motive power is from a Kyosho DM20 geared 6:1 on 8 x 110mAh cells, with a Merz 'SM' BEC controller and a Peck Polymer prop.

Below: As well as his F-16, Jean-Paul Schlösser produces kits for the P-51 Mustang and Spitfire here, for 600 motors and 8 cells, each weighs about 1.2kg (42oz).



The Brown B2 1930s racer 'Miss Los Angeles' by Manfred Graf. Wingspan is 1.9m (75") and weight 4.5kg (9.9lb).



The engine room of 'Miss Los Angeles' where you can just see 26 x 1700mAh cells, an Ultra 1600/8 with Kruse 2.4:1 belt drive and 17 x 10 prop.



'Felix' is built from a Titanic Airlines kit that costs 79 DM. Wingspan is 1.8m (71") and it uses a geared 400 motor and a 9 x 6 Slim Prop.



'Junkers Ju 52' built from a Titanic Airlines kit costing 379 DM. This model uses three Speed 400 7.2V motors, eight or nine cells and has a wingspan of 1.5m (59").



In the foreground is 'New Bingo', a 700 DM Electro-Hubschrauber (helicopter) kit by: Karel Pustka, Am Büchl 39, D-82041, Oberhaching, Germany. Ø1270 or Ø1400mm rotors are available and weight is 2.75kg (6lb) with 16 x 1700mAh cells which provide 8 to 12 minutes flying time with the Ultra 1600 motor. (See 'Quiet Rotors' column in previous issues.)



LMO Vario reduction drive available in the ratios: 2, 2.25, 2.4 and 2.57 to 1 to suit Ultra 1600 and similar size motors. Available from: LMO, Seinsheimstr. 64, D-97199 Ochsenfurt, Germany.



'Westland Whirlwind' built by Klaus Hakelberg for two Ultra 1600/6 motors in Graupner 2:1 units and driving 13.5 x 12 props on 34 x 1700mAh cells. Wingspan is 2.43m (8') and weight 6.5kg (14.3lb).



'Titanic Airlines' produce a kit for this Boeing B-29. Wingspan is 2.05m (81") and weight 1.3kg (46oz) giving a wing loading of 39g/sq.dm (13oz/sq.ft). It flies with four Speed 300 motors on 8 x 1700mAh cells. It is available for 195 DM from: Titanic Airlines, T. Behnisch, Seilerstr. 15, D-97084 Würzburg, Germany.



This one seventh scale 'Fiesler Storch' has a wingspan of 2m (79") and weight of 1.8kg (4lb). It uses a Johnson motor geared 3:1, 10 cells and a 12 x 6 prop. The plan is available, price: 50 DM from Norbert Ladenburger, Im Fuggerle 46, D-7352 Schwäb Gmünd, Germany.



Left: Stephen Dolch shows us his 'Stab Heuschrecke', a 1.2m (47") span, 232g (8oz) lightweight powered by a 4:1 geared Kyosho DM20 BB motor and 8 x 250mAh Sanyo AA cells. The prop is a 9 x 6, receiver a Simprop Nano and speed controller with BEC, by Heino Jung.

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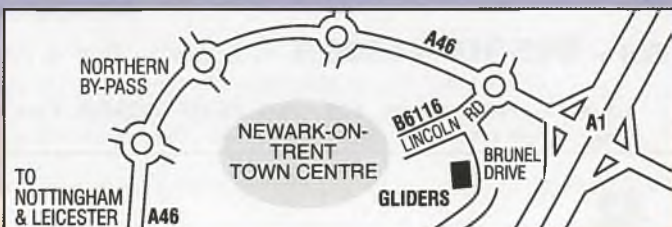
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Junior 60

The Ben Buckle 'Electric Junior 60' was originally kitted by Keil-Kraft as the 'Junior 60' nearly 50 years ago.

Mike Goulette has prepared this kit review and says "The model is an absolute delight to fly. It will do multiple touch and goes, cruise around on ridiculously low throttle settings and can be safely manoeuvred at very low airspeeds" and all on a low cost motor.



Some background

Although I generally fly gliders and helicopters these days I have had a long interest in vintage models and I joined the UK chapter of the Society of Antique Modellers (SAM 35) when it was formed in the early 1980s. One of the models that I recognised then as a classic was the Junior 60. At the same time I became active in electric flight and the two came together when I built an electric "60" in around 1981. This was built from an early Ben Buckle drawing that I think had been drawn from an actual model rather than from the kit plan. My model was powered by an MFA Olympus belt drive and six very poor Sub-C nicads. Nevertheless it flew, including unassisted ROG (rise off

ground) take offs, although the flight duration was very short. This particular model met its end after I converted it to "wet" power and the wings folded during a loop. I was delighted, therefore when Editor Stephen asked me to review the Ben Buckle electric "60" kit as it has given me the chance to compare the advances in electric flight in 15 years as well as a chance to do some real building rather than mess around with foam and glass or assemble plastic and aluminium.

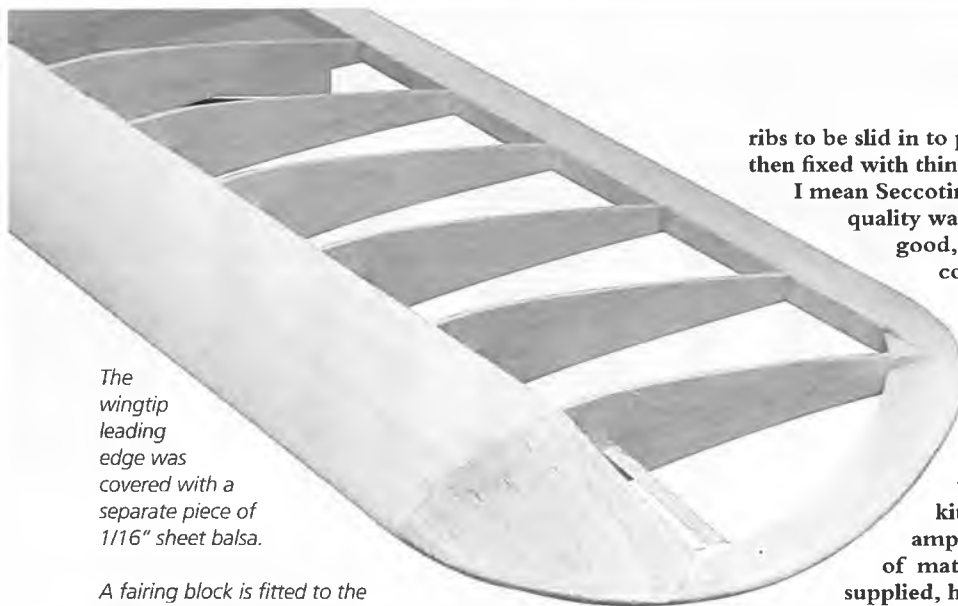


Astro speed control fits on top of the motor mount.

Left: Keil Kraft transfers embellish the fin.

The Model

Eddie Keil's Junior 60 was designed to take advantage of the emerging post war market for "gas" models. Although powered flying had been banned during the war, quite a few petrol engines had found their way in to



The wingtip leading edge was covered with a separate piece of 1/16" sheet balsa.

A fairing block is fitted to the centre section leading edge.



Fin and tailplane ready to cover. Note the reinforcing strip in the centre of the tailplane.

the UK from visiting GI's and from our troops who had been posted abroad. The diesel era had yet to dawn in earnest and these early petrol engines were relatively heavy for the power they produced, just like our electric motor/batteries in fact! Consequently the Junior had a very short nose. This was a little problematic when the much lighter diesels came along later and was addressed in the 1964 redesign that became the equally famous "Super 60". The Ben Buckle electric conversion takes advantage of the short nose by placing the flight batteries up front, underneath the motor and RC equipment.

In the 1950's the Junior 60 became the model of choice for the emerging sport of RC flying and the kit was reissued in 1955 with details for RC conversion. This was, of course, rudder only and the changes were confined to widening the fuselage to make it easier to fit the bulky valve radio receiver and the large batteries and to showing a moveable rudder. The Ben Buckle kit version has a small rudder and a very small elevator which work just fine for an 'RC assist' style of flying.

The Kit

The kit is comprehensive and includes wheels, linkages, hinges, and the parts for the electric motor mount. There is no die cutting (and definitely no LASER cutting for this vintage aeroplane!), the ribs and other preformed parts are accurately bandsawn to shape. Parts fit was excellent, particularly the rib to spar fit which allowed the

ribs to be slid in to place and then fixed with thin cyano (sorry, I mean Seccotine!). Wood quality was generally good, I replaced a couple of 1/4" square longerons because they were soft but otherwise I used all the wood in the kit. There were ample quantities of material supplied, however my

kit was missing the 1/4" dowel for the wings and tail, which proves that this kit was not specially selected for review. The instructions include a "helpline" with a phone number for the manufacturer so this sort of problem is easily fixed. I only had two gripes regarding the contents. Firstly, the two sheet plans (based on the kit drawing, unlike my early model) were folded rather than rolled. Obviously folded plans take up less room in a kit box but the fold lines always make it difficult to get the plan to lie flat on the building board. Secondly, the piano wire undercarriage parts in the kit did not match the shape on the plan very precisely and some additional bending is necessary to get the wheel axles correctly aligned. These additional bends are out of plane of the initial bends that have been done for you. I think that a

beginner with limited facilities would have great difficulty in getting this right.

Electric modifications are shown as a reduced scale drawing on the main fuselage plan and are quite clear. The motor mounting arrangement is definitely from the "brick outhouse" school of design with a 1/4" ply plate screwed to 1/2" beech bearers. I have no doubt that it could cope with an F5B motor at full chat! I built in about 3 degrees of down and right thrust and this seems about right with no trim changes with the motor on or off. I decided to use the "Master" Speed 600 and gearbox shown on the plan, however it would be very easy to adapt the motor mount to accommodate other geared or ungeared motors. The drawing shows the speed control on top of the motor mount, under the cowling and you will need a fairly small unit if you want to do it this way. I used the tiny Astro Flight 217 which is ideal. Don't worry if you only have a large controller, however, because there is plenty of room in the cabin to accommodate it.

The flight pack slides in to a battery compartment under the motor and this makes battery changing on the field very quick and easy. There is no means shown of retaining the battery in place, however, and I added a reusable tiewrap at the front to hold the pack in place. You should be able to see this in one of the photos.



A reusable tiewrap secures the flight battery.

Building the model

This is building the old fashioned way and although it is very easy, modellers weaned on today's lite-ply and foam construction methods may find it somewhat long winded. I found it very enjoyable and by making good use of both cyanoacrylate and fast setting PVA, quite quick. The instructions and the plan notes cover the major issues so I will just concentrate on hints and tips.

The fuselage sides are built up over the plan from 1/4" square balsa and it is worth spending a little time to get the parts to fit precisely. I usually cut slightly overlength and then adjust the final fit using a sanding block. The fit should be gap free but not too tight or you will get distortion of the longerons from the locked in stresses. Build the second side directly over the first one, this helps to ensure that you end up with a square fuselage when you put it all together. Use a sheet of

polythene or similar between the two sides when you build the second one or you will end up with just one double width side! No method for retaining the removable top half of the cowl is shown on the plan. I used a dowel at

the rear and a small magnet at the front to hold it in place.

The tail surfaces are simple strip and sheet outlines. The fin attachment looked very insecure to me, however. The centre section of the tailplane is covered with 1/16" sheet after sanding to shape and the fin is butt glued to this with no reinforcement. I fitted an additional 1/4" square chordwise strip under the sheeting at the fin attachment point and after fitting the fin I drilled a couple of small holes up through this strip into the fin and then cyano'd small pieces of cocktail stick in to the holes as reinforcement. Belt and braces maybe, but it gives me peace of mind having crashed a vintage model a few years ago when the fin folded over in flight.

The plan includes details for building a two piece wing, however if you decide to do this I suggest that the wooden dowel joiners are replaced by 6 SWG wire joiners in to brass tubes. I would recommend, however,

that you build the wing in one piece as it will be both stronger and lighter. The plan shows the central dihedral brace should be made from 3/32" ply, in my kit this was cut from 1/16" ply which should be adequate for gentle flying. If you want to occasionally perform some non-vintage aerobatics I suggest you replace it with 1/8" ply or double up the 1/16". I took the former route with my model.

The upper leading edge of the wing is covered with 1/16" balsa sheet and the plan is a bit vague about what happens at the wingtip. I used a separate piece of sheet to cover from the tip rib down to the tip bow. This can be seen in one of the photographs.

I covered my model with "vintage" Solartex. This material is translucent and is an excellent substitute for silk or nylon. A couple of genuine Keil-Kraft waterslide transfers were applied to the fin to finish off.

RC installation was very simple and followed the suggestions on



Landing - no prop! It had come off during the flight.

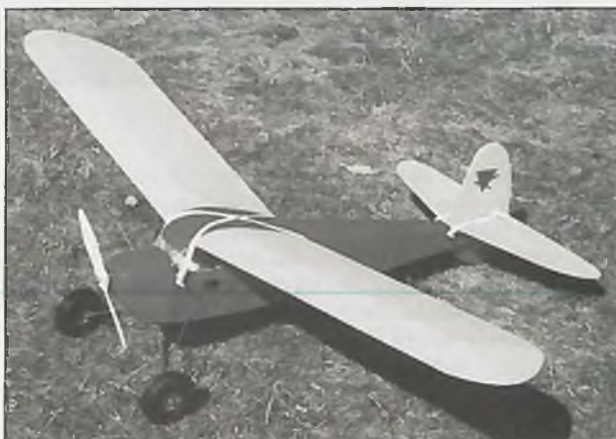
the plan. If this had not been a review model I would have replaced the rudder pushrod, which has a very long unsupported wire rod to the clevis at the rear end, with a closed loop system. In a low speed model like this the consequent slop is no problem and it has worked just fine in practice.

Flying

And now for the interesting bit. For the first flight I fitted an 11 x 7 wooden prop and an old pack of Sanyo 1200 SCRs. After range checking with motor off and on, the model was hand launched by John Dominy (who also took the in-flight photos) into a stiff breeze. She climbed away steadily and handled the wind fairly well. Control response was mild but quite adequate for the intended flying style of the



Mike Goulette and Junior 60. Guess which one is the younger.



Rubber bands, balloon tyres and a wooden prop, all that is missing is the smell of diesel fuel, thank goodness!

model, i.e. RC assist or Ab Initio training. The second flight was ROG and the Junior got easily away after a short run. Subsequent flying sessions in calmer weather have shown that the model is an absolute delight to fly. It will do multiple touch and goes, cruise around on ridiculously low throttle settings and can be safely manoeuvred at very low airspeeds. I have even managed to get it to go up in a thermal, mind you, bricks were climbing faster! In short, I love it.

The best prop I have found so far is the Master Airscrew Electric Series 11 x 7. This has a thin highly undercambered blade section and seems to match the motor/gearbox very well. Flight times are around 6 to 10 minutes on the old 1200 SCRs and would be about 50% better with 1700 SCRs.

Conclusions

The model is a classic, the kit, with minor exceptions is excellent, it flies like a dream. If you fancy electric vintage go out and buy one. This kit was kindly provided by Irvine Engines, if your dealer hasn't got one, tell him to ask Irvine Engines.

"Das Elektrojet, a fantastic electric model" are Martin's own words to describe this stand-off scale model of a diminutive German prone-pilot dive bomber that was intended to be too small for Allied AA gunners to hit. The original prototype was about to begin test flights when the factory was captured by the advancing Soviet army in 1945. This 1.2m (47") span model for Morley Jet-Elec or similar fan units doubles as your first ducted fan model and a fun aerobatic trainer.



History

'Das Elektrojet' was my second electric ducted fan model. Everything started when I was flying my first fan model the 'Electric Fan Flyer' at a fly-in. A friend of mine asked if I could design a fan model that was easier to fly and build (the Fan Flyer is a twin boom design).

I accepted the challenge and went home to look through all my magazines for a suitable subject. In one of the magazines I found

an article about Chris Gold's gas turbine powered Cobrajet. Chris had based his model on the German Henschel 132. It had a pod-mounted fan and the fuselage was very streamlined, a perfect candidate for an electric conversion. Like Chris, I prefer to call this a "cartoon scale" model.

Battery access is easy and bad landings made safer!

With the Morley Jet-Elec fan unit and 8 cells I had 400 grams of thrust in my Fan Flyer so I decided on a target weight of 1200 grams and a 1.2m wingspan.

I also decided to use the same

Henschel 132

PLAN REVIEW AND CONSTRUCTION

BY MARTIN
LAGERSTEDT



wing profile (section) as my Fan Flyer. The wing has a flat underside and you build the wing direct on the bottom planking.

Building the wing

Glue the wing bottom planking, lightweight 1.5mm (1/16") balsa, together and mark the positions of the wing ribs. Glue the leading edge, 6 x 8mm (1/4 x 5/16") balsa and the trailing edge, 4 x 6mm (5/32 x 1/4") balsa to the planking.

Fit the wing ribs between the false leading and the trailing edges by cutting the rear of the ribs. When glueing the rib closest to the wing root, use the dihedral template to get the correct angle on the rib. Sand down the rear of the ribs. Strengthen the wing fan mounting according to the plan.

Build both halves, remembering to build one left and one right! Glue together the wing halves with a dihedral

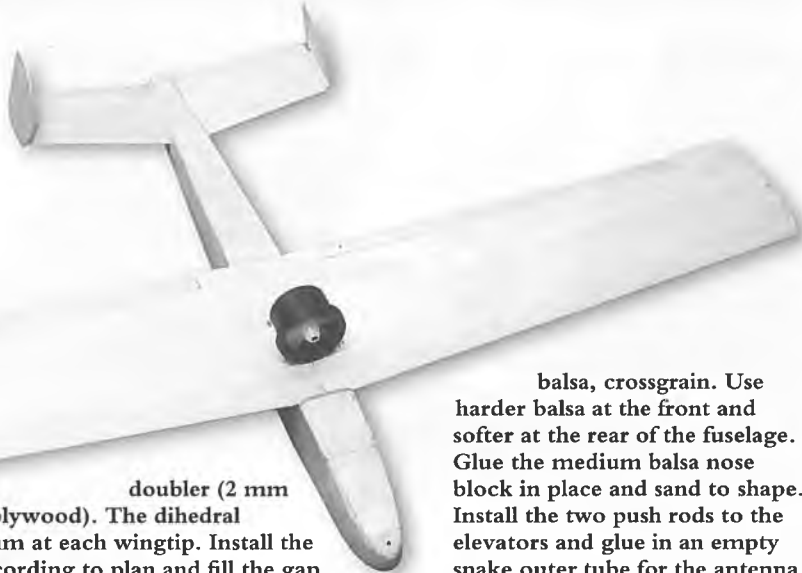
Youngsters love jets - and so do some more mature fliers.



Martin's first ducted fan model was 'Fan Flyer', a Jet-Elec unit on a Chris Martindale designed model that some of you may know.



A trial assembly to check fits; you could even test fly it at this stage.



doubler (2 mm plywood). The dihedral should be 50mm at each wingtip. Install the aileron linkage according to plan and fill the gap between the linkage and the rear of the wing with soft balsa. Sand to shape.

Plank the top of the wing with light 1.5mm (1/16") balsa. Trim the planking to shape and glue the front leading edge in place. Build the ailerons (light balsa) and mount them with hinges. Reinforce the wing joint with 1 or 2 layers of glass fabric, or tape, and epoxy. Drill holes for the 4 mm nylon bolts and glue a dowel in the front of the wing.

Fuselage

Cut the 2 fuselage sides from 2mm (3/32") medium balsa. Glue the 1.5mm (1/16") plywood doublers and 10 x 10mm (3/8 x 3/8") balsa triangle strips according to plan. (Remember again to make one right and one left side – and don't say I didn't warn you!)

Cut the formers. Former 1 is a lamination of 1mm ply + 1mm balsa + 1mm ply. (If you cannot obtain 1mm, use 1/32"). Glue formers 1 and 2 square to one of the fuselage sides. Then glue to the other fuselage side. When the glue is dry, glue the rest of the formers in place. Make sure that you get a straight fuselage.

Plank the bottom of the fuselage with 2mm (3/32")

balsa, crossgrain. Use harder balsa at the front and softer at the rear of the fuselage. Glue the medium balsa nose block in place and sand to shape. Install the two push rods to the elevators and glue in an empty snake outer tube for the antenna.

Plank the top of the fuselage with 1.5mm (1/16") balsa behind the wing (crossgrain) and 10mm (3/8") balsa in front of the wing. Plane and sand all corners/edges so you get a streamlined and rounded fuselage. Build the battery hatch/canopy from balsa. The landing skid is made of balsa/plywood or balsa/carbon fibre.

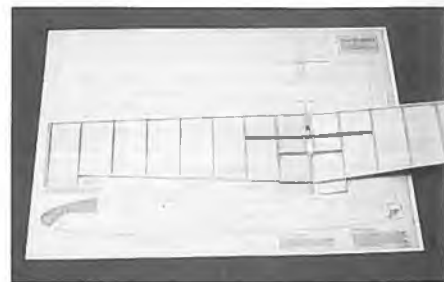
Tailplane

The tailplane (stabiliser) is made of 3mm (1/8") light balsa. Crack and glue the tail at the angle shown in the plan. Strengthen the joint with balsa or glassfibre or carbon fibre and epoxy. The fins are glued to the tailplane and joints strengthened with triangle strip.

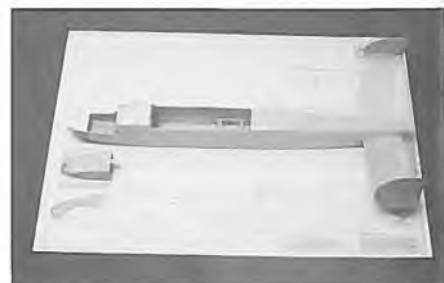
Assembly

Drill a hole in the fan so you can fit a wheel collar with an outside diameter of about 8mm (5/16"). When the fan is placed in the wing secure the fan with a 3mm screw (into the wheel collar) from the bottom of the wing. Use a ply disc washer. A

shroud can be built from foam around the fan unit according to



The quick way to build wings.



Fuselage construction is very straightforward.

plan (not essential). Don't forget to cut a hole in the wing for the motor cables.

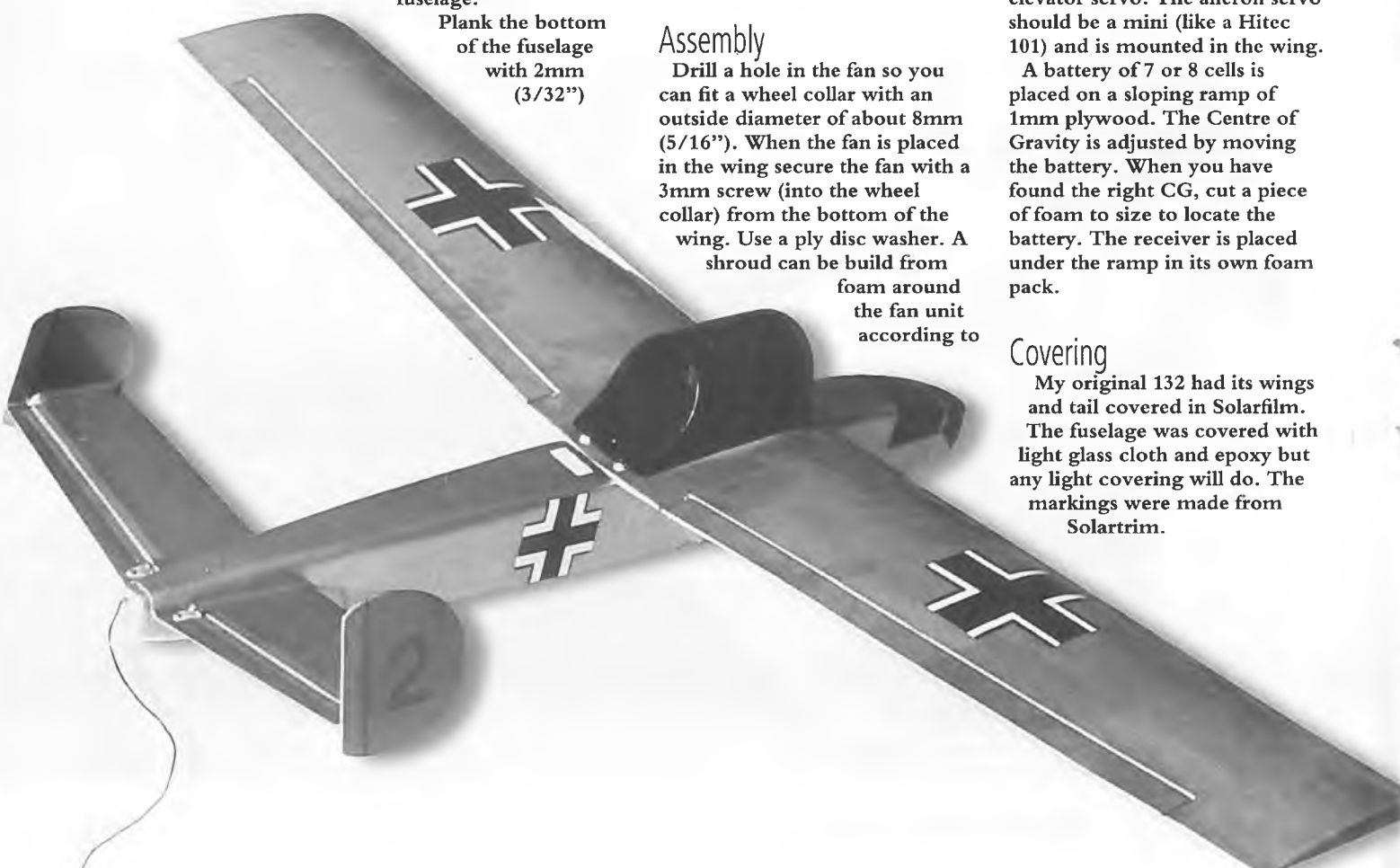
Equipment

The fan motor used in my model was a Kyosho MEGA, Part No. 2475, 2 x 20 (20 turn, double wind). The elevator servo is placed on servo mounts as shown on the plan. The speed control (BEC in mine) can be placed beside or in front of the elevator servo. The aileron servo should be a mini (like a Hitec 101) and is mounted in the wing.

A battery of 7 or 8 cells is placed on a sloping ramp of 1mm plywood. The Centre of Gravity is adjusted by moving the battery. When you have found the right CG, cut a piece of foam to size to locate the battery. The receiver is placed under the ramp in its own foam pack.

Covering

My original 132 had its wings and tail covered in Solarfilm. The fuselage was covered with light glass cloth and epoxy but any light covering will do. The markings were made from Solartrim.



Flying

I designed this plane to fly as a fan trainer. My first fan model was faster and more aerobatic but it needed a very good hand launch to get airborne due to the small size and its high wing loading.

Das Elektrojet is much easier to launch. Just launch, let it build up some speed and it will start to climb. Once it is away it's great fun to fly. Keep the speed up and rolls and loops are possible (requires a small dive). One of my favourite manoeuvres is a high altitude dive towards the field, make a very low pass and with the help of the speed climb steeply.

The model is very easy to fly. If you have flown an aileron trainer before you should have no problem with this model. It is very stable and can be flown quite slowly because of its low wing loading. The model will fly on 7 and 8 cells. You get longer duration with 7 but 8 is more fun!

Das Elektrojet will glide very well without power. When it is time to land you

have to come in very low if you want to land before the end of the field.

I have flown Das Elektrojet for two years now and I still enjoy it. With 400 grams of thrust on 8 cells you don't have fighter performance but I think the scale speed is similar to the early German jet planes and the high-revving fan creates a sound/scream that is very close to a real jet engine (or vacuum cleaner!).

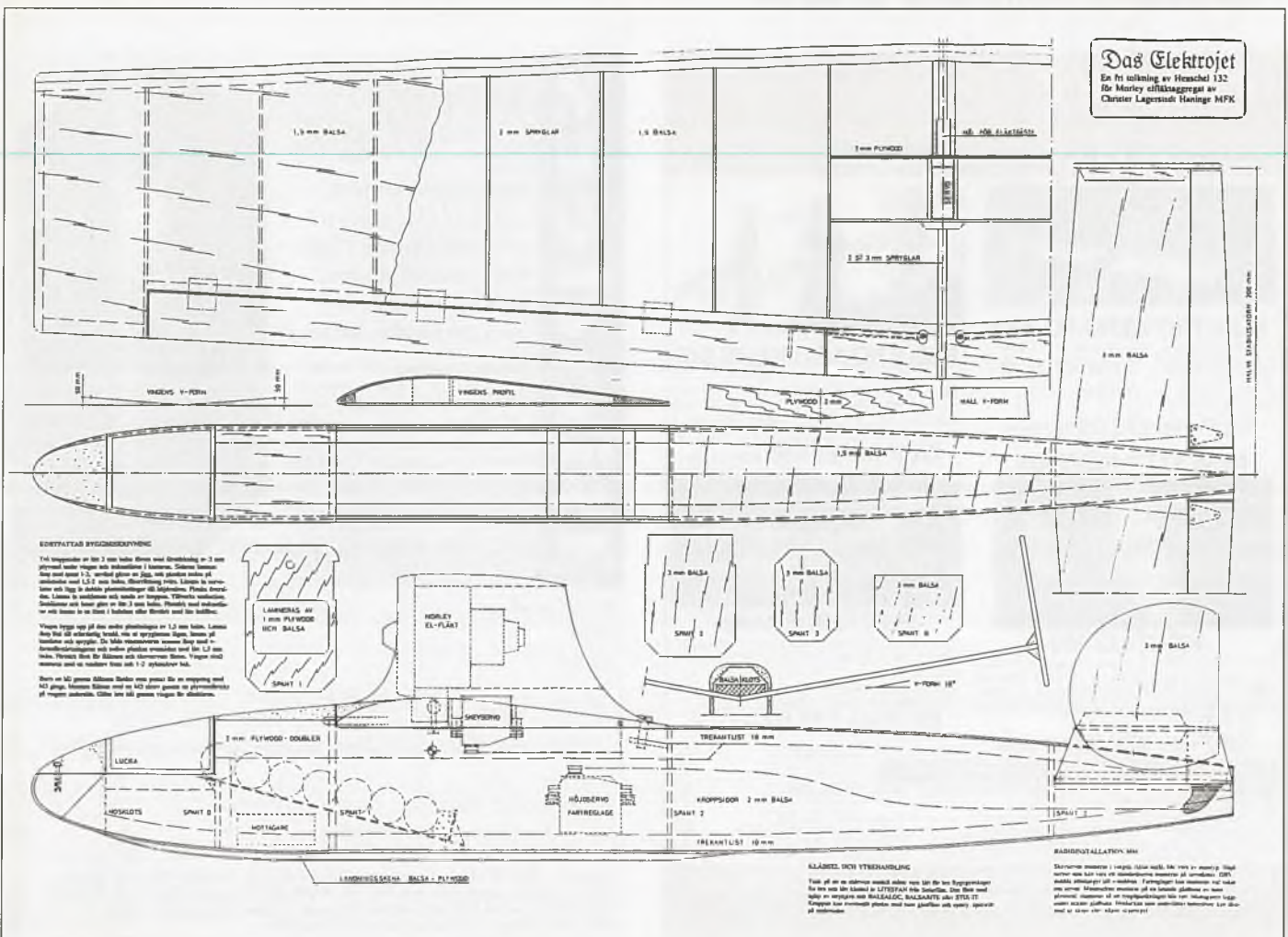
Specification

Span 1200mm (47")
Wing area 24sq.dm (372sq.in)
Weight, 7 cells 1250g (44oz)
Wing loading:
7 cells 52g/sq.dm (17oz/sq.ft)
8 cells 54g/sq.dm (17.7oz/sq.ft)
Control movements:
Elevator 10mm (3/8") each way
Aileron 7mm (1/4") each way

A shroud can be build from foam around the fan unit according to plan (not essential).



Copies of this plan, No. MW2575 are available from Electric Flight International (Plans service), Traplet House, Severn Drive, Upton-upon-Severn, Worcestershire, WR8 0JL. Price £6.50 plus UK postage £1.50. If you can read the instructions on this reduced drawing, they are in Swedish. On the full size one you get, they will be in English!



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PYLON RACING

Brushless DC motors have been around for many years now. The most common application is for cooling fans for electrical appliances, such as computers. They have been chosen because of their quietness, efficiency and size. These motors typically draw less than 1A. Improving technology over the years has seen big improvements in MOSFET technology (these are the discrete electronic transistor components that switch the power to the motor on and off). Additionally, smaller footprint electronic devices called surface mount devices, are readily available at reasonable prices, and the use of surface mount micro controllers all mean that it is now a practical proposition (in terms of size and cost) to have high current brushless DC motors for radio control use. Just compare electronic speed controllers of today and those of just a few years ago. Even the controllers from last year can be deemed old technology compared with the latest surface mount power MOSFET units.

Motor test: Aveox F5D motor by Darron Rodrigues

You will probably have heard that brushless motors are leading the competition rankings in both F5B and F5D. I doubt that you will be surprised, as we all know, that commutation and brushes are not the most efficient way to drive a motor. This article is a review of one of these brushless motors available now and this one is designed for F5D Pylon Racing.

Aveox

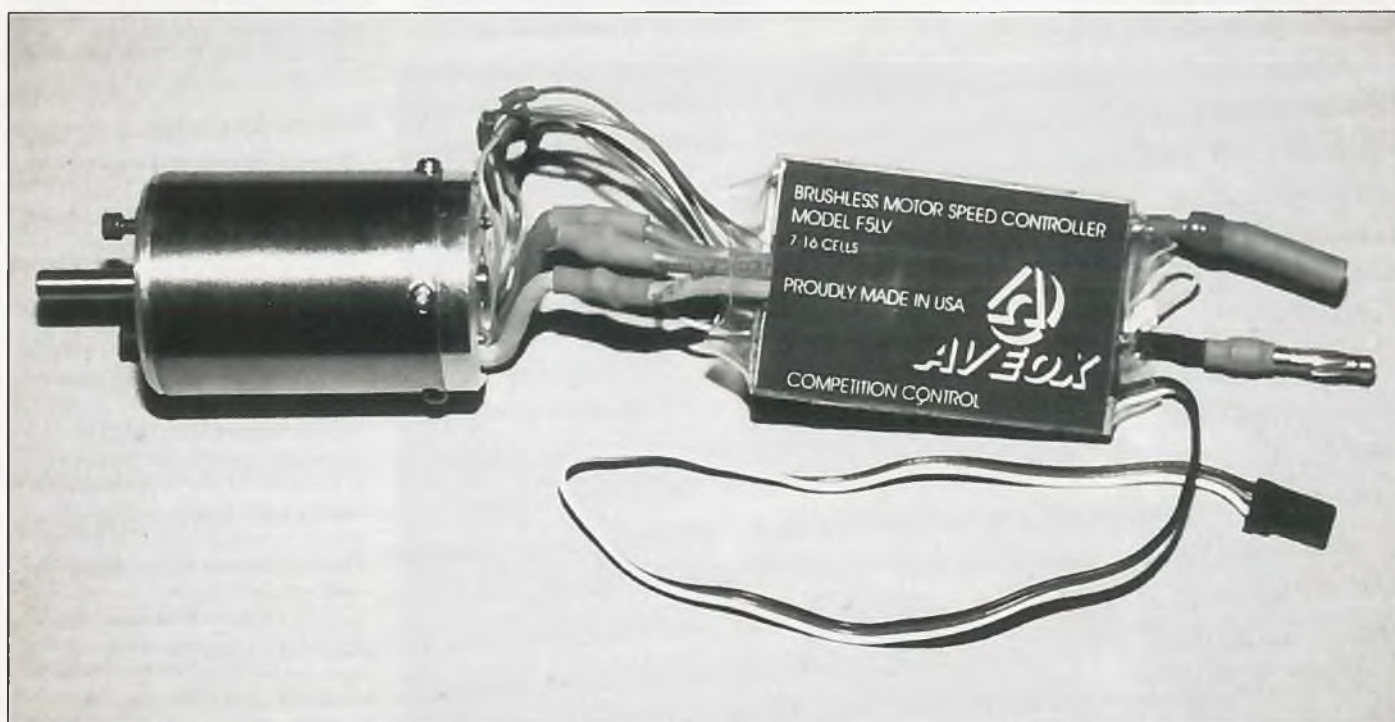
Aveox brushless motors came to my attention a couple of years ago when they started to advertise in some of the UK international modelling magazines. I gave them a call and they sent me a catalogue. I took one look at the specs and prices and decided not to pursue it. A couple of years later, during a rare moment of boredom at work, I was surfing the internet and came across the Aveox Web site, which I browsed with interest. In this I found that there was a reference to an F5D pylon racing motor, the branch of E-Flight that tickles me the most. Aveox supplied the following text:

"The New F5D Pylon motor is

a very low resistance (.004 ohms) high rpm (Kv = 4500 rpm/volt) motor that was tuned specifically for F5D competition. On 6 volts, the motor spins a Cam Speed 5 x 5 prop approx. 24,000 rpm, when correctly installed (very short wires, timing advanced to 8A etc.). Since the motor remains much cooler at high currents than brushed motors, you will not only start the race as fast as anything, but finish much faster. The US F5D team should be flying brushless this year at the worlds."

I found the claims above too good to be true so I e-mailed them and quizzed them over a few technical points regarding efficiency and the like. The response was: try it and see it for yourself. I accepted the challenge and a few days later the motor arrived.

The Aveox company was started by David Palombo, who is reported to have had a keen interest in electric flight. Using his engineering skills an electric flight system based on the brushless DC motor was created. An Aveox designed brushless DC motor flight system powered the model that won the 1994 World F5B Championships at Wangaratta in Australia. Since then their motors have



broken many land and water speed records. Aveox's motors have also found applications outside the modelling arena in powering 85 pound Naval Flying Radar Target drones for the US Navy.

What's in the Box?

The Aveox motor comes in two parts, the motor and the controller. Since the motor is a three phase motor, you can only use controllers that were designed to be used with the Aveox motor. The dimensions are similar to a Speed 600 sized 'can' motor. The motor has a 5mm shaft that is compatible with the 5mm version of the Graupner Precision Spinner. The first impressions on the controller is that it is large. It contains no less than 12 high quality Power MOSFETs, this implies that 4 FETs per phase is used since the motor is a three phase motor. The controller is fully proportional with an optional brake. The system can be configured to run both clockwise and anti-clockwise.

Technicals...

The motor is a modified 1409/1Y and has only 1 turn of windings on each phase with the rotor and stator being 0.9" long with the air gap increased to 0.050" from the normal 0.020". The motor is a basic three phase motor with each phase connected in a 'Y' configuration. Three Hall Effect sensors are mounted inside the motor which help the controller locate the position of the rotor. As with all brushless motors, the 'windings' are in the motor 'can' and the magnets, which are neodymium-iron-boron, are of course on the rotor, attached to the shaft. The windings are then switched in rotation to create the rotating magnetic flux that attracts the magnets in the rotor, which then rotates.

The controller is the F5LV competition version that has a large capacitor across the input battery terminals to reduce transient currents at the battery input side. Up until this point I had never realised that this could ever be a problem since a battery is surely just a large capacitor.

The controller's components can clearly be seen through the clear shrink wrap cover and is very basic in design. One micro controller, and some MOSFET gate drivers. The sensors are connected directly to the micro controller and power is taken from a 5V DC/DC converter which operates down to 6 volts.

Conventional speed controllers use between 4 and 6

Prop modified to fit shaft and spinner base as described in the text.

quality power MOSFETs in parallel to control the current to the motor. The Aveox controller only uses 2 in parallel, but the duty cycle is only one third of a conventional controller because of the three phases. So, in effect, there are indeed 6 power MOSFETs in parallel to handle the load currents.

The three windings are connected in a Y configuration, red, blue and yellow. This means that each winding, as the field rotates, is required to take a positive voltage and then a zero volts (or ground). So, each end of the windings has two pairs of MOSFETs connected to it. One pair to source current from the battery positive terminal, the other to sink it to the negative battery terminal. Hence 12 power MOSFETs are required. The microprocessor controls the complete operation, switching the pairs on and off as required. The rotor speed can also be determined from the Hall sensors, this then sets the 'lag' time between receiving the signal and activating and deactivating the coil pairs.

The Aveox system should be better for one single reason, RPM. To understand this I'll need to draw comparisons with a top F5D set-up.

With my own F5D motor and home-made controller, I can get the motor to turn the 5.5 x 5.5

CAM prop at around 23,000 RPM, 60 amps. With the Aveox, 23,000 RPM with the 5 x 5 CAM prop, 80 amps. Now remember, this is the static performance and doesn't mean a great deal as both props are stalled but it does give us a bench mark.

At 80 Amps the battery voltage from the seven cell battery pack is only 5.5 volts. At 60 amps it is closer to 6.2 volts. Both systems unload in the air to around 50 amps which means a terminal voltage of 6.7 volts. Therefore when the my motor unloads in the air, it will see 0.5 volts more at the motor terminals compared with 1.2 volt more for the Aveox. Now the Kv figure (RPM per Volt) is 5300Kv for my motor against 4400Kv for the Aveox. This means that my motor will have an increased RPM of 2650 RPM against 5300 RPM for the Aveox.

Using these figures, the Aveox will give 28,300 RPM against 25,650 RPM for my motor. If we use the Zero Incidence Pitch this translates to a speed of 134 MPH for the Aveox and 133 MPH for my motor. Now my motor uses a larger diameter prop so it will be able to get closer to the ZIP speed and quicker. How close and how much quicker I don't know, only flying the two systems side by side will answer this question.

Physical Attributes

If you compare this motor with the best that Germany has to offer, you will find that the Aveox System is somewhat heavier, although, there's not a lot of difference in motor size. The Aveox motor comes out at 245 grams while the Lehner is 195g. The controllers weigh 73 grams for the Aveox against 47 grams for a Graupner Race 80. This makes the combined weight of 318 grams for the Aveox system while a Lehner plus Graupner system would weigh 225 grams. That's 76 grams difference, or 2.7 ounces in old money. If you really want to make the Aveox system lighter, you can replace the outer 'can' or flux ring with a suitably moulded glass fibre one, and perhaps make some more cooling



Aveox 1409/1Y dismantled. The rotor is the shaft with two 'blocks' on it. The larger block is the motor magnets and the smaller block is more magnets to trip the sensor Hall Effect sensors in the fuzzy backplate in the foreground.

Arguably, one of the biggest benefits gained from brushless motors is the total lack of 'glitching' from radio interference caused by the motor.

Off to the Races

holes. This is exactly what the US F5D team have done, but I am also informed that they were using the smaller 1406 motor with a 1.5 wind and with the 4.7 x 4.7 Graupner CAM Speed prop which is lighter anyway.

Fitting the controller into my Freudenthaler Fox, did prove to be problematic. Space inside these racers is very cramped, as they are designed not to be just large enough, although, in this case it was about 3mm too small. With the battery on the floor of the fuselage and the controller sitting on top of the battery, the external capacitor was just proud of the wing seating. I could have cut a hole in the wing to accommodate the capacitor, but I decided not to as this might have weakened the wing. Instead another solution was adopted. I replaced the capacitor with one that was taller and thinner. The motor mounting holes are the same as that of the Astro 05 series of motors, as are the screw threads so no problems here with fitting the motor. Despite the heavier motor and controller, no adjustments were needed to correct the centre of gravity placement, since I had been using around 100 grams of lead to get the correct CG with the Lehner.

Propeller and Spinner

The recommended prop and spinner are the 5 x 5 Graupner CAM Speed prop and the 35mm Graupner Precision Spinner. This is where the hard work starts. The prop only has a 6mm hole against the 8mm shaft of the spinner, so the prop needs to be drilled or reamed to fit. The CAM prop was also designed to fit on the smaller 30mm spinner so the space required for the spinner base on the prop needs to be enlarged. This only needs 5 minutes worth of careful filing of the blades base with a needle file. Compare this with the Lehner system that uses the 5.5 x 5.5 prop that comes with an 8mm hole and the blades don't interfere with the spinner base, in other words, a direct fit straight out of the box.

The best testing must surely be in the air, under true flying conditions. So I took it along to the some of BEFA electric league meets, the nationals and BMPRA FD5 competitions. As expected, the model does not pull away from the start as well as other larger propped combinations, but the model was visibly quicker in the air. Perhaps the most important aspect of the flight was the claim that it wouldn't slow down towards the end of the race which I found to be the case. It did not slow down anywhere near as much as the Lehner did towards the end of the race.

The results achieved were encouraging. A third at the British Nationals and a first at RAF Cottesmore with BMPRA. Considering that the flying was not the best the times were quite respectable. I would expect a well practised pylon racer to knock at least 2 seconds a lap off my best time which was 125 seconds.

My own experience showed that there was plenty of motor run left at the end of the race, so there is plenty of scope for more performance. The suggestions here, are to tweak the pitch of the prop, or increase the timing.

Reliability

The main concern of any electric flight system, is reliability. It's no good if it's the fastest motor system around if it only works two out of three times. You need the third time to count, if you want to win. The Aveox flight system, in its complexity, brings in additional modes of failure. Instead of two wires to the motor, there are eight that can become disconnected or shorted. Even the US F5D team experienced these problems at the last World Champs as I have too, albeit, a bad soldering job on my part. There are also three Hall sensors and six MOSFET pairs that could potentially fail. To help minimise any problems of pulling off the sense wires, I would suggest securing them inside the motor and controller with a blob of silicone glue. On the plus side, you now have a motor system that is maintenance free. No more brushes to change and bed in, no more carbon dust to clean, the only item that can wear out is the bearings, and they look like they could last a good few thousand miles.

Other Options

Since starting the testing and writing this article, the World F5 Champs have come and gone and Aveox have some more motors suited to F5D. Each motor has been specifically tuned for the three sizes of Graupner CAM Speed props.

#425 for 5.5 x 5.5 20,800 rpm, 60A,

#376 for 5 x 5 22,800 rpm, 60A

#355 for 4.7 x 4.7 25,900 rpm, 61A

Looking at these figures, the motor to go for here would be the #355, which was also the one opted for by the US F5D team.

Conclusions

In summary, the Aveox seems to be on par with motors like the Lehner, if not better. The additional complexity could lead to reliability problems which I have expected, but my problems, I consider to be more irritating than problematic, since it occurred during my third and final race. The solution was simple but it had already happened. The motor and controller, are larger and heavier, but only by a small amount. I like the Aveox, and, I will be buying the review motor and using it as my number one motor. The cost of the Aveox system is around \$370 which works out to be cheaper than a new Lehner motor and Graupner controller. The controller can also be used on all the other Aveox motors.

It's also worth pointing out that Aveox have quite a large range of motors that will suit most applications, from ducted fans to pattern ships. One quick call to Aveox will help find the right motor and prop combination.

Two guys who used Aveox motors at the recent world champs. USA pilots Troy Peterson and Daniel Vozenilek used similar models with 1406 motors and Graupner 4.7 x 4.7 CAM Speed props.



Letter From New Zealand.

Building Electric and Vintage models has taught Tom Charlsworth how to build really light. He has been applying this to a little 'time out' with a glider and some serious building of a vintage electric to suit the new SAM approved class: 'RC Electric Jumbo Rubber'.



Rain wind, wind rain. Old man Winter has had fun with us here in New Zealand this season. Snow-storms down south, heavy flooding and strong cold winds everywhere. Those that could afford it flew to the Gold Coast of Australia on our discount airline 'Kiwi Air', (sadly now in liquidation) to bask in the warm sunshine.

As we felt it was time to replace our twelve year old car with something newer, we stayed home

and kept the fire stoked. I built model aeroplanes at the table and gathered chilblains on my toes!

Time out

My first effort, as change of pace from electric, was a small RC hand launch glider in anticipation of the thermals coming back - if we ever see summer! It has a 1.56m (62") span RG15 wing. All up weight is 255g (9oz) which gives a wing loading of 4.4oz/sq.ft. According to the plan the original weighed 12oz so I feel happy to

have got it down to 9oz, thanks to what I have learned in keeping weight down in electric models. I used two of the new Hitec HS60 super micro servos and a 'MICRO-GEM' receiver. Also to save more weight I used the new Oracover 'Lightweight' polyester covering which I have found excellent on lightweight airframes, adding torsional rigidity to the structure even in the heat of summer. Test flights on cold days to date look promising, the best time so far, off a small bungee was four minutes.

Take advantage!

Returning home from shopping at the supermarket one day in August, after some heavy overnight rain, I spied this lovely little lake on the playing field of the University grounds near our home, where I enjoy many a happy hour flying my 'silent' models. The wind had dropped and the sun even showed itself, so it was a hasty unload of wife and groceries when we arrived home, a quick reload of my trusty electric Quaker Flash which just happened to have its floats fitted. I only had one 7 x 1700SCR charged, so after a 'top up' on the charger and a check of the battery voltage

"Make hay while the sun shines." Or, when it rains fit floats. Tom made use of his temporary 'instant lake' for his Quaker Flash, which just happened to have its floats fitted.

in my 77 Super it was back to the lake, as I felt this break in the weather was the 'eye of the storm'.

What fun! The lake was just big enough to take off from. So it was leisurely circles overhead, 'touch and goes' for the next very enjoyable nine minutes in the fresh air until the battery told me it was time to land.

After squelching back to the car in my 'wellies' (we call them 'gum boots') with the model and a satisfied grin on my face - guess what? Yes, it started to rain and the wind came up.

Jumbo Rubber

I am a member of SAM 55 and so gliders and Vintage models are mainly my 'thing' with the occasional diversion such as 400 Pylon. I am also a table top builder with the cork topped building board and many layers of newspaper on the dining table



when the building bug is about. My wife is very tolerant of my hobby but sanding is strictly an outside job, as is the use of smelly dope etc. That's why most of my models are covered in film. I was interested in reading Dick Comber's article and plan for 'Little Bee' in the September/October issue of EFI as my latest lightweight electric off the table top is a 50" (1270mm) Jumbo Rubber Lanzo Puss Moth converted to the new SAM approved class 'RC Electric Jumbo Rubber'. Some years ago I came across the plans and article in a 1972 American 'Model Builder', so after reading about the new RC electric class in a recent issue of 'SAM SPEAKS' my thoughts (as others have) turned to the Lanzo PUSS MOTH. Starting in 1939 Chet and the Puss Moth flew at contests over the next eight years, never placing lower than third! It is probably one of the best rubber powered free-flight scale models to ever enter a contest.

The original weighed 11oz (312g). How light could I get an RC electric version without building it to 'indoor' standards? I wanted to use easily obtainable over-the-counter bits such as a Graupner



Iris Charlsworth with the HLG that Tom built 'even lighter' with a little electric-building expertise.



This 50" (1270mm) span 1939 Chet Lanzo Puss Moth has been converted by Tom to the new SAM approved class 'RC Electric Jumbo Rubber'. It uses readily available equipment and still weighs only 22.6oz (640g) with a 7 cell pack.



Tom and his Puss Moth at the recent Electric and Vintage club meeting that he will tell us about in the next issue.

Speed Gear 4:1 400 7.2V driving a Gear Prop 12 x 10. The speed controller is a Futaba MC114 with a NZ 11 gram 5 function Rx. The batteries are 7 cell packs of either 500AR or 600s and servos HS60. Covering is like that of the HLG, the new 'lightweight' Oracover,

and was pleasantly surprised at the all up weight of 22.6oz (640g) with a 7 cell battery, which gave a wing loading of 11.6oz/sq.ft.

It takes off in a most realistic manner from short grass and looks great in the air. At about half throttle the noisy gearbox from a distance sounds like a 'Gypsy' and the Moth flies at about scale airspeed, unlike some power models I have seen. The no-lift airtime is around 7 to 8 minutes so I am very pleased with the exercise and look forward to the coming of summer along with some thermals as the turbulator spar Lanzo wing should respond well to lift.

I've got more to tell you, about other electric fliers and a great Electric and Vintage meeting we recently held at our club field. The weather was smashing for this one, I'll tell you more in my next letter. Best wishes from New Zealand.

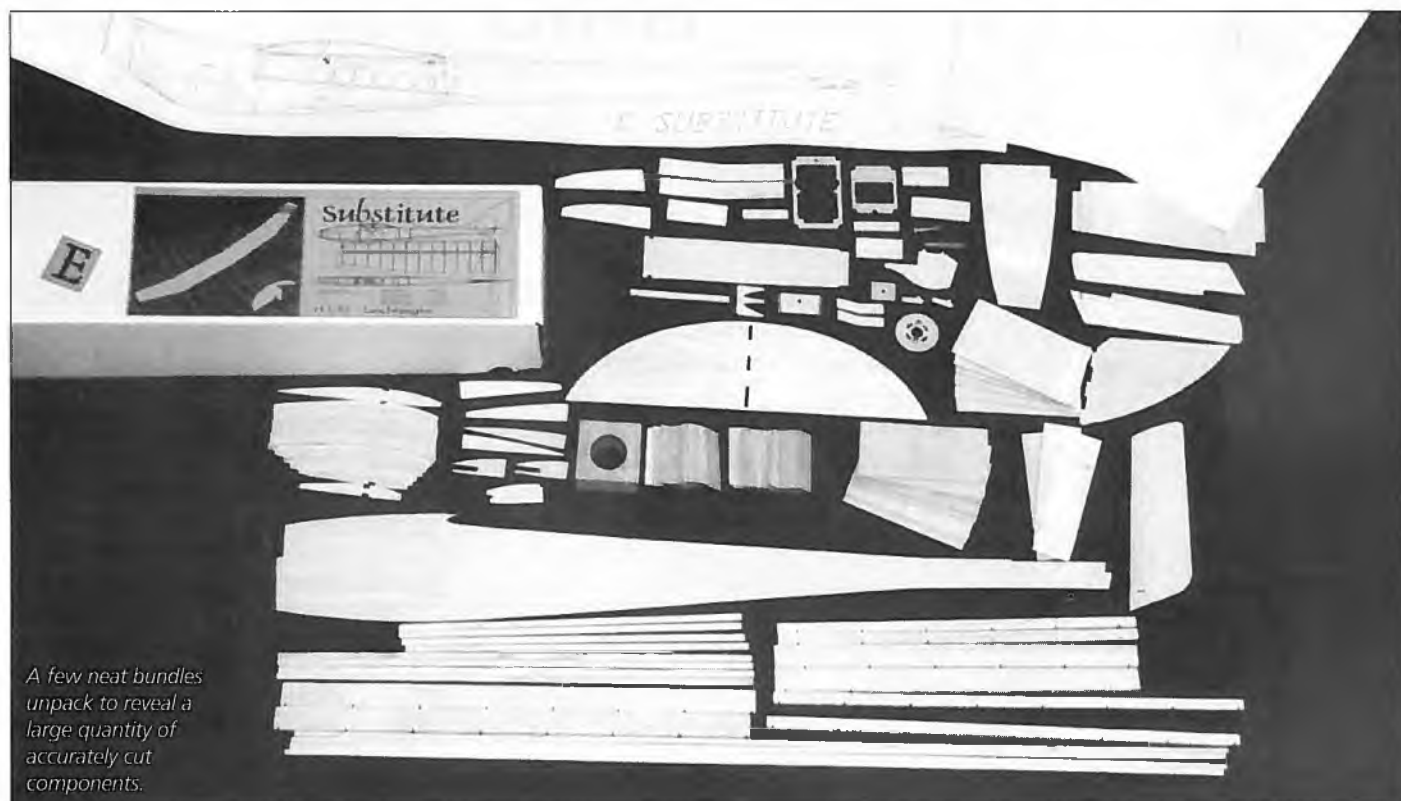
which so far, only comes in red, yellow or white. I had some vintage Williams wheels the right size but a little on the heavy side I thought, but I used them anyway

Lanzo Puss Moth on Tom's building board.



Substitute 'E'

1250MM (49") SPAN ELECTRIC GLIDER FOR DIRECT DRIVE 400 MOTORS, REVIEWED BY LEN WHALLEY.



A few neat bundles unpack to reveal a large quantity of accurately cut components.

The remarkable thing in this kit that jumps out and grabs you is the superb quality of the timber, both hardwood and balsa. It is as if each piece has been hand selected, the sort of job which would require weeks of travelling around all my local model shops and would leave a waste box brimming with offcuts. We just cannot buy this quality material! And as it says on the kit box 'With CNC cut-out Parts'.

Size

If we are to use a standard power source then "Big is Simple and Small is Tricky". What I mean is that low loading and a large efficient wing slows everything down, the rate of climb and descent, and also the essential reaction time, and simplifies the job of lining up a one-shot landing. The converse is true of small models and the Substitute E is, in this sense, in this second group. The benefits of the smaller model are that it is able to climb away from hazards quicker and also the slightly steeper descent slope makes it easier to predict the touch down point. This assumes that all other things, prop size, gearbox etc., have been made to match.

A 50" lightweight?

To convert a 10oz HLG (chuck-glider) to electric sounds a simple job, but if you remember that the weight will

almost double, the flying speed will make a similar change, and room has to be found for a 6 or 7 cell AA pack, you realise that the 'conversion' must mean a virtual re-design.

The wing shape and tail end are retained from the 'Substitute' HLG but more strength has been added to carry the flight and landing loadings associated with the 'E' Version. The singularly uninspiring photo on my box in any case shows one of the HLG originals, not this 'E' electric powered conversion, so this gives only the slightest clue to the contents.

First Impressions

Although CNC (Computer Numerical Control) cut materials is becoming more accepted as a standard, this means that when you open the box which contains your kit there seems to be very little in there. The parts have been taped together in precisely shaped bundles each of identical profile, so that the packs of ribs and webbing, and the fuselage sheeting, doublers and blocks contain far more than is apparent. This is also true of the beautifully cut outlines of the ply parts in their polythene bags. When you tip them out onto your building



Len's 20 SWG piano wire control rods fit tidily into the supplied lightweight ply control horns.

board, you begin to appreciate how much material has been removed to leave these exact profiles and blocks. The other remarkable thing in this kit that jumps out and grabs you is the superb quality of the timber, both hardwood and balsa. It is as if each piece has been hand selected, the sort of job which would require weeks of travelling around all my local model shops and would leave a waste box brimming with offcuts. We just cannot buy this quality of material! The drawing, by contrast, although full size is very short of sketches or information (in any language).

This too has been CAD produced and shows just a few numbered parts which relate to the instruction sheet. On the box we can find the price in the UK and this excludes this model from any 'economy range' even though it should not require a gear box. It had better be worth it! There are no snakes or links in the kit hardware and the choice is yours as to the type of linkage you are to use. I decided to use 20 SWG piano wire with zed bends at each end, all in narrow snake outers, and double kinks in the wire for final adjustment.

The first step for me was to translate the German instructions; I could not risk complaining about lack of information if the points were encrypted into the couple of pages of the 'Assembly Method and Parts list' or if the numbered parts on the plan were meant to be assembled in numerical order.

We are assured by the distributor

that when you get yours a translation (and some added notes) will be included.

Construction

The positive result of all this 'Hi-Tech' pre-cutting is that the amount of hand cutting, fretting and shaping needed for the construction is negligible. Also, provided you use the recommended motor and pack, there is little to be changed or adapted around the 'heavy end'. This is bound to lead to a much reduced construction time but for me, there was a lot of re-learning to do. The length of time since I last needed to handle such delicate materials and fine detail means that this enjoyable excursion away from 'foam and glass fibre' and into light electric flight seemed closer to my 'free flight' pre-history than any experiences of building RC sailplanes.

As there is no printed ID on components themselves, some time early in the process it is essential to identify the parts from the Parts List and locate them on the plan. This avoids any problem later with the location of centre (sheeted) ribs or embarrassing bits left over etc. In the construction I used entirely yellow Aliphatic Resin glue (modern non-brittle variety). I thought the hardwood spars supplied for the tip panels were a bit of unnecessary extra weight so I used hard balsa instead. You will already be aware that at this size every gram counts.

Pitfalls

The CNC pre-cutting should not be taken entirely at face value. If you try to assemble the kit like a Meccano set and totally avoid the need to cut or work on the components you will be disappointed with the result. Although the Fin and Tailplane are cut to precise outline shape, the usual profiling needs to be carried out. Also the Leading



The editor's own Substitute is now two years old and is used as a 'flying test bed' for 400 size motors and props.

Edge strip is notched but not pre-shaped and so there are quite a few places where a fine sharp knife blade is needed. For example: Slots in the tip panel TE strip to take the ribs do not allow for the forward sweep of the TE. These things are no great problem, but we must not expect to have the modelling taken away from us completely. We still need to make proper use of the balsa knife and fine sanding block etc. The fuselage is built 'in hand' with regular checks by eye to introduce only the intended bends. I fitted the ply battery plate loosely in place while gluing in the formers and this maintained the whole shape of the basic box to aid in alignment. Mark the motor mounting block to show the right way up!

In construction of the wing, the only potential complications are at the Leading Edges and at the dihedral breaks. The dihedral break has the two panel end ribs joined and the supplied dihedral braces should be inserted dry before making the dihedral joint. The LE is packed 1/16" off the building board and the LE material provided was extremely light and inclined to shear easily at the notches so this was pre-glued and given glue fillets. At the wing centre, a dowel-in-the-bulkhead and TE bolt mounting ensures that the model handles as a one-piece unit. I added a piece of 1/32" (.08) ply behind the LE across the centre bays but no other changes were needed. Resist any temptation to 'beef up' the structure.

Installation

The servos and a typical pack are tried in place before the underside of the back end is closed up. This way the snakes are directed clear of the pack and associated connecting leads, aerial etc. BEC is sensible here, and of course there is plenty of room for Gordon Tarling's Micro Star 20 BEC/B speed controller, and a micro Rx.

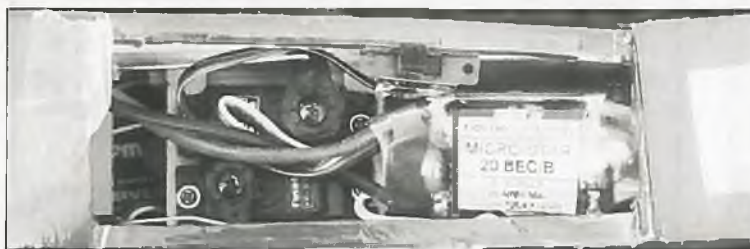
I used the reliable Fleet FM Rx converted to Futaba leads and a pair of micro servos. Six 600 mAh (2/3 AF) cells fit neatly and weigh a bit less than the AA size cells. Motor: Robbe Power 400/45 with Höllein prop centre/spinner fitted with Graupner 7 x 3 blades, all on direct drive.

Finishing Straight

Headings like that belong in the local rag! The suggested Oracover (Profilm) is very stable but a mite heavy for this size of model and either

Höllein spinner/hub 40/2.3/6, y32, and Graupner 7 x 3 folding blades.

It looks a tight fit here with the hatch hinged forward but there is quite enough room for the Gordon Tarling Micro-Star 20 BEC/B speed controller, two Futaba S143 servos and Fleet micro Rx. Out of sight below the speed controller is the rear of the motor and behind the Rx, below the wing, is the six cell battery pack.



Kit Review

Milar/tissue plus (thinned) dope or Solarkote coverings are preferable. Whatever your choice it is important not to over-shrink as this would easily distort the light structure. Use clear strong colours to help with visibility. Assembly now is critical, check the alignment of wing to tail and fin. Fit the motor, prop and spinner, then it only remains to charge up and go. Check all the throttle behaviour of the motor from full charge to flat so that you are familiar with the power-up and power off routines. Feel the torque, this is only a small craft and torque effect is quite pronounced.

Flying

"Hand launch to test glide in long grass on a calm day?" Not for me, but you may wish to do things that way. My initial trimming method is to hold the loaded model facing into smooth air flow on a fairly breezy day (say 8 to 10 knots) holding the front end with the radio Rx and Tx switched on but with motor disconnected and no intention of letting go. Try the feel of the balance and controls in the breeze. If the CG is in the right place and there is no tendency to veer, no warps etc., then we are ready.

The first flight is under power on a rather calmer day, a trial burst then it's time to release! A steady climb without aiming too steeply. The model climbs quite quickly clear of the unforgiving hard ground etc. The built-in amounts of right and down thrust are fine. Total motor run time on six 2/3 AF cells is surprisingly long, and with a bit if light lift around you can easily stretch out the duration to say seven minutes per charge from three climbs to about 400 ft. (Not much higher, this is too small a model to go very high). Torque is strong, so steer right not left just as you open up. Do not make a tight left turn with the nose up, as this can result in a dropped wing tip and some height loss (or worse). The landing approach (with a just a little power left?) is remarkably flat but quite fast.

In summary

The kit contents are of excellent quality and assembly is quick and simple. Details are still tricky in places and I would have liked some clues on such as hatch size/construction and indication of the wing-tip detail. The all-up-weight and hence wing loading is, as expected, quite high and the typically fragile construction renders landings fairly risky. Although the balance of control and stability is good, the relatively high flying speed means that this should not be recommended as a first model. Although the kit cost is relatively high for the UK market, if compared with the price of your packs, motor/prop, switch or speed controller and RC etc., the cost is no deterrent.

The flight pattern of a lightweight example is extremely smooth and provides a really delightful bonus. This model will reward the careful flyer with a great deal of flying time and matches up well to the performance requirements for electric flight from small flying sites. With care and some good



Len's Substitute is bright coloured but a small model soon flies out of sight, don't fly yours too far away.

fortune I expect mine to last a long time. It's not just a 'Substitute', this is the real thing! This kit is available from The Electric Aeroplane Company, in the UK (see ads) or Modell-flugbedarf Höllein, Coburg, in Germany, telephone: 09561 8121 81.

Model specification

Span:	1250mm (49")
Airframe weight:	170g (6oz)
Flying weight:	415g (14.5oz)
Spinner-hub:	Höllein
	40/2.3/6, Ø32mm
Prop blades:	Graupner 7 x 3
Receiver:	Fleet 'micro'
Speed controller:	Gordon
	Tarling Micro-Star 20 BEC/B
Servos:	Futaba S143
Motor:	Robbe 400/45, 7.2V
Energy:	6 x 600mAh (2/3 AF) cells



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MODELS & HOBBIES

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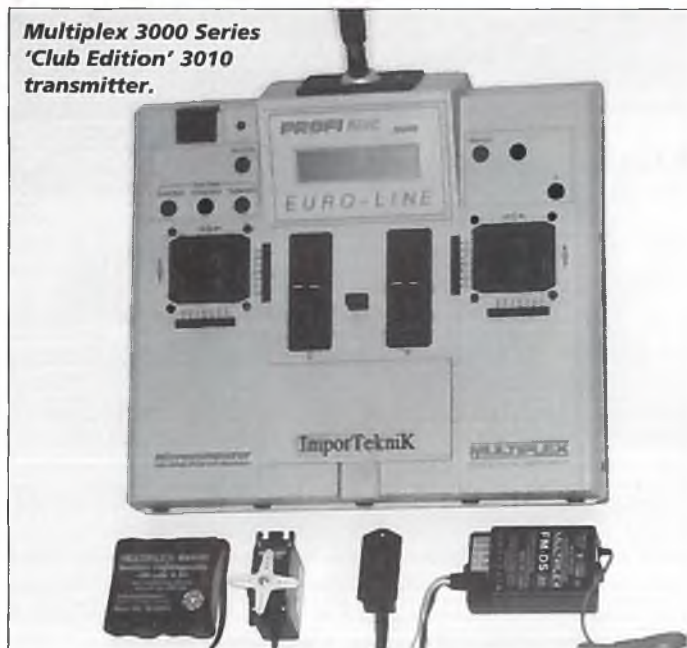
EP0397

Current Affairs.

The last issue ran out of space, apologies to all of who complained about this missing column. This issue contains a variety of new products, including all those discovered by the editor in the Czech Republic, that you did not see last time.

MULTIPLEX 3000

**Multiplex 3000 Series
'Club Edition' 3010
transmitter.**



power, helicopter, glider, electric etc. These may be copied across and/or modified rather than starting from scratch. Those who have programmed a very versatile Tx will appreciate this advantage!

Combos and complete sets are available or the Tx alone at an introductory price of £299, in the UK from: ImporTeknik, 29 Braiswick, Colchester, Essex, CO4 5AU.

Based on the established Multiplex 3030 format, Multiplex have added this 3010 Euro-Line transmitter to the range. This apparently thin, clean uncluttered case is almost its own transmitter tray but the control sticks are conveniently near the edge, for those of us who still wish to grip their Tx. It weighs less than 3 pounds and operates for more than 4 hours on its six sub-C cells.

It has a 30 model memory and 9 functions. As with the better computer radios, if you use several different brands of receiver each stick or switch or slider may be designated to whichever desired Rx output socket. This can be different for each of the 30 models. Similarly the very flexible arrangement for function mixing and multi-function for non-standard models can be different in each of the 30 model memory. To make it easier for you when you start with this Tx, 9 of the 30 memories are pre-set for a plausible range of model types,

GEAR SHIFT



**Marx Quattro-Shift-Gear,
50 x 50 x 70mm (2 x 2 x
2.75") and 150g (5.3oz).**

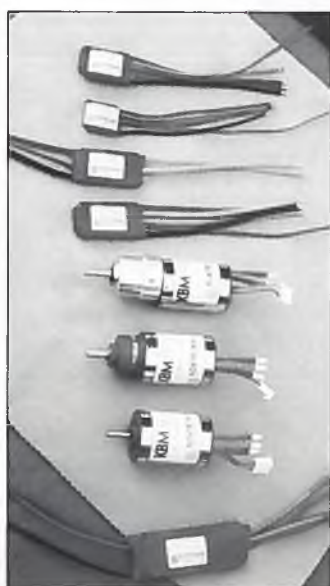
Have you wondered if you have the right gear ratio in your model? Have you thought that what was the correct ratio for take-off was not right for climbing, and then perhaps not right for cruising and then not right for aerobatics?

Marx have been making gearboxes for our size motors for years. They have offered gear ratio selection too. Now they offer a gearbox with which you can shift gear whilst in the air. In the photo you will see two ball end levers at the top of this unit. Servo links to these permits you to change ratios from 1.7:1 to 2.3:1 to 3:1 to 4:1. This will be like learning to change gear all over again, presumably the motor is momentarily switched off to effect a change, like pedalling a bike with Sturmey Archer gears. You will have to try it (or perhaps Electricalc?) to feel the benefit. Thankyou Rob Hemmings for spotting it at Aspach, and the photo.

ELECTRICALC

When you are building a new model do you sometimes ask yourself if the recommended motor is really best and "Do I have to have that many cells and do I have to use that prop? Or if I change the battery pack to one with more cells, or less and the weight is different, what prop do I need? Would it be better with a gearbox? Can I electrify this IC plan? What motor do I need?"

If you design your own models you have even more questions that need answers. Wonder no longer, 'Electricalc' can do it all for you. It needs a PC compatible machine running Windows 3.1 or Windows 95. We have heard good reports of this from the USA and we will present a full report on our copy of this program in the next issue. If you cannot wait until then, it is available in the UK from Gordon Tarling, 87 Cowley Mill Road, Uxbridge, Middx, UB8 2QD, price £30, tel & fax: 01895 251551, or check the ads.



Kontroniks

Their brushless motors were in the first second and fourth place models in the recent F5B world championships, but what else do they do? Brushless motors are a very recent venture for Kontroniks. The company is young but until the motors all they made was speed controllers for brushed motors. A great virtue of their controllers is that the user 'programs' the controller from his transmitter by selecting from a range of options as the controller scans through its sequence of functions, easier than it sounds.

The photo shows the range of products. The four speed controllers for conventional brushed motors in the background are typical of the range that cater for 4 to 8, to 6 to 36 cells and maximum currents of 5 to 150A. The brushless motors are all the same size and recommended for 7 to 30 cells and with the option of direct drive, Kruse 2:1 intro gear drive or Kontronik 3.7:1 planetary gear drive.

Contact: Kontronik, Nürtinger Straße 4, D-72649 Wolfschlugen, F R Germany. Tel: ++49 7457 9453 0, fax: ++49 7457 9435 90.

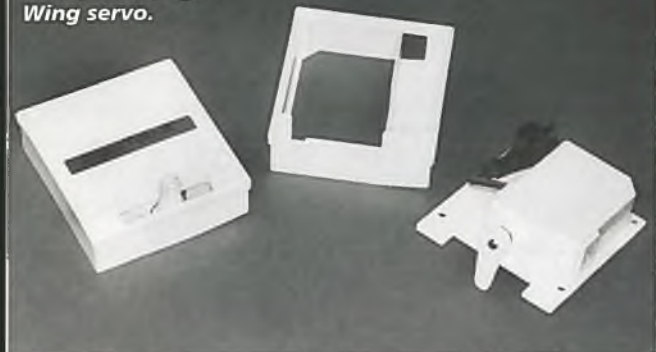
Kontronik brushless motors with brushless speed controller in the foreground. Behind are four speed controllers for conventional brushed motors.

INTEGRAL WING SERVO

Mounting aileron or flap servos in wings is the best (some say 'only') place to locate them. This is not often easy, there are not enough thin servos and no mounting lugs where you need them. All of a sudden this is very easy, Multiplex offer us a mounting box that fits so easily in a wing and also a thin servo with ball races and metal gears that locates positively within it. It is retained by the 'lid', secured by four countersunk screws and is easily removable for maintenance. This servo was announced some time ago; now it is available.

Available in the UK from MULTEK, 29 Braiswick, Colchester, Essex, CO4 5AU.

Multiplex Integral Wing servo.



Micro-Star 10 BEC

A lot of pilots of small models have been waiting for this speed controller! Gordon Tarling has for years been supplying kits and ready-built chargers, switches and speed controllers. His Micro-Star 10 and 20 controllers are very popular with Speed 400 fliers. The great advantage of the '20' is its BEC and brake, making it a useful part of any electric glider and although small it is much larger than the '10'. Smaller fun and scale models do not need a brake facility but the opportunity to use BEC means that the weight and space of an Rx pack can be saved. The original '10' did not have BEC, this one does, and there is very little penalty in weight or size. It is 35 x 18 x 9mm (1 3/8 x 3/4 x 3/8") and weighs 8g (1/4oz) without leads. Use it with 6 to 10 cells at up to 10A.

It has all the advantages of the earlier '10', auto-calibration, auto-cell sensing, glitch suppression, fail-safe, power-up safety. BEC with staged PCO, low resistance and low power consumption. The editor has already tested one in his Toucan with a 400 motor; sensitive throttle adjustment makes for easy flying and the weight advantage of no Rx pack aids handling and improves the climb rate – longer flights!

Gordon Tarling Micro-Star 10 BEC compared with the original '10'. Weight and size increase is marginal but now it has BEC. The 2p coin is Ø25.4mm (1").



Micro Radiocontrol

"They are getting smaller all the time." Rick Ruijsink showed early models of his really micro radio gear at Dortmund earlier this year. By the time you read this it will be in production and should be available. There are a few items of RC gear available and pilots in different disciplines have different needs. Rick is an electric pilot so he is certainly looking after us; the smaller item in the real size photo is a speed controller good for 1.5 amps, more than enough for indoor models.

'µMagnetactuator-Receiver'. This is an Rx that weighs 2.2g (0.08oz) including the 250mm (10") long antenna. It is a full 9 function FM receiver with micro crystal and integrated electronics for the control of two fully proportional magnet actuators. These 'integrated electronics' are usually part of each servo so there is even more going on in this tiny board than in our regular Rx. This Rx will also drive the speed controller in the photo. If you need more functions, you need more circuitry. What you see is ideal for HLGs and with the controller, ideal for small electrics. By the time you read this there should be available an Rx plus controller on one board

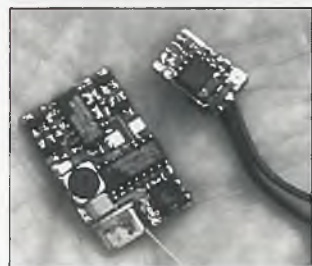
16 x 30 x 5mm. The electronics work on 1.8V so two nicad or nickel metal hydride cells or one lithium cell is enough. The controller weighs less than 3g (0.11oz) including cables and will operate on from 1.8 to 4.8V.

'µMagnet Actuators'. These are the equivalent of servos. Rick cannot yet supply ready built items but he can supply building instructions and magnets that any competent modeller can assemble. These are small and intended for small models. Rick recommends a Neodym magnet Ø3mm (1/8") and 4mm long, for models up to 30g (1oz). For models up to 60g (2oz) magnets Ø5mm (3/16") and 6mm (1/4") long are OK and the actuator only weighs 2g (0.07oz). For models this size it really is easier to think metric! Ready built actuators may be available later.

Small models vanish sooner. With a normal FM transmitter and the 250mm Rx antenna, range is more than 100m (109 yards) enough for micro models. Rx bandwidth is not as narrow as a regular Rx so operation with 20KHz spacing is recommended, however with transmitters close together 10KHz has been found to be OK.

Coming soon are some Rick 'minis' possibly more suitable to all but micro indoor enthusiasts. These are integral receiver-controllers that will handle up to 5A for the motor. The controller has full 5A continuous rating, temperature and undervoltage protection and of course a high operating frequency. The Low-Drop BEC supplies 4.8V and 0.5A continuous (1A peak) or optionally 3.3V. Antenna is 500mm (19") long for good range and this FM Rx has better HF and IF filtering for unrestricted use on 10KHz spacing. The speed controller channel is function 1 with 8 more functions available but only 2 JST micro sockets on the board, more sockets on flying leads can be provided. Servo electronics are not on the board, enabling this Rx to be used with conventional servos like the 11g Voltz, 9g Ultra-Micro from Cannon, the 6g from Duddles, the new 6g from Becker or CETO or the 3.8g servo from WES Technik. The complete mini Receiver-Controller with BEC will weigh less than 4.5g (0.16oz). Two versions will be available; one for 6 to 8 cells and the other for 4 to 7 cells.

All receivers have soldered-in



In your editor's small hand is the tiny 'µMagnetactuator-Receiver' and a speed controller. The 'big' item here is actually 24mm (less than 1") long.

crystals in three popular RC bands. In the 35MHz band, channels 62, 66, 70, 72 and 76. In the 40MHz band, channels 50, 52 and 55. In the 41MHz band, channels 403 and 413. 27Mhz FM frequencies are in preparation.

Price is as important as availability, exchange rates fluctuate so use these for guidance. The µMagnetactuator-Receiver will be: 200 DM, £75, \$US120. The µMagnetactuator-Receiver-Controller will be: 250 DM, £95, \$US150. The Mini-Receiver-Controller will be: 200 DM, £75, \$US120.

Contact: Rick Ruijsink, De Kopple 343, 5632 LM Eindhoven, The Netherlands. Tel: ++31 40 2489918, fax: ++31 40 2480273. Email: R.Ruijsink@cyclone.nl

He says fax or email is quicker!

PROP HUBS

Occasionally (and not so occasionally with competition fliers) you wonder if your model might perform better with just a little more pitch in the prop blades – or a little less. Aero-naut supply prop hubs similar to their regular folding prop hubs but the slots for the prop roots and hinge pins are set at an angle, not normal to the prop shaft as with the regular ones. These are available to provide more pitch or less pitch at 2.5° and 5°. Pitch is usually measured at about 3/4 'prop span' measured from the motor shaft, centre of the ring where the prop is doing most of its work. With a 13" (320mm) diameter prop, 2.5° adds more than 1" to the pitch.

Some prop brands are available in half inch increments, most in one inch increments, so that by going plus or minus at the hub you provide yourself with quite a selection to choose from without purchasing too many prop sizes.



Aero-naut prop hubs machined for plus 2.5° and plus 5° more pitch. Negative angle hubs are available too.

Permax 280BB

and has a splined 2mm output shaft. The front mounting face includes two fixing holes on standard 280/300 spacing and two on standard 400 spacing as well. Price in the UK is £20 from Importechnik.

Some fliers wish to go smaller than 400 motors. The next size down is 300 or 280. This 280 is the same size as the rest but with a higher specification. It is ball raced and with a peak efficiency of 74% at 24,000RPM. It weighs 54g (2oz)

Multiplex Permax 280BB.



Turbo Spinner 2

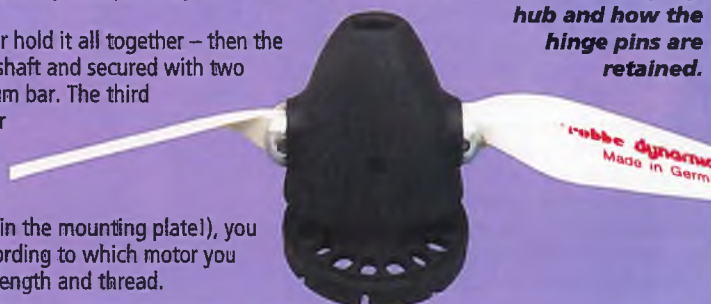
A few fliers had doubts about the original not circular Robbe Turbo spinner. The new Turbo-Spinner part No: 7730 is very neat. Diameter is 38mm (1.5"), smaller than before but well suited to the new slimmer motors. The blades are on 36mm centres for closer folding. You will see from the photos that the prop hub is round bar aluminium and slides through the moulded nylon backplate after the spinner has been fitted to the backplate. This holds it all together and during this assembly sequence the blades are fitted too. The hinge pins are a push fit and retained by the spinner; you can see this in the assembled photo.

These parts assembled in order hold it all together – then the assembly is offered to the motor shaft and secured with two grub screws through the aluminium bar. The third moulded disc you see is the motor mounting plate that you build into, or bond into the nose of your model. Don't be mystified by all the screws (or all the holes in the mounting plate!), you will only need 2 or 3 of them according to which motor you fit. One set has to be the correct length and thread.

Robbe Turbo-Spinner components.



Turbo-Spinner. See how unobtrusive is the prop hub and how the hinge pins are retained.



JES CONTROLLERS

'JETI model' manufacture two ranges of speed controllers to cater for the needs of almost all electric model fliers. The JES 05-50 range looks after cell counts from 6 to 12 and all have BEC, and PCO – power cut off. All but the very smallest have TOP – temperature overload protection and most are available with brake. The JES 50 weighs 26g and will handle 50A.

The JES 40-150 range can all be used with 7 to 30 cells and all have brake, and galvanic separation by OPTO element, and two colour LED for setting max power and brake, without the motor connected. All are 50 x 35 x 10mm, have a current limiter and soft start if required.

Both ranges are SMT, and HEC – high efficiency clock, and POR – power on reset, and TOP – temperature overload protection. The controllers are supplied with Futaba or Graupner (JR) wires and plugs.

Contact: Juraj Tinka, Fucikova 1328, 742 58 Pribor, Czech Republic. Tel: ++42 656 91 12 92



The smallest 'JETI model' controller JES 05 Micro weighs 4g with the cables you see here and will handle 5A continuous, good for indoor models. The one Koruna coin is Ø20mm, a little over 3/4".



The largest 'JETI model' controller JES 150 weighs 51g with cables and 25g without. It will handle 150A. One Koruna coin for scale.



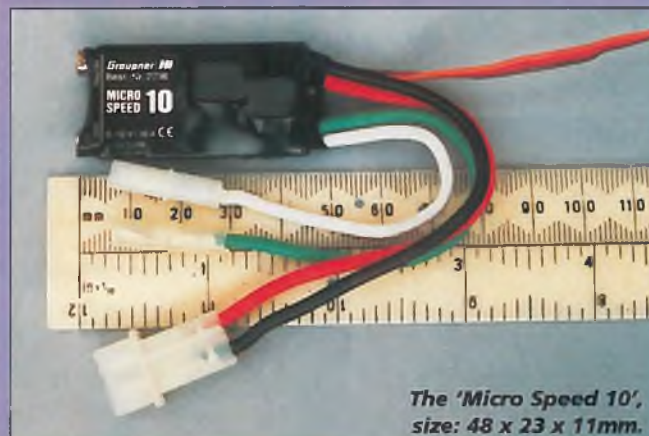
Two Velkom VM2828/3N 'Sports' motors with different flux rings and the larger VM2835/3N.

currents quoted and/or max output and recommended voltage ranges. All the motors have 5mm shafts. All these specifications are from the manufacturer.

MOTOR	SIZE	WEIGHT	MAX OUTPUT	MAX A	VOLTS
VM 24/10	Ø36.6 x 67	242g	180W	33.5	5 – 9
VM 24/16K	Ø36.6 x 53	160g	120W	29.4	5 – 8
VM 24/12	Ø36.6 x 67	238g	160W	35	5 – 9
VM 24/16	Ø36.6 x 67	29.6			8 – 12
VM2828/3N	Ø39 x 72	320g	280W	50	6 – 10
VM2835/3N	Ø39 x 79	370g	480W	75	8 – 12

Manufactured by: Velkom s. r. o., Voctarova 1477/3, 1800 00 Praha 8, Czech Republic.

Graupner Micro Speed



The 'Micro Speed 10', size: 48 x 23 x 11mm.

Here are two more miniature speed controllers for small models. The instructions state "...for use in battery-operated radio-controlled model vehicles (not model aircraft)." So why are they here? The reason they are not for aircraft is because they are intended for wheeled vehicles or boats and therefore have reverse polarity. But these are small, I am sure model fliers will wish to use them. This writer certainly will. Reverse? Some pilots have preferred to use even folding props in reverse as an airbrake – it certainly works! Many very small speed controllers do not have brakes, now you have two.



The 'Micro Speed 4', size: 31 x 19 x 7mm.

The 'Micro Speed 10' is for 2 to 12V (2 to 10 cells) and up to 10A continuous, or 20A for less than 1 minute, suitable for use with motors up to 400s but nothing hotter. Weight is 27g (1oz) including all the cables and connectors you see here.

The 'Micro Speed 4' is for 2 to 7.2V (2 to 6 cells) and up to 2A continuous, or 4A for less than 1 1/2 minutes, suitable for use with the smaller motors like 160s and 140s (280s and 300s are too big). Weight is 14g (1/2oz) including all the cables and connectors you see here.

Available from 'Gliders' of Newark, see the ad.

VELKOM PALICKA MOTORS

The editor has noticed mention of these from various parts of the world and referred to as 'Velkom' or 'Palicka' or 'Strontium' or more local brand names. So they are widely known, though perhaps not well known, which is a pity, because they are 'performance' motors at a very reasonable price.

There are two series of motors, the 'Classic Line' with Strontium-Ferrite magnets and the 'Sports Line' with Neodym magnets. Both types looked very well built and the Sports Line motors had very well mounted and well cooled brushes. The table I have compiled below shows maximum

Velkom 'Classic' series motors VM 24/16K and VM 24/12.



Electric Flight International – JANUARY/FEBRUARY 1997

65

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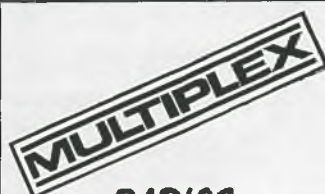
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