

Electric Flight

INTERNATIONAL

MAY 1998

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INTERNATIONAL
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TICKETS
TO BE
WON!**

Sinsheim Show

NEW 'SLOW FLY' MODELS

Construction Tips

MAKE A SCALE MODEL OUT
OF A PROVEN MODEL DESIGN

Horten IX

PLAN REVIEW OF THIS SCALE DUCTED FAN TWIN

THE MAGAZINE FOR SWITCHED ON MODELLERS

TRAPLET
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Electric Flight

INTERNATIONAL

Co

MAY 1998 • ISSUE NO. 23

Regulars

Editorial

Current Affairs

New model, components and tools

A Good Read

Reviews of four aviation books

Diary Dates

Whats on in 1998

The Light Fantastic

News on EDF models and a few other
lightweights by Chris Golds

Quiet Scale

More advice on 'How to make a scale
model out of a proven model design' by
Martin Irvine

Cover Story

Flying the Concorde
Report by the editor on the progress of
this ambitious Chris Golds model

Over Here!

News for sports fliers from Dereck
Woodward in the USA



Page 34

Services

Classified Adverts
Shopper's Directory
Next Issue

Bargain basement 64
Where to get it 65
Coming soon 66

4

6

8

9

38

14

34

58



Page 28





Features

Sinsheim 18

Show report, new models and a lot of information on 'Slow Fly'

Horten IX 28

Plan and construction, a scale jet for two electric ducted fan units - by Chris Golds

Twang! 40

How to Bungee-launch models without tears - by Chris Golds

Robbe Gnat - ANOTHER view 46

More advice on how to get more from your Gnat

Other Pilots Models 50

Compiled by Stephen Mettam

The Ptailless Ones 54

The construction story of a one third scale model of the Westland-Hill Pterodactyl 4 - by Eric van den Hoogen, translated by Theo Gordijn



Editorial

The 'off-season' is the time for shows, we do not lose out on flying time, we see what is new, we purchase what we need for the new flying season. Now that EFI is published every month your editor has retired from his previous 'day job' in order to devote more time to this publication and has recently been taking advantage of his increase in available time to visit as many of the model shows as possible.

Shows

There are not so many major shows in the UK, so I have been travelling more often than was usual, to Germany - a busy electric scene - to visit the model shows there. 'Modellbau Sud' at Stuttgart towards the end of 1997 was reported in the January/February issue. The Nürnberg Toy Fair, the world's biggest toy trade fair was reported in the March issue. 'Faszination Modellbau' at Sinsheim in March is reported in this issue and as soon as I have finished this 'editorial' I will be dashing off to the exhibition and mega market in Dortmund. After all those I think I will concentrate on some model building at home and flying on home turf - until next year!

Sinsheim

"Faszination Modellbau" at Sinsheim is one of the smaller annual German model shows but it has something the others have not - model flying. This includes outdoor flying if weather permits and three days of indoor model flying, which you can do at any time of the year, whatever the weather.

Show reports do not often take a lot of space in this magazine - but this time there's flying! Regulars who have read me for the past couple of years may remember my predictions like: "Small RC gear makes indoor flying of small models viable." I just had to go to Sinsheim this year because I knew there

were going to be so many small models flown indoors.

I already knew a few of the pilots there and had read/heard about most of the others from contributors to this magazine and their reports, I'm sure that you too will be familiar with a lot of the names and some of the models.

Cottage industries and smaller manufacturers have been into micro RC gear for a few years. Now the bigger names are making and selling micro gear and the smaller manufacturers have gone 'micro micro' - just check the Nürnberg report.

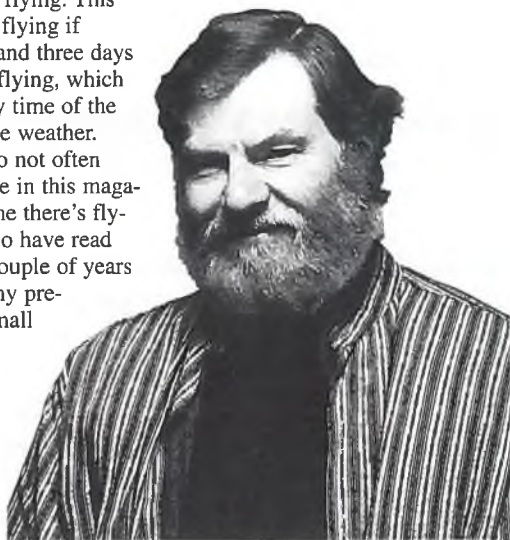
One emerging new category for model flying is 'Slow Fly' - which says it all - but it is already wider than just Slow Fly. The Slow Fly models that you read about on these pages during the past two years were not all indoor models, in fact most of them were outdoor and very light and reasonably small. I think that all the older indoor models must fit the Slow Fly category even if they are not so slow and a lot of the outdoor lightweights are definitely slow

flyers. Stefan Dolch's very original 'Stubenfliege' (Housefly) was in EFI's Inter-Ex 1996 report and now his partner 'Andrea Braun Modellflugtechnik' is manufacturing it. There are a few 'rip-offs' too of all or part of this design by other manufacturers and private builders. This all supports the aphorism: "Imitation is the sincerest form of flattery." Dereck Woodward's column 'Over Here!' included last month and this, photos of Horst Fenchel's Stubenfliege. If it impressed Dereck it must be good.

Slow Fly is here to stay and that is part of the reason for so

much space to be devoted to it in this issue. At Sinsheim the indoor flying included: control line, CO2 powered RC, free flight CO2, free flight electric, RC gliders and of course RC electric. There was even one model of a North American A-6 Texan/Harvard with retracts. It looked very light but it did not fly, there was probably just not enough space for it.

Future issues of EFI will include more on electric Slow Fly models but because this is such a broad field, if you need more information immediately, I suggest you check the next few issues of EFI's 'big brother' magazine 'RC Model World'.



Beginners Monthly

Going monthly has given us double the space in any one year. We are expanding into other electric areas. We have always catered for the beginner in electrics but there is only so much space. This is OK for modellers transferring to electrics from one of the other disciplines but we may be short of information for raw beginners to electrics AND model flying.

Our sister magazine RC Model World (or should it be 'Mother magazine' - EFI is one of its many specialist off-shoots) caters more for beginners to RC model flying and for a much broader spectrum of model flying.

I am continuously made aware of young and older beginners who are entering the sport through electrics - so we need more basic information. We have engaged the services of seventeen year old Steven Goff who has just got into electrics. His entry has been made easier by a father with electronics expertise and a neighbour with extensive model flying experience. Steven is a recent beginner with a still very fresh memory of his needs and difficulties experienced getting started. So I am going to give you his own introduction in the editorial pages. This as close as I can get to the front of the magazine to grab the attention of beginners - there will be lots more for you next month.

In a Learner's Shoes

By Steven Goff

Iaving been building electric models for a little over three years, and flying them for a lot less, I can sympathize with all the beginners out there who find it difficult to find the information they require. It isn't a case of finding the information as such, there is a wealth of it out there, its more about sorting through it and finding what suits your needs.

My intention for this article, and for any future ones is to guide you, the beginner, the easiest way I know how. Although I don't want to tell you how to go about enjoying your hobby, I feel a little introduction into what's required would be ideal. Most newcomers do not realize the amount of thought which has to go into a model, such as which motor to use? Which batteries to install? What type of propeller should I be using, a speed controller or a switch? Which radio gear to install? These are just some of the many questions the beginner to the hobby might ask.

"Flight 349, Permission To Land On Runway Alpha"

I think the first question you should ask yourself, is "Do I have somewhere to fly?". There is little point in purchasing a brand new kit, and radio gear, if you have nowhere to launch your fickle flying machine. Obviously, the best place to fly your plane would be one of the many clubs dotted around the country, but depending on where you live, this may not be practical. The club which I currently fly at, I am the only 'full time' electric modeller

there, although a couple of people dabble with electric gliders. I find I get more interest and enthusiasm than criticism, with many of the comments coming from the prospective newcomers.

Of course we don't all have the luxury of club grounds to land (hopefully in one piece!) our latest model on, so we must search elsewhere for a suitable location. Probably the second most popular choice would be to fly in a nearby field, of course, at the discretion of the land owner. I cannot emphasize enough, the need to gain permission before attempting to enjoy a day's flying in the middle of a corn field. Not only is it common courtesy to ask your friendly farmer if you can use his land to enjoy your hobby, but there is the question of safety.

Although electric planes do not carry as much risk of a mid-air explosion, due to the lack of explosive fuel they carry, there is still the possibility of an electrical fault. I do not think your local farmer would be too pleased if you ignited his prize corn field, and destroyed a couple of acres of crop. This would obviously greatly reduce your chances of flying there again (try 'never') but you could very well be prosecuted for trespass or criminal damage!

Of course, this is a worse case scenario, so put it out of your head for now, but do bear in mind these accidents can happen, so it is always best to ask permission first. I recall back to the days (not that long ago) when I flew in a farmers field brimmed with green corn, this was a fairly irresponsible thing to do, not because of the risk of fire, but the damage I could have caused his crops by dragging my mud-clad feet across his land. I was eventually caught doing this, and told to "get on your bike", fortu-

nately for me the jolly red faced fellow didn't have his shotgun handy that day, so I consider myself lucky I wasn't shot down!

Who would fly in a field like this?

Just before you hi-jack the nearest tractor, and beg the farmer for a "piece of his land", take into consideration the basic geography of where you will be flying. Obviously if the farmer owns a small rain-forest, it won't really be suitable for our purposes, so take a look round in advance, and find an ideal location. "Well, er... what is an ideal location?" you could ask.

The first consideration would be airspace. Not being vertically opposed, you should concentrate on surrounding trees and shrubs, electrical pylons, telecommunications cables, houses and small buildings, and field divisions. Is amazing how invisible some wire fences can seem, but believe me, your model won't have a problem finding them, especially on overshooting the indented landing zone.

The next thing you should be looking for is civilization. Be it human or animal, it still provides a potential hazard during an aborted landing, or as fate would have it, a crash. I would not even consider flying if my chosen flying spot, was situated next to a built up area. It is just not worth the risk of your model becoming your next-door neighbour's television aerial, even if his Channel 5 reception will be greatly improved.

A question of safety

Whilst we are on the subject of possible accidents, it is seen

as a fundamental requirement, that you ensure you are fully covered by suitable insurance. This is the cheapest most reliable method of making sure you are financially covered in the event of an accident, short of winning the National Lottery. For the mere price of £7.50 you can be covered for up to £1,000,000 for one year, this would be ample coverage for the amount of damage a small Speed 400 glider could cause.

There are two ways of going about insuring yourself, one of which is mentioned above, Private insurance such as with MFA, or joining the BEFA through a model club. Whichever route you choose to take, please make sure you are covered, this way you can enjoy the hobby with the peace of mind that if an accident does happen, you will be financially backed.

The closing curtain

Well, that concludes this little article. I hope it has been of some use to any of you wondering how to go about starting the hobby. Obviously I don't want to put any of you off joining us, in this wonderful gathering, but I feel it is important you consider a few points before you go about purchasing models and equipment.

Hopefully you will be successful in finding a suitable flying site, and once you have gained your insurance, we can start to think about the next steps. However you choose to go about what I have mentioned, I hope you will enjoy the hobby and get the most out of it.

If you would like to contact me and hopefully provide some feedback, you can do so by e-mailing me at: steve@goff.powernet.co.uk
EFI

Current Affairs

The Sinsheim show report contains news of some new products. Here are products spotted elsewhere or that have come into the office since then.

Carbon D-Light E

ICARE is a Canadian based distributor that offers this RTF kit that combines with electric the best of composite free-flight construction to provide us with a state of the art high performance motor glider. Its speciality is the wing construction, the moulded carbon D-box. A pre-shaped (D-form) is pressed with a layer of carbon into a female mould. This gives a very stiff and accurate leading edge to the airfoil, the remainder of the D-box is faced with light balsa shear webbing. The wing behind the D-box is of conventional balsa construction. Root and transition ribs are made of balsa/carbon sandwich and all flying surfaces are covered with Orallight.

The covered but empty airframe weighs 225g (7.9 oz) as delivered and claimed flying weight is about 540g (19 oz). Micro servos and Rx are required to fit in the slim light moulded 55g (2 oz) fuselage. A Speed 400 6V motor, JAS 4:1 gear-box and 12 x 8 light-weight JAS prop or



similar items are recommended for regular flying. For long duration like all-up-last-down events ICARE recommend a 6:1 JAS gearbox and they offer both these set-ups as combo specials.

This model will be reviewed in a future issue but check the ICARE web page at: <http://www.jonction.net/~icare/icare.htm> or ICARE sailplanes, 381 Joseph-Huet, Boucherville, Qc, J4B 2C5, Canada

Modular Tool

Cordless tools are common now and some are becoming available that are suitable for modelling use in particular. The Lynx looks just that bit more versatile than most. The following is extracted from the sales literature:

It is a well made unit from this leading manufacturer and comprises two-speed battery driven drill, heavy duty screwdriver attachment, an effective light and finally a soldering iron which is fairly unusual on a portable appliance and obviously extremely useful in the field.

Accessories include drills, screwdriver bits, abrasive wheels and of course a mains charger. It is ideally suited to on site use for the active modeller.

The recommended retail price is £59.95 plus part-post and packing at £3.00 (UK). Trade enquiries are invited to Westbury Products Limited, Armour House, Brunswick Square, Southampton, SO14 3AR, tel: 01703 335386, fax: 01703 335463.

▼ Lynx Modular Tool No. MT-304Q.



12V Power Saws

Different saws for different jobs. Two new Minicraft saws are ideal for model size cutting jobs in wood, metal, plastic and circuit boards. Quoting from their promotional material:

The Circular saw table is die-cast constructed for greater accuracy and reliability and includes a rip fence and mitre guide for controlled cutting. Also incorporated is a see through blade guard for safety and good visibility and a fan cooled motor for extended usage and longer life.

The Precision jigsaw is the perfect tool for cutting intricate shapes, small radii and scroll work. The compact lightweight design is ideal for easy handling and working in confined areas. The design also includes an adjustable shoe for 45°-90° angle cutting as well as positive blade locking for extra precision. The 100w motor gives ample cut-

Schulze Speed Controllers

Schulze is a respected manufacturer of high specification chargers and speed controllers. They are better known for their high current speed controllers but have recently introduced a range aimed at smaller models. All include BEC which may be eliminated by the user if desired. If two weights are quoted in the table below, the first is without cables and the first current (A) shown is continuous current rating whilst the second is the maximum. The controllers incorporate IPS 'intelligent programming system' for configuring when you switch on and beep to tell you the model is armed.

slim-7be,	7A,	15A peak,	1.5g.
slim-18be,	18A,	25A peak,	2.5g.
slim-24be,	24A,	30A peak,	4-17g.
slim-25be,	25A,	33A peak,	12-25g.
slim-35be,	35A,	45A peak,	12-25g.
slim-50be,	50A,	65A peak,	12-25g.

Available from: Gordon Tarling,
01895 251551 (UK)
email: gtarling@ndirect.co.uk -
Or, The Electric Aeroplane
Company.



▲ The Schulze 'slim' range of speed controllers.

Long Balsa

Have you experienced the inconvenience of scarf jointing sheet balsa? You need to select sheets exactly the same thickness and density in order to avoid any ridges and/or a lot of careful sanding. You can now purchase six foot x four inch (1829 x 102mm) sheet balsa in the following thicknesses:

3/32"	(2.4mm)	£2.65
1/8"	(3.2mm)	£2.85
3/16"	(4.8mm)	£3.60
1/4"	(6.4mm)	£4.10
1/16"	(1.6mm)	is expected to be available soon.

Trade enquiries welcome.

**Contact: Solutions, Unit 5
Whinfield Industrial Estate,
Rowlands Gill, Tyne & Wear,
NE39 1EH. Tel & fax: 01207
544414**

400 Gearbox

You can see in the photo how much smaller is this box than the 400 motor. You fit the motor pinion and the mounting flange (you might need to shorten the motor shaft) then secure the box to the flange with two screws. The output shaft is 4mm, with a flat on it (pity about that, it limits the adaptors you can use) and I am informed that this is a very smooth running gearbox. If the editor has counted correctly the minute teeth and done his sums right,



the ratio of this epicyclic gearbox is 4.75:1. The packaging is labelled 'Cosmotech Inc.

Made in Japan' and the inpack literature is in Japanese. The reported source in the UK was telephoned for a price but we are told does not import it, so ask around. It is a gearbox worth finding.

ting capacity, greater efficiency and longer life.

The Minicraft 12v saws work best with the Minicraft variable speed transformer MB730 and MB750.

FEATURES INCLUDE:

MB410 CIRCULAR SAW TABLE

work surface area	169 x 119mm
cutting capacity:	
wood	6mm
plastic	2mm
non-ferrous metals	1mm
mitre guide capacity	0-90°
blade sizes	Ø50mm, Ø60mm

List price: £54.99

MB552 PRECISION JIGSAW

cutting stroke	9mm
cutting capacity:	
wood	10mm
plastic	5mm
softwood	20mm
ferrous metals	1.25mm
non-ferrous metals	3mm
List price:	£44.99

For free catalogue and list of stockists call Minicraft on 07000 MINICRAFT 646427238



▲ Minicraft Circular saw table.



▼ Minicraft Precision jigsaw.



Astro 020 gearboxes

The Astro 020 brushless motor has been on these pages before, so has the announcement of new Astro gearboxes for the larger motors. Now available, are two very different gearboxes for the 020.

The Astro 020 Super Box with helical spur gears, offset output shaft and generous mounting flange for motor and then the whole assembly in a model, has a ratio of 3.27:1. This is the separate unit in the centre of the photo.

For models with slim noses there is the 'in line' epicyclic gearbox with a ratio of 4.4:1. Alan Fry of ImporTekniK who supplied the photo says of the two gearboxes; "These pull

▲ Astro 020 with 4.4:1 gearbox on the left, lone 3.27:1 Super Box centre and bare motor plus speed controller on the right.

down the RPM to values more appropriate to conventional propellers around 8" diameter."

Available from:
**ImporTekniK, 29 Braiswick,
Colchester, Essex, UK-CO4
5AU and West London
Models: 0181 897 2326.**

Multi Vice

This vice is versatile. The ball joint enables the Vice to swing through 360° and locks at any angle. Features include vertical and horizontal grooves for holding tubes and dowels. The vice also has detachable soft jaw grips for delicate work. A base clamp attaches firmly to a workbench. Jaw length is 74mm, holding width is 60mm. RRP in the UK is £24.99.

For free catalogue and list of stockists call Minicraft on 07000 MINICRAFT 646427238



▲ Minicraft Multi Vice.

A Good Read

Your editor - like many of the readers out there - is a 'TAP' (Total Aviation Person) and has quite a collection of books, mostly aviation. His library shelves cover everything flying, from winged insects through man powered, historic, civil, military aircraft, and gliders to space travel. Some of the aviation books are especially valued if they have related model use.

Lockheed SR-71

The secret missions exposed, by Paul F Crickmore, published by Osprey, a division of Reed Books Limited, Michelin House, 81 Fulham Road, London SW3 6RB. ISBN 1-85532-681-7

This is author Paul Crickmore's third book on perhaps the world's most impressive military jet. It deals with the actual operational use of this exceptionally fast and high flying aircraft and pilot experiences in test flying and reconnaissance missions with the SR-71 and its single place forerunner the A-12, spread over three decades.

It contains detailed accounts of missions and transcribed interviews with the crews. It is profusely illustrated with photographs of the several different versions. It quite makes me want to build an EDF version.

Northrop Flying Wings

A history of Jack Northrop's visionary aircraft, by Garry R Pape with John M Campbell, published by Schiffer Publishing Ltd, 77 Lower Valley Road, Atglen, PA 19310, USA. Price: US\$49.95. ISBN: 0-88740-689-0

A much earlier book on this brilliant aviation designer contained some later inserted appendices on his flying wings so I was delighted to get the opportunity to read this book devoted to them.

Jack Northrop was interested in aviation from an early age and when the Loughhead brothers (later Lockheed) set up to build a seaplane in the rear of the garage where he worked as a mechanic, he assisted them whenever he had the time. As he put it years later:

"I made a nuisance of myself

until they gave me a job. I had a little experience as a garage mechanic, and I worked for a year as a draftsman for an architect, and I worked for my father who was in the building business and this sort of qualified me to design airplanes, you can understand....in those days."

This modest tale disguises Jack's abilities as a talented structural engineer and his success with cantilever monoplane wings for other manufacturers enabled him to step sideways more than once to form his own company, or a division within another and manufacture 'Northrops' and his pet interest - flying wings.

I was really not aware just how many different types of flying wings he constructed and were flown for him. He often had to 'break-off' - usually for financial reasons to design wings for more conventional aircraft. Jack had this thing about parasite drag and made his wings as clean as possible, - hence cantilever monoplanes. His first plane called a "Flying Wing" in 1929, had no fuselage but it did have a tail on booms. The first real 'wing' was in 1940 and there were so many that were gliders, prop or jet, with one two, four, six or eight engines.

The XB-35 YB-35 and YB-49 lasted longer than WW2 and competed with and lost out to the B-36 to become the USA's Jumbo strategic bomber (see 'Fantasy' in the January/February issue of EFI). Jack Northrop retired in 1952 and died in 1981, aged 85 years. His flying wings did not stop there. It was noticed almost by accident during the testing of one of the YB-49s that the air defense radar at Half Moon Bay near San Francisco had problems detect-

ing the aircraft due to the reduced radar signature produced by its shape. Test pilot Max Stanley recalled:

"Without exception they were unable to pick us up until we were directly overhead. I think this was the first indication that this airplane had something special about it, low observability."

The Northrop B-2 'stealth' is a continuation of all of his work.

The book has a lot of informative black and white photos, some superb colour shots and most important to the model builder, scores of 3-views of so many tailless Northrop wings.

Hurricane Aces 1939-40

By Tony Holmes, published by Osprey, an imprint of Reed Consumer Books Limited, Michelin House, 81 Fulham Road, London SW3 6RB. ISBN 1-85532-597-7

The latest in a line of 18 "Osprey Aircraft of the Aces" titles thus far, this is a record of the Hurricane flying careers of many RAF pilots and some Hurricane equipped squadrons. There are accounts of pilots and operations and illustrated by contemporary photographs. These accounts were not my cup-of-tea but I know they be enjoyed by many readers. This volume has some excellent line drawings of Hurricanes and 42 side views in colour of individual pilots' aircraft with camouflage colours, serial numbers and squadron identification that will provide valuable information to any scale modellers who insist on authentic and accurate finish.

Classic World War II Aircraft Cutaways

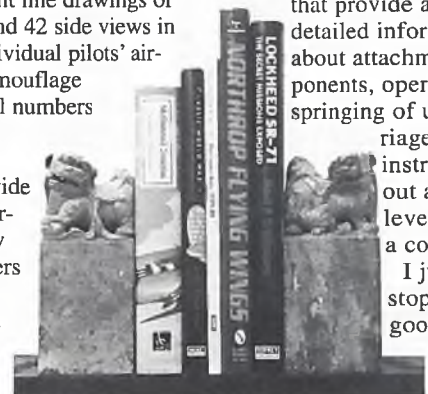
By Bill Gunston, published by Osprey, a division of Reed Books Limited, Michelin House, 81 Fulham Road, London SW3 6RB. ISBN 1-85532-526-8

Cutaway drawings have an informative quality not quite imparted by any other mode of information presentation - and there are still so many ways you can do it! Bill Gunston has collected together this work of 50 years ago, by technical artists who worked for 'The Aeroplane' and 'Flight' weekly magazines.

Each drawing is accompanied by Bill Gunston's typically fearless comments about the aircraft and his usually praiseworthy observations on the different styles of the artists. His entry into journalism was after all these drawings had been published but his career in the same publishing house must have overlapped the careers of some of the artists. He sometimes questions accuracy but classified information is not easy to draw round in wartime.

These drawings can provide another source of information to the scale modeller who may need to know about airframe structure not obvious in a 3-view. Some of these drawings have supplementary sketches that provide a lot of detailed information about attachment of components, operation and springing of undercarriages and even instrument layout and control lever location in a cockpit.

I just cannot stop admiring a good cutaway.



Diary Dates

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

26 April

Glenrothes Fly-in, UK. Electroslot, AULD 400 and Electrobatics. Glenrothes Club canteen open, please leave your sandwiches at home! Contact: Colin Sparrow, 01505 850242, email: csparrow@clara.net

May 3

BMFA F5B League, Owthorpe, Notts, UK. Contact Mike Proctor, 01904 489386.

May 10

Vintage and Scale Fly-in. Raydon Airfield, Ipswich, UK. BBQ & raffle, clubhouse & toilets. Contact Gary Western, 01473 729279 or 01473 652462.

May 21-24

Pfaffikon, Switzerland.

May 23-24

Mettenheim Electric Meet, Germany. For information contact: Franz Stockinger, tel: 08677 2198, Germany. Or, Mike Payne, in the UK, tel: 0121 444 0264.

May 24

Blackpool & Fylde RCMS, All Electric Fly-in. Fun and competition flying for all types of model. Proof of insurance required. Contact: P. Leech, 8 Hacklands Avenue, Lea, Preston, PR2 1XY, UK. Tel: 01722 731614 or Stan Craythorne on 01254 248299.

May 30-31

Panonia Cup, Oberpullendorf, Austria.

May 31

Cumnock Electric Fly-in, UK. Contact: Keith Reid, 01290 550055.

May 31

Diamond Jubilee Cabbage Patch Nats. Including CL electric Aerobatics and Speed. Contact: Brian Lever, 3 The Park, Peakirk, Peterborough, PE6 7NG, UK.

June 6-7

ADS Fly-in, UK. Electroslot (plus Open and 100" Thermal). Contact Norrie Kerr, 01224 734652.

June 7

BMFA F5B League, Oakington, Cambs, UK. Contact Mike Proctor, 01904 489386.

June 7

BMFA Southern Area Electric Fly-in, access off A272 Winchester to Petersfield road. Scale, Vintage and AULD. Contact: Andy Palmer, 47 Lovage Way, Horndean, Hants, PO8 0JG, UK, tel: 01705 591228, or Eddie Clowes, 2 Chalmers Way, Hamble, Hants, SO31 4LR, UK, tel: 01703 452931.

June 7

Isle of Axholme MFC Fixed Wing Fly for Fun Day. Epworth Agricultural Showground, North Lincs, UK, 7 miles from junction 2 of the M180 (A161). Proof of insurance required. associated trade welcome. Contact: Steve Fields 01427 873346.

June 13-14

River Valley Flyers Electric only Fun Fly, Wis. Rapids, WI, USA. June 13-14, Land of Lincoln Electric Fun Fly, Springfield, IL, USA.

June 20

Aberdeen Aeromodellers Longest Day Fly-in, UK. Various fun competitions from 5pm. Contact: Les Adams on 01224 734652 or email: lesadam@aol.com

June 26-28

MARCEE 98. The Great Minnesota Area Electric Fly, USA. Contact: Stevepauley@worldnet.att.net

June 27-28

BEFA International Festival of Electric Flight, Middle Wallop, Hants, UK.

June 28

Chester MFC All Electric Day, Roodee Racecourse, Chester, UK. open Duration, Vintage, Scale and Aerobatic competitions. Enter on the day. Extended sports flying. Vendors pre-booking only. Contact: C R Filtress, 26 Raymond Street, Chester, UK. Tel: 01244 378476.

June 28

Mossmorran Electroslot and AULD 400 (plus Open Thermal), UK. Contact: Colin Sparrow, 01505 850242, email: csparrow@clara.net

June 28

Electric Fly-in. Raydon Airfield, Ipswich, UK. BBQ & raffle, clubhouse & toilets. Contact Gary Western, 01473 729279 or 01473 652462.

July 3-5

Popular Flying Association, International Air Rally & Exhibition, Cranfield Airfield Beds, UK. Contact: PFA at Shoreham Airport, Sussex, BN43 5FF, UK. Tel: 01273-461616 or fax: 01273-463390.

July 5

Cumbernauld Fly-in. AULD 400 and fun events. Contact Dougie Eustace on email: 106006.220@compuserve.com

July 5

Ebor Electric Fun-Fly, Knavesmire Racecourse, York, UK. No competitions, just come and fly for fun. Contact: Mike Proctor, 01904 489386, or Eric Leadley, 01904 422615.

July 5

Malvern Soaring Association. Open, 100S and Classic glider competitions plus Electroslot 7 cell, at Fish Meadow, Upton-upon-Severn, Worcs. Contact: Nick Neve, Eynhallow, The Purlieu, Upper Colwall, Malvern, Worcs, UK-WR14 4DJ. Tel: 01684 561160. Pre-entry by June 29, 2 frequencies, £3 per event, include SAE if confirmation and map is required.

July 11-12

Wings and Wheels Model Spectacular. North Weald Airfield,

UK. Market and airshow. Contact: Designaction Limited, P O Box 102, Malvern, Worcestershire, UK-WR14 1XJ. Telefax: 01684 562038, mobile: 0836 297168.

July 11-12

Mid-America Electric Fly, Walled Lake, MI, USA.

July 12

BMFA F5B League, Oakington, Cambs, UK. Contact Mike Proctor, 01904 489386.

July 19

Ipswich RCMC, BEFA League, Electroslot and E400 competition, £3 entry with 3 frequencies and insurance required. BBQ & toilet on site. For details and location map send SAE to: P. Wainwright, 35 Humerduy Lane, Ipswich, UK-IP4 3NR. tel: 01473 447237.

July 25 & 26

INTER-EX 1998. Oistrach, (near Bodensee) Germany.

July 31-Aug 2

Electric Flight Festival, Neuhausen, Germany.

August 1-2

Scottish Soaring Nationals, UK. Electroslot and 30 Minute Electric (plus Thermal soaring events). Contact: John Walker 01292 560341 or Colin Sparrow, 01505 850242, email: csparrow@clara.net

August 2-9

F5B World Championships, Neuhausen, Germany.

August 2-4

USA AMA Nats.

August 8-9

Fort Wayne ElectricFly, Texas, USA. Contact: Pat Mattes, Yoder, IN, USA. email: Pat-Ingrid-Mattes@Juno.com

August 15-16

Family and Model Craft Show at Plumpton Racecourse, 4 miles from Lewes, Sussex. All Enquiries to:

Dave Bishop of DB Sound, 17 The Square, Tatsfield, Kent, UK-TN16 2AS. Tel 01959 577550. Mobile: 0850 752061.

August 16

Greenacres MAC Electric Fun-Fly 98. Walsall Airport, Off Bosty Lane, Walsall, West Midlands, UK. Signposted from Junction 9 M6. Entry £2 per Tx. Food and refreshments on site. Trade stands welcome. Contact: (01922) 404658 or 448873.

August 22-23

Haverfordwest Model Club's annual show, Scolton Manor. Contact: Adam Pollard, 6 Castle High, Haverfordwest, Pems. UK-SA61 2SP. Tel: 01437 762633.

August 22-23

2nd Annual MARCEE/St Paul RC E-Fun Fly, USA. Contact: Stevepauley@worldnet.att.net

August 29-31

BMFA Nationals, venue still undecided, UK.

September 6

Montrose Electric Fly-in, UK. Fun events. Contact: Ian Guthrie, 01674 672268 (business hours).

September 15

SAM Champs at the AMA National site in Muncie, Indiana, USA.

September 19-20

KRC, Queen City Airport, Allentown, PA, USA.

September 20

BMFA F5B League, Owthorpe, Notts, UK. Contact Mike Proctor, 01904 489386.

September 20

Pillerton Fly In, Pillerton Hersey, Warwickshire, UK. Fun fly, carrier take-off and landing competition, AULD after lunch. Contact: John Lewthwaite, Home Farm, Pillerton Hersey, Warwick, UK-CV35 0QQ.

September 20

Linithgow, UK. Electroslot (plus Open Thermal). Contact: Colin Sparrow, 01505 850242, email: csparrow@clara.net

September 20

Battle of Britain Fly-in, UK. Bring your WW2 aircraft. BBQ & raffle, clubhouse & toilets. Contact Gary Western,

September 25 to 27

Lley Model Aero Club 'Bring and Fly' all flying model types. Contact: Frank Pilling, Crud y Gwn, Abersoch, Pwllheli, UK-LL53 7HR. Tel: 01758 712673.

October 4

Mossmorran Electroslot (plus F3J Thermal), UK. Contact: Colin Sparrow, 01505 850242, email: csparrow@clara.net

October 11

BMFA F5B League, Owthorpe, Notts, UK. Contact Mike Proctor, 01904 489386.

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The Light Fantastic

CHRIS GOLDS

Chris Golds continues his own exploration into EDF models - and looks at some of yours, with and without fans.

Please! Please!

When you begin a new column you suffer greatly from having little or no input from the public you are addressing. And so it is with this issue of 'LF'. PLEASE, PLEASE send me photos/descriptions/stories of your EDF models both alive and yet-to-be born and see yourself and your model in print!

Talks and people

On Sunday 11th January 1998 I drove to PITNEY near Langport in Somerset to give a talk to the local model club about my adventures in electrics so far. I was invited to do so by an old RAF flying and model-

ling friend DAVE LINNEY a club member and a modeller who runs a night-school class on - you guessed it - model aircraft!

The talk went very well with videos and actual models to illustrate the various points that I made. After a break for yum-yums we had more videos and finished with a question and answer session. The audience evinced great interest in electric flying, some of them already being electrolytes and my demonstration of my VULCAN (4 x WeMoTec Mini Fan 480) at 'full poke' raised some eyebrows and a lot of hair! Again the beauty of no smell and no smoke allowing extended engine (motor) testing indoors. How strange is coincidence!

One of those attending, called Tony, was FAA groundcrew on HMS CENTAUR (I think) when we were both in Aden - he floating out at sea - doing our duty against 'recalcitrant tribesmen' as they were called in the early '60s. We had a lot of fun recalling various crazy flying episodes which occurred then. I thoroughly enjoyed my visit and my thanks go to the PITNEY CLUB and those who attended plus of course for the buns and wine laid on for the break.

Horten

I mentioned in my first issue my design for a HORTEN IX for twin WeMoTec 480 EDF power, and my insistence that

the model should fly with NO fin area and rely upon drag rudders for control of yaw. The model spans 68 inches and weighs 66 ounces ready to fly. The Editor has asked for it as an EFI plan so sometime in the future you can have a try at finless wing flying for yourself.

The model has survived its first flight wherein it was very nose-heavy and suffered from considerable tail-wagging when more than about 30 degrees of bank was applied. Fortunately our club video expert, David Brock, captured it on film and I was able to see and re-see the flight to try to sort out what to alter to reduce

▼ **Alan's MiG atop his twice size Ladybird.**





◀ **Brian Gaskin's Antonov 12 with 4 x 400 motors.**

the wagging. I am convinced that it was caused by too much drag rudder extension at large aileron angles so I have halved the amount of DR when used coupled to ailerons. I still have 100% DR extension under my left thumb if needed - whether

coupled or not. I have also moved the CG back by 1/2 inch (13mm) to relieve the need for lots of up 'elevator' to counter the nose-heaviness.

Well, the Horten has completed all but two flight tests and it really does fly very well and in

a completely stable manner. I have stalled it twice (once by accident) and each recovery has been gentle, quick and safe. This gave me the confidence to begin the steep and fast bank swapping from extreme bank left to extreme bank right and back again all under perfect control. And without any fin area at all!

▼ **Just sixteen days work for this baby foam Speed 480 Hunter.**



Your models

Electric man Brian Gaskin has supplied some photos of his latest creation - an ANTONOV 12 which is 64 1/2 inches (1640 mm)

span and weighs six and a half pounds (3kg) with four speed 400 motors turning ZINGER 10 x 8 three blade props (not the Graupners in the photo). Brian reports a very good performance from a hand launch as his flying field's grass needs cutting.

Next from Alan Morgan of Cheshunt comes news and pictures of his MiG 17 which is loosely based on Pavel Bosak's plan. All built-up, the model flies on a GASKIN 400 (there he goes again!) fan unit powered by a speed 480 Race motor. With an all-up-weight of 44 ounces and a wing loading of 30 oz/sq.ft the model flies well after launch from a piggy-back ride on a twice size KK Ladybird powered by a LASER 75 (you know - one of those suck-squeeze-bang-blow things). The Ladybird (ah! memories of my youth with an ED Bee) easily carries the MiG and gives the Russian a good start in life every time. I am pleased to see a 17 instead of the usual 15, because I got chased by some once upon a time when I was flying 'top cover' for a photographic Canberra in the Middle East: we did get home but it was a fun-packed twenty minutes before we came within range of our own CAP.

Alan



► **Alan Morgan with his EDF MiG 17.**

► **The 1953 electric RTP
'Rapide' before restoration
to flying status.**

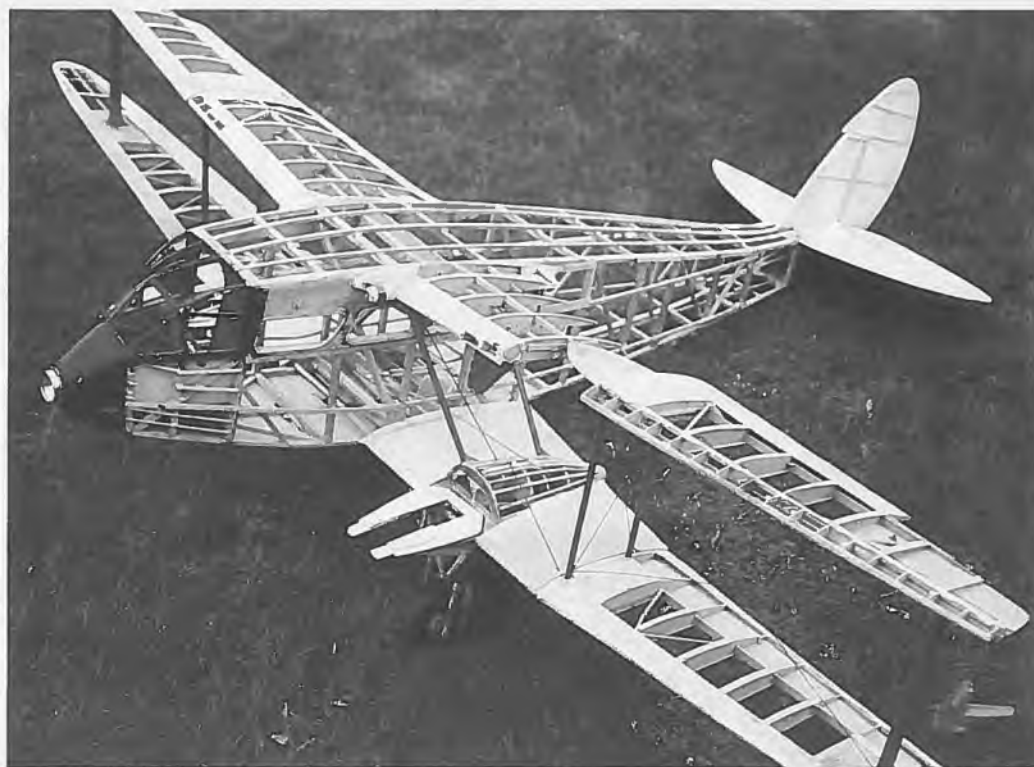
also sent me a photo of an electric RTP model built in 1953 by de Havilland apprentices which he intends to re-furbish and put back into the air, albeit powered by a couple of goo-producers! Anybody out there that remembers this model from '53? If so please write in to me and I will connect you with Alan Morgan.

The Long and Short of EDF Ducts

I have previously been put off building EDF models requiring long intake and exhaust ducts because common knowledge has said that thrust losses are too big to allow any flying performance better than 'dreadful'. So I set to and produced a test rig in my studio to allow various combinations of intake and exhaust to be fitted to a standard WeMoTec 480 unit using a Speed 480 race BB motor. I tried the following set-ups:

- A. Plain shroud unit, no plastic lip ring.
- B. Ditto with lip ring.
- C. Shroud unit with only 9 inch exhaust extension.
- D. Shroud unit with only a 4.5 inch intake extension - no lip.
- E. Shroud with both intake and exhaust.
- F. Ditto with intake lip ring.

The results were quite a surprise to me and so I tabulated them for easier reading. The worst case was the bare shroud without lip ring and the best case was the shroud with exhaust extension and intake extension with



a balsa lip ring, better by a small amount than the shroud with its own lip ring plus exhaust. Not being very scientific I put this down to the fact that with the long intake plus balsa lip ring the fan is 'eating' nice straight flowing air whereas the plain bare shroud is 'eating' very turbulent air. To prove the case I rapidly designed and built a 36 inch span (slightly over-winged) Hunter - all from foam except sheet balsa tail feathers. Take-off weight is 35 ounces and after a bungee launch it flies around happily for 2 minutes on an 8 x 600 pack. This compares well with my original single

WeMoTec profile model which weighed only 28 ounces. Your Editor (all kneel!) reckons that I need a PLETTENBERG motor in there to provide some sparkle in performance. Perhaps I can get Santa Klaus to call early this year?

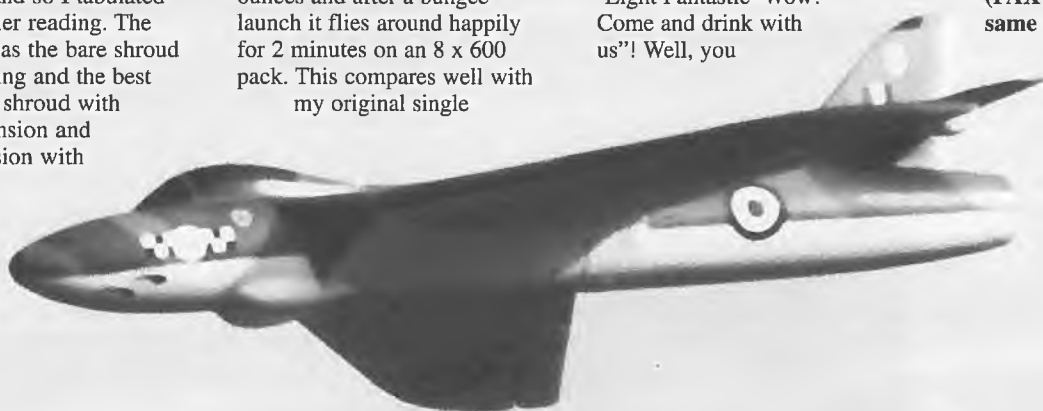
There we are for this issue: I want to make this EDF column YOUR column - so send me your stuff and listen in the pub to the girls saying "Gosh! you must be the John Smith who appears in this months 'Light Fantastic' Wow! Come and drink with us"! Well, you

can all dream! Have you noticed that ducted fans appear frequently in classical literature? Such as...

*"Where 'ere she walks,
Cool gales shall fan the
glade..."*

Fly Safe.

**Please send material to me
at: Hideaway, Lower Loxhore,
Barnstaple, N.Devon EX31
4SX. Tel: 01271 850456
(FAX by pre-arrangement -
same no.) EPI**

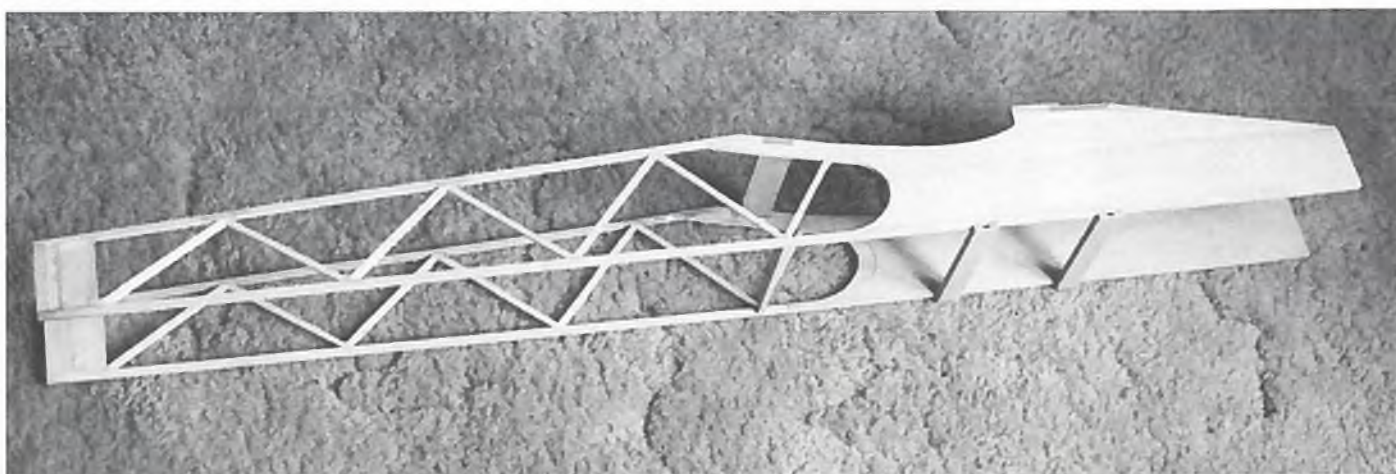


▲ **Really, this is me some
thirty-five years ago -
YIPPEE! 480 Hunter low
pass.**

Quiet Scale

MARTIN IRVINE

The next step in "How to make a scale model out of a proven model design". Martin describes more of the construction and how to add scale-like detail with your model construction.



Hawker Fury

Well, the Fury is coming along nicely. (I like stay at home Christmas holidays!)

Ground angles?

As I re-read my article from last month, I was struck by a possible point of confusion. I wrote about the Acro Star's ground angle as 10 degrees as opposed to the Fury's 13 degrees. In the following paragraph I talked about the vertical CG/ground angle as 13 degrees for the Acro Star and 10 degrees.

The ground angle is the angle between the aircraft centre line and the ground. The Fury has a greater ground angle, ie the nose sits higher as it sits on the grass.

The vertical CG/ground angle is the angle between a vertical line through the vertical CG in the flying stance, as it would be in the midst of taking off, and a line drawn between the vertical CG and the wheels contact point on the ground. You could argue for the axle as the end point rather than the ground. It probably is

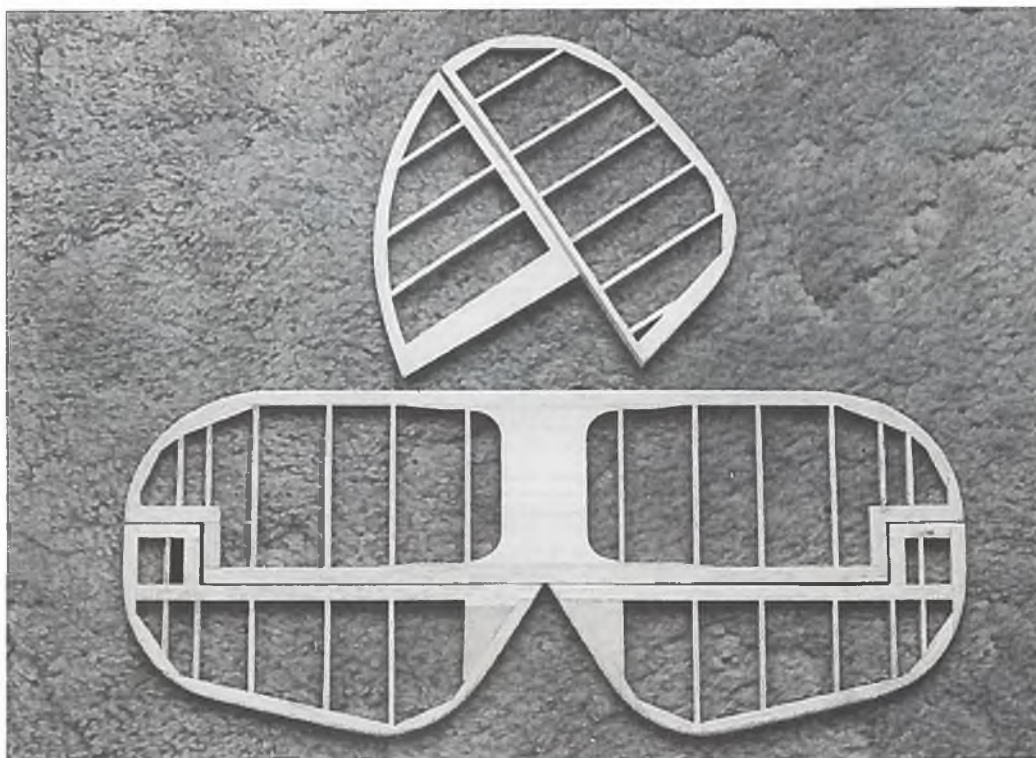
not enough to make a difference but it makes the angle look better. There is an opportunity for some experimentation here. The vertical CG is the point at which the plane would hang with the wings

vertical and the centre line horizontal.

Fuselage

I widened the fuselage to accommodate up to 4 cells

across but I kept the parallel sides of the Acro Star back to the cockpit. This makes sheeting the forward fuselage much easier as a single curvature can be done with a single piece of sheet as opposed to having to



plank a double curvature. Aft of the cockpit is stringered so the scale curvature is straight-forward.

The main longerons are 3/16 (5mm) sq. spruce. This means that the forward fuselage uses 3/16" sheet so this needs to be the lightest stock you can find. I nearly always use a thin 1/32" (0.8mm) or 1/64" (0.4mm) ply doubler to tie things together. The hard ply surface is also very resistant to the bruising that balsa sides always seen to suffer from when using removable packs.

As the photos show, I tried to use just a Warren truss type of construction but in the end I added verticals as the unsupported lengths of 3/16" were too flexible.

The side stringers are 3/32" x 3/16" (2.5 x 5mm) hard balsa over 1/8" x 3/16" (3 x 5mm) verticals. I also put in diagonals which stiffen things up considerably for negligible weight.

The front side curvature is done with soft 1/8" (3mm). This may sound like overkill but the alternative would be sheet formers and 1/16" (1.6mm) sheet. There wouldn't be much air in there and the sheet is a lot simpler.

The nose of the Fury cuts in sharply to the spinner. The only way to do this is with block balsa. I lucked in when I went to buy block. 6lb stock in the hobby shop's balsa bin - Wow!

Battery access will be through a hatch under the nose. The details are still to be worked out but I want to be able to replace packs with the plane on its wheels - and without me standing on my head!

Cabane

Cabane struts are from 3/32" (2.5mm) spring steel and slide into brass tubing mounted in plywood crosspieces. The plus of this is that they can be removed for all sanding and covering.

The photo shows a method of determining the exact lengths of struts. It's all very well to draw the struts accurately (and not difficult) but making them accurately is the real test. The left and right struts must be 100% identical but the front and rear strut lengths are slightly less critical. The wheel collar allows a bit of adjustment for setting the stagger of the top wing.



The wing attachment plates are made from .030" (0.76mm) brass strip folded over and soldered. I use a jig of "Foamcore", a 3/16" foam faced with smooth paper on both sides. The jig sets the strut's slant forward (the stagger). The loose attachment plates are bolted to the wing mounting points with a patch of 1/64" or 1/32" ply under them. This protects the wing's surface from the soldering iron which will solder the plate to the struts at the correct angle for the wing's lower surface curvature. When the iron has been applied to the plate and the solder is liquid, screw the attachment bolt down tight. I use Allen head screws for this

as they are very secure. Work quickly to minimize scorching.

Wings

The wings have been built pretty much as laid out last column.

I am having second thoughts about the airfoil thickness. Having built the wings to near completion, I will continue with this section but I may have to build a new set with a thinner section.

I would bury the rear spar under the balsa sheet in another wing as the exposed spar is more difficult to do well.

The wing tips are a combination of the easy to do sheet tips seen on many sport planes and

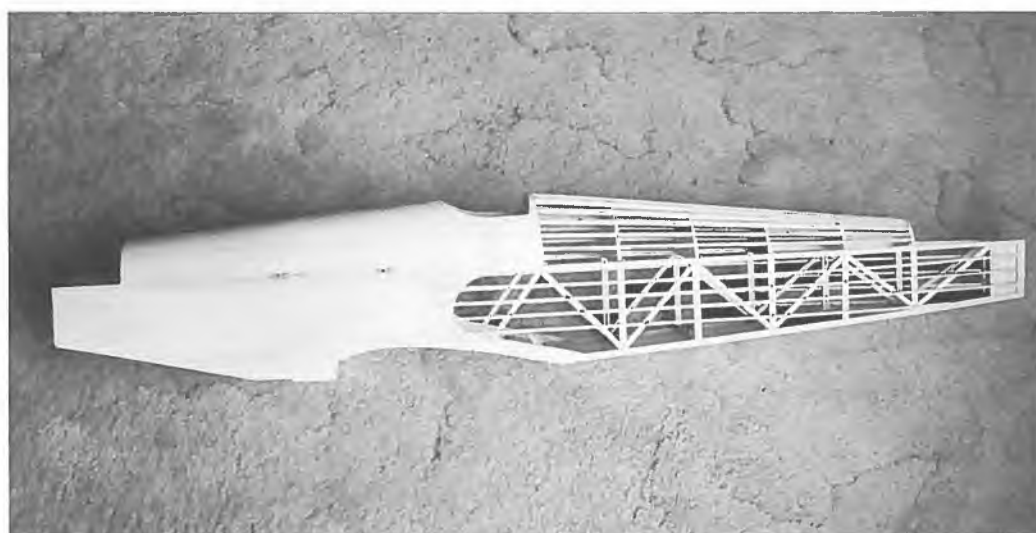
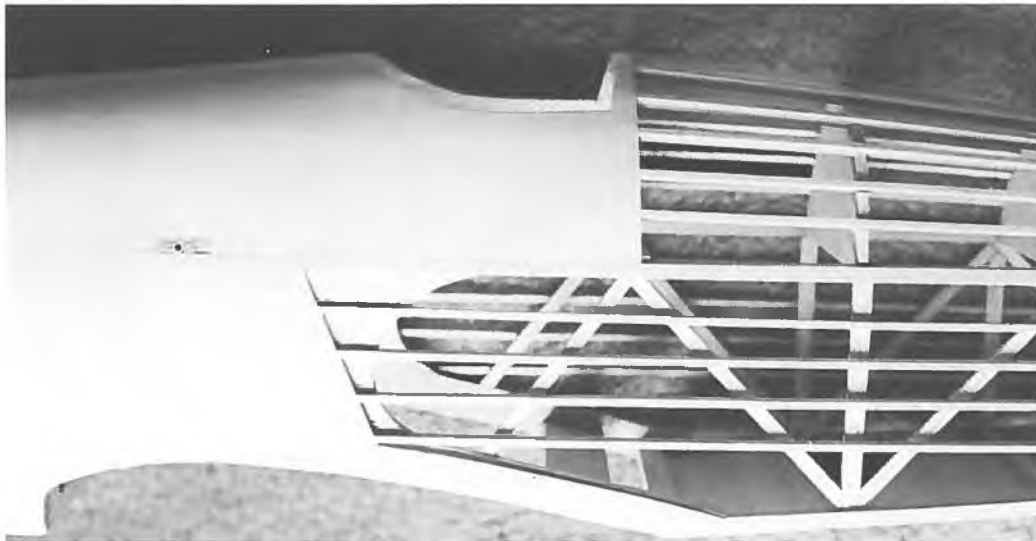
the strength and delicacy of laminated tips. With the sheet backing, I can use balsa for the laminating which is much easier and faster to build and easier to sand than my usual basswood laminations.

I have started using PICA Gluit sandable white glue for some of my building. This is great for laminating and other areas that require feathering of one surface into another. It is good for the edges that will be sanded close where CA tends to leave hard lines.

Stabilizer

The Acro Star has a sheet tail. This would be a possibility but a built up tail is lighter and much





better looking, even under the covering.

The fin has a leading edge of laminated balsa. It is an easy method of construction that I

think looks very attractive, especially under transparent covering.

The other surfaces have edges of strip stock. The important

thing to remember with this construction is that it is the long glue joints that provide the strength. Try to make as few end grain joints as you can.

Landing gear

I drew a shortened landing gear strut and wheel but it just looked BAD. I redrew with some massaging of lines and angles until I got something that looks right and is still lower and further forward than scale to enhance the ground handling. The dural gear will be recessed so that the attachment bolts will be hidden by covering but still accessible for maintenance (aka repairs!)

Interplane struts

Biplane struts are a pain. I continue to look at other people's versions of strut fittings, searching for that magic system that is unobtrusive, easy to make, and quick to put on and take off. I'll probably find it about the same time Sanyo comes out with 4Ahr AA cells!

The wings of this plane probably don't need functioning struts as the wings are fully cantilevered, and there are ailerons in one wing only. However, with a wire cabane alone holding the top wing in place, there is likely to be a little flexing during manoeuvres. Functioning struts will tighten this up. It will make the whole assembly stiffer and stronger.

The set-up in the photo is a new method that I think will work pretty well. Each end is based on a servo attachment device. It has a pin that is intended for the servo wheel and a set screw to clamp down on the pushrod wire.

For the strut end the pin is soldered into a hole in a piece of brass strip which will in turn be epoxied into the wing. The set screw will clamp a 1/16" (1.6mm) wire in the interplane strut. With all the set screws facing the same way, attachment and dismantling should be fairly quick and, as the screws are merely loosened not removed, I hope I won't be fumbling for bits and pieces.

Spinner

While for sport scale a commercial spinner will do, this plane was an opportunity to try a vacuformed spinner. I have just started the process and will have more to say about it next time. I will say that with the low RPMs of geared motors, homemade spinners are even more attractive.

STOCK WEIGHT: LBS/CU.FT		6LB		8LB		10LB		12LB		14LB	
		OZ	G	OZ	G	OZ	G	OZ	G	OZ	G
36" LONG SHEET											
THICKNESS & WIDTH											
1/32"	3"	3/16	5.3	1/4	7.1	5/16	8.9	3/8	11	7/16	12
	4"	1/4	7.1	1/3	9.4	5/12	12	1/2	14	7/12	17
1/16"	3"	3/8	11	1/2	14	5/8	18	3/4	28	7/8	25
	4"	1/2	14	2/3	19	5/6	24	1	28	1 1/6	33
3/32"	3"	9/16	16	3/4	21	15/16	27	1 1/8	32	1 5/16	37
	4"	3/4	21	1	28	1 1/4	35	1 1/2	43	1 3/4	50
1/8"	3"	3/4	21	1	28	1 1/4	35	1 1/2	43	1 3/4	50
	4"	1	28	1 1/3	38	1 2/3	47	2	57	2 1/3	66
3/16"	3"	1 1/8	32	1 1/2	43	1 7/8	53	2 1/4	64	2 5/8	74
	4"	1 1/2	42	2	57	2 1/2	71	3	85	3 1/2	99
1/4"	3"	1 1/2	42	2	57	2 1/2	71	3	85	3 1/2	99
	4"	2	57	2 2/3	76	3 1/3	95	4	113	4 2/3	132
3/8"	3"	2 1/4	64	3	85	3 3/4	106	4 1/2	128	5 1/4	149
	4"	3	85	4	113	5	142	6	170	7	198
1/2"	3"	3	85	4	113	5	142	6	170	7	198
	4"	4	113	5 1/3	151	6 2/3	189	8	227	9 1/3	265
1"	3"	6	170	8	227	10	284	12	340	14	397
	4"	8	227	10 2/3	302	13 1/3	378	16	454	18 2/3	529

Aveox 1412 motor and 18 x 1400SCRs with total weight of 46 oz. Radio weight with FMA 200BB servos is about 8 oz. This puts the projected weight at between 6 1/4 and 6 1/2 lb. Area is 800 sq.in (5.6 sq.ft) for a wing loading between 18 and 19 oz/sq.ft.

According to E-Calc, a computer simulation programme, the 1412/2Y on the Astro 3.69:1 gearbox turns a 13 x 8 prop at 7300 rpm and 24 amps for input wattage of about 70 watts/lb. A 14 x 8 prop turns 7000 rpm at 30 amps for an input wattage of about 85 watts/lb. Given the increased efficiency of a brushless motor, these figures look very encouraging (as they did during the design process).

Weights

The fuselage is quite large and the whole plane has quite a lot of sheet, so I watched the weight build-up closely.

The fuselage is nearly finished and lacks some light block in the nose. With the cabane attached, and rough cut blocks for the nose, it weighs 398g (14 oz). The completed

bottom wing weighs 176g (6.2 oz) and the top wing without ailerons weighs 218g (7.7 oz). The framed up tail surfaces with its struts weigh 52g (1.8 oz). The landing gear and interplane struts still have to be built, but the uncovered total so far is under 30 oz (850g). The wheels weigh 90g (3.2 oz) and I would guess the landing gear blank weighs 55g

(2 oz). Add a couple of ounces for the interplane struts and a couple more for the unknowns that always seem to crop up! Our total is about 1050g (37 oz). Add about 7 oz for covering and flat overspray. This will total 44 oz. Even if another 4 oz is added (for more of the "unplanned for") the total is still only 48 oz.

My power system is a geared

Weight chart

A couple of months ago this column had a picture of a small postal scale and a reference to a chart of weights. Well, here is that chart. I weigh each sheet of balsa as I buy it and mark the weight per cubic foot in ink at one end. I then try to cut from the other end so that the marked wood is the last to be used.

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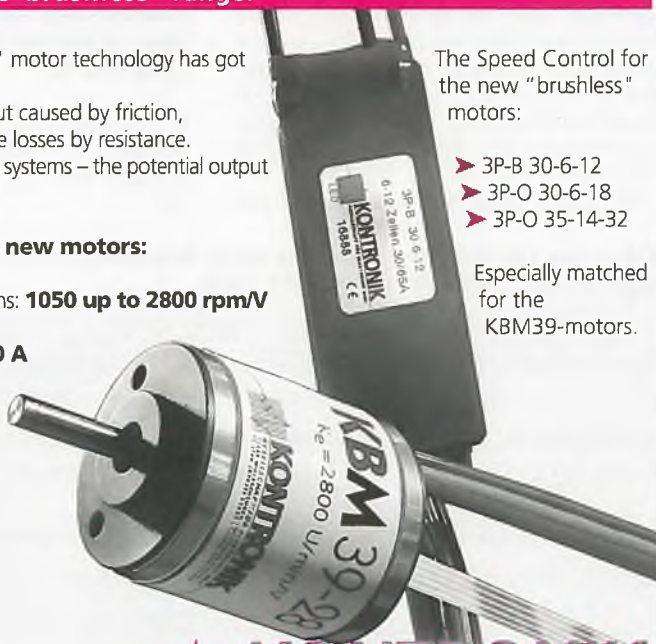
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Sinsheim Faszination Modell

6 - 8 March 1998

REPORT BY: **THE EDITOR**

March in Germany is not normally the climate for outdoor flying. They did at Sinsheim in the cold - but it was warmer indoors with - 'indoor' models of course and the so impressive Slow Fly models that are multiplying - fast.

Sinsheim

"Faszination Modellbau" at Sinsheim is an exhibition and market for all types of models and unlike other wintertime shows but it has something the others have not - model flying. This includes outdoor flying if weather permits and three days of indoor model flying, this year dominated by Slow Fly models which had crept in from the calm summer days - outdoors.

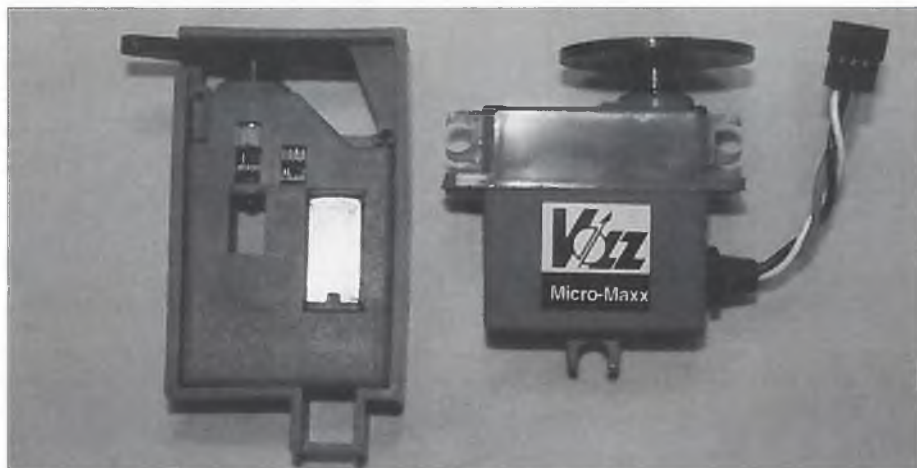
If you are reading this article before the 'editorial', please leaf back through the pages and read the Sinsheim part of the editorial first. That explains why you are getting such a big dose of one model category in one issue. I suspect that many of you will be indulging in this sort of flying by this time next year. Any model flyers who endure long winters with little flying will relish the chance to try these models and



▲ **FVK Yak 9 for 400-480 motors. Wingspan is 820mm (32") and the all moulded model weighs 220g (8 oz) bare, as you see it here and as you would buy it.**

you fortunate pilots with calm enough summers or warm enough winters will probably wish to fly them outdoors too.

▼ **New Volz alleron servo displaying gears and motor. It is mounted in its frame which is built into the model's wing.**

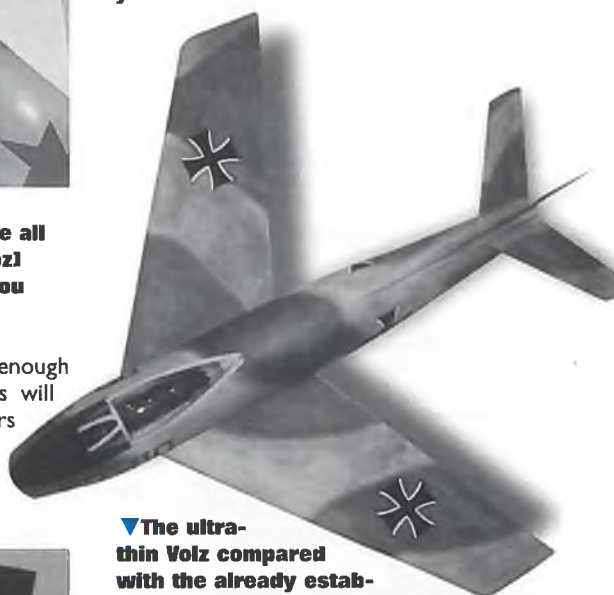


New models

I suspect that the big names in manufacturing had already launched all of their models that were new, at the big trade fair (See 'New at Nürnberg' in the April issue) in February and I suspect that some smaller makers are saving their new items for Dortmund. These I am sure will be in the next issue for you to view.

The new thin aileron servo announced by Volz at Nürnberg is getting "nearer to available" and you see here a genuine production case with the mechanics installed.

▼ **Glöckner Modelltechnik's F-86 Sabre, all cut foam model for WeMoTec Eco Pro fan units should be in production and available by about the time you read this.**



▼ **The ultra-thin Volz compared with the already established Micro-Maxx, a servo provided with lugs for wing mounting.**



◀ Wijnand De Joode's small yellow model, wingspan 330mm, flown by and using Rick Ruijsink's 10g RC system.

Ilbau



▲ Inside Wijnand's model the structure is delicate and Rick's radio is small. The fuselage is about 30mm (1 inch and a quarter) wide.

I was expecting the FVK 'Yak 9' for Speed 400-480 motors and it was no disappointment. It is all moulded and most of the colours are already on the model when you buy it. My language difficulties sometimes confuse me but I think that control surfaces are hinged and control runs installed. Another new FVK model is the 'Jonny Bee', 1100mm (43") span, slow fly at 194g (less than 7 ounces), it flew well.

There were a lot of new 'Slow Fly' models, some flying, more on display and boxed kits for some of both available. A lot of the hardware - RC gear, servos, motors and gearboxes for these was not so new and traders had it on their stands; some of these items are on these pages.

EDF flyers will already be familiar with the Glöckner Modelltechnik, Hawk, Sabre and Pampa for 480 and similar size motors. On the Glöckner stand was a bigger F-86 Sabre for WeMoTec Eco Pro fan units; this model will be available soon.



▲ Rick Ruijsink's 330mm (13") span CO2 and electric models. The electric model uses a Knight & Pridham 00 motor with Rick's own gearing. Each is covered in silvered condenser film and each weighs 25g. (One ounce weighs 28.35g.)



▲ Stefan Forster of FVK flew this 'Jonny Bee' with very available RC gear (what does one do with regular length servo leads?). See the FVK ad.



▲ One of many Bleriot II models that flew very capably round the hall.

Variety

The big impression made on this writer was by the Slow Fly models. There were the obvious indoor models, the ones that outdoors the lightest breath of wind will flick over or blow out of sight before you noticed any wind - but are so majestic inside. There were a lot of Bleriot IIs or similar own-designed models that fly inside, or out on very calm days. The Bleriot II has done so much to popularise Slow Fly in little more than one year. Slow Fly? - there were fast models too and some very nimble ones.

The smallest models there were Rick Ruijsink's 330mm (13") span ones and Wijnand De Joode's small yellow scale monoplane, the same size and also using Rick's RC gear and flown by Rick. You may have seen some photos of Rick's sub-micro



▲ This all cut foam 'Floh' by Conzelmann was flown with and without floats. Here it starts its take-off run between boats.



▲ As you see from the splash, the 'Floh' has landed dead stick and stopped dead. It turned and was off again in seconds.



▲ The 'Jedelski' style wing and lightweight ribs of a 'Floh'. This one used a Faulhaber motor with 12 to 1 gearbox and 'computer optimised' 4g carbon fibre epoxy prop. This very light version with floats and lightweight Becker RC weighs 120g.



▲ Roman Scholl day-dreams as he waits for his turn to fly his Little Bee. Thirteen year old Roman is already a competent Slow Fly demonstration pilot.

circuit boards on EFI pages in previous years, almost lost in the palm of my hand. He had several 3 function complete RC systems installed in models at Sinsheim. A complete 900mm (35") span glider and this 330mm electric each weighed 25g - less than one ounce - ready to fly. The radio gear in each: 3 servos in the glider or 2 servos and a speed controller in the electric plus Rx, plus Rx battery weighed 10g (one third of an ounce) for the complete RC system.

'Variety' just has to be also tagged on to



▲ Stefan Dolch displays his design 'Stubenfliege' (Housefly) built by Andrea Braun Modellflugtechnik. It is supplied built and covered and you may purchase this transport box too if you wish.

► Tail panels clip into control horns. The horns are permanently fitted to the fuselage so the tail will always be rigged correctly even though removed for transit.



▲ You can see the extremes of tail movement of this Little Bee, used to make tight turns.



Roman Scholl's Little Bee uses a WES Techik motor with 8.3:1 gearbox and 8 x 50mAh cells.



▲ Stefan Dolch assembles a Stubenfliege for you. Undercarriage legs are plugged into the fuselage tube. Moulded carbon fibre clips are already bonded to the legs and the clip grips the tube.



▲ The simple linkages and tail mount of a Little Bee.

the way they flew. Some were very docile and slow enough to be flown round the hall and round a pillar in it. Some were fast and not easy to fly in the space provided. The most impressive were the lightweights that were so nimble and with geared motors as big as half a finger running on 6 to 9 cells, from 50 to 200mAh. These lightweights take off in 150mm (six inches) and climb fast. Control is usually rudder and elevator and often a V tail but they will roll fast and turn faster than you would believe was possible, until you have witnessed it.

'Zepron'

A group of three who often flew together arrived with some similar



▲ Team Evolution 'Little Bee' components unpacked from the kit box. You just cover with the film in the bag (front right) and assemble. Wingspan is 860mm (34") and typical wing loading is 5.2g/sq.dm (1.7 oz/sq.ft). Kits available from: Team Evolution, Hauffstr. 12, D-72622 Nürtingen, Germany. Tel: +49(0)172 7136723, fax: +49(0)7158 4008.



▲ Cabane struts clip onto the wing centre tube.



◀ Halfway along a Stubenfliege fuselage tube, two Volz Kolibri servos and a Simprop Nano Rx, cases removed to reduce weight.

▶ This is on one of Stefan Dolch's Stubenfliege models but this neat RC unit was used by many, the Becker Rx, two servos and speed controller all in one case.



▶ A lot of guys were using carbon tubes but there is nothing wrong with good old fashioned wood. This is the front end of a Simprop Taube, built from the kit.



▲ Simprop Taube. Simprop kits are imported into the UK by J Perkins.



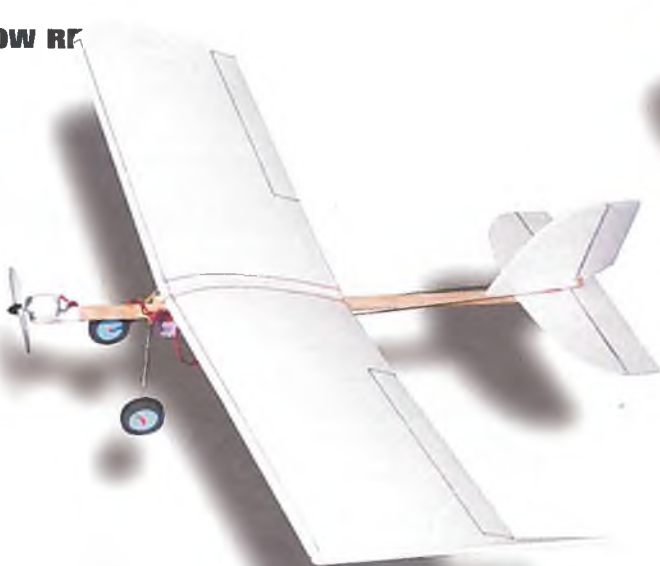
▲ Another Rumpler Taube, one of three Ikarus Slow Fly kit models, designed by Rainer Mugrauer who did not fly at Sinsheim but entertained the spectators with his almost endless commentary and extraordinary vocal sound effects that so realistically simulated many types of man carrying size aircraft engines, tyre squeal, wind noise, etc.



▲ 'Peppino' is a 480mm (19") free flight electric. As you see it here it is getting its 25 second recharge from 3 nicads from designer builder Roland Oehmann. It uses a very small motor and 6:1 gearbox weighing 4g, supplied by a 2.5V 3.3 Farad Gold Cap capacitor also weighing 4g. The prop is a carbon tube with yogurt cup blades. The airframe weighs 4.8g so the total weight is 12.8g (less than half an ounce). The model is hand launched - motor off. The undercarriage is an ingenious switch, as the model touches down the wire legs slide up and completes the circuit to the motor. The model bounces and climbs, motor on and flies for 50 seconds, descending as the capacitor runs down. It does not get much higher than twice head-height.



◀ Ikarus Eco 8 helicopter that gave demonstrations every few hours. It can be equipped with a choice of motors and 6 to 12 cells. I think I witnessed it using 8 and 10.



▲ This model has a deep wing with cut foam skins, a balsa box fuselage and direct drive Speed 280 size motor with Paul Günther 5 x 4.3 prop. It is quite big at about 1m (40") span but light. Kits are available from: 'Innovative Model Aviation' of Molenstraat 84, 2387 Baarle-Hertog, Belgium. Tel & fax: 014-699855. web page: <http://members.xoom.com/ima>

▲ A Union kit that will soon be available complete with motor, gearbox and prop and can accommodate regular micro RC gear.



▲ William Bravenboer of 'Innovative Model Aviation' shows us his all-foam Sopwith Triplane with a 600mm (24") span, weight 210g (7.4 oz).



▲ WES Technik were building very small components for small models long before Slow Fly. This is their latest 1.8g (one sixteenth of an ounce) servo. The DM coin next to it is 24mm or 15/16" in diameter.



▲ The motor and gearbox in the yellow biplane is a Speed 400 and 5.2:1 ratio gears liberated from an RC car, all set-up in a space frame of carbon fibre and epoxy resin. The model flies on 8 or 9 x 300mAh cells and weighs 400g (14 oz). It has been tried with 500mAh cells but was a bit heavy.



▲ This very low aspect ratio model was built and flown by Michael Hegerkamp who enjoyed flying round the hall prop-hanging at an angle of attack of about 50 degrees, I thought there were laws of aerodynamics that prohibited that sort of thing. Wingspan is 700mm (28") and weight 110g (4 oz). It uses a tiny 12:1 geared motor and home-made prop, 8 x 110mAh cells, WES Technik servos and a Becker 6g (1/5 oz) Rx.



▲ One of the bigger models was this biplane built by Martin Kopplow and flown last year when there was more space; this year there was not enough room for it. Fuselage and wings are 3mm polystyrene sheet foam sold in Germany for wallpaper lining. Engine framing and struts are balsa and the undercarriage is carbon tube.



▲ Martin's yellow biplane originally used full span ailerons on the lower wings only. For faster control response he added outboard ailerons on the upper wings; you can just see the pushrods between the planes.



▲ This 'Saalschleicher II' is a real indoor model. It is light for its 1120mm (44") wingspan.

Roland Oehmann built it from ultralight carbon tube and balsa and covered it with mylar/polyester film. Here it is in its cardboard transport box with a spare wing and spare props. It is flown with a 4 x 200mAh or 5 x 110mAh cells and gear ratios of 5.5:1 or 6.6:1. Best motor/flight times are over 20 minutes. Depending on battery pack it weighs 124 to 132g (4.4 to 4.7 oz).



▲ Saalschleicher II about to take-off. It flies at 7 KPH (4.4 MPH) - a fast walk.

▼ This stumpy little biplane was another of Martin Kopplow's, all 3mm polystyrene foam and carbon sticks, with a Faulhaber motor and 6.3:1 gearbox. It was fast and with full span ailerons top and bottom it was very twitchy. It often flew several consecutive axial rolls, not so easy in a confined space.



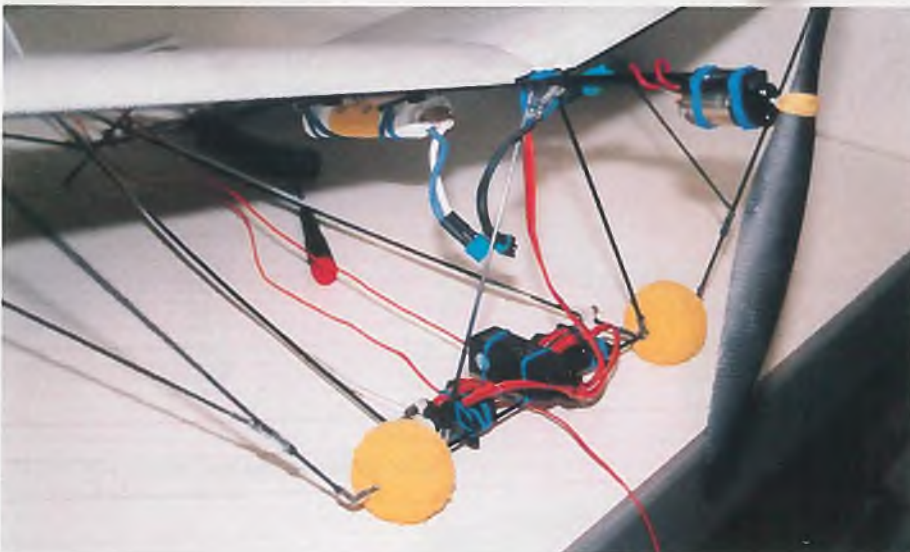
▲ Matthias Hübbe's very manoeuvrable, no ailerons, thick symmetrical section wing, 192g (7 oz) model, was fast but will fly slow, especially with a lighter battery pack.



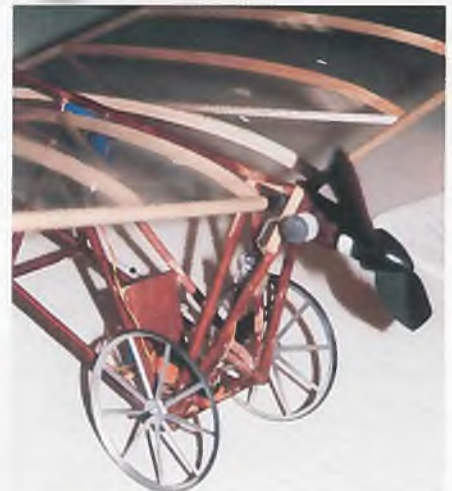
▲ The single surface carbon/epoxy prop used on Martin's white biplane was moulded on the front of a Top Flight prop.



▲ Friederik Wilk Meyer added tip dihedral for tighter turns when flying indoors but you can see genuine 'hanger rash' on the wing tips.



▲ A 'Zepron & carbon stick' by one of the group-of-three - now look at the photo of the Demoiselle model.



▲ A model that must have been inspired by the 1909 Santos-Dumont Demoiselle, shows the ancestry of many of the Slow Fly models.



▲ This large model for a small hall had its maiden flight at Sinsheim.



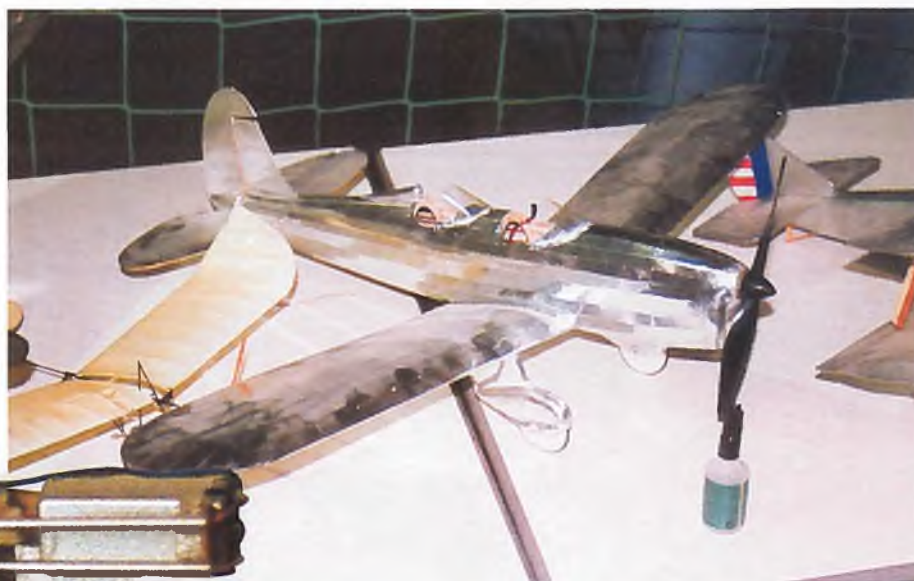
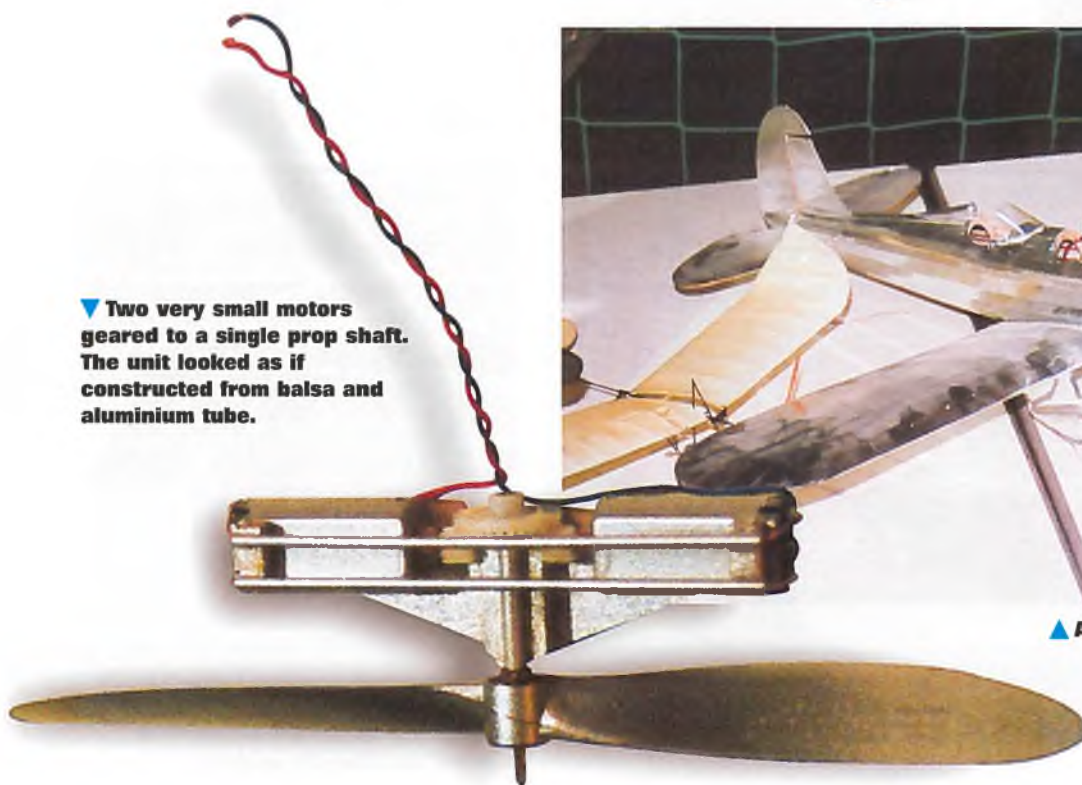
▲ Urs Szymanski of Lausanne spotted the plan for an IC fun-machine in another magazine. He built one, considerably lighter for indoor electrics. The original had a one leg undercarriage but this has two and is almost too manoeuvrable for comfort! Urs was able to fly it in circles with one wing tip stroking the floor.



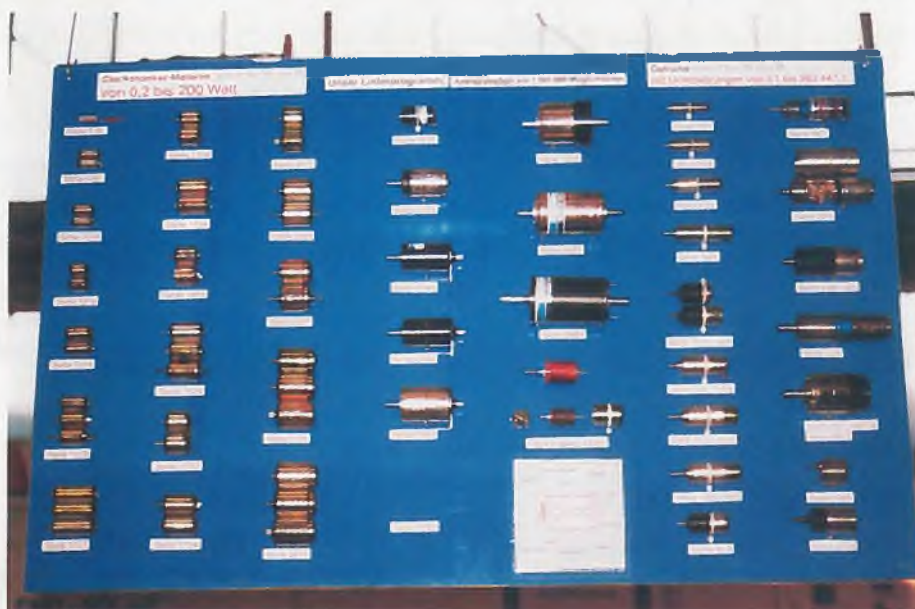
▲ Sven Petersen, aged 16 and his father, flew identical models built almost entirely from balsa. Wing span is 1m (39") and weight 165g (6 oz) with 7 x 110mAh cells and a 6:1 geared motor.



▼ Two very small motors geared to a single prop shaft. The unit looked as if constructed from balsa and aluminium tube.



▲ A lot of models on display did not fly in the space provided



▲ Lemo-Solar supply electric motors for a variety of model uses in diameters from 6 to 38mm and with a vast range of gear ratios. A lot of the Slow Fly models used these motors.



models constructed primarily from sheet polystyrene foam and carbon stick or tube. One model with a thick symmetrical section wing and tip dihedral was flown by Matthias Hübbe, usually fast but it could fly slowly. This model made fast axial rolls on rudder control only, it had no ailerons! Other fast models in this group, made mostly from carbon tube 'kite sticks' and thin polystyrene foam sheet, could - I was assured - fly slowly with smaller lighter battery packs. Martin Kopplow flew monoplanes and biplanes with single surface wings. Friederik Wilk Meyer who is a teacher flew some simpler models developed so that his pupils could build and fly them. I understand that many have constructed their own models and share the common RC gear. This foam is branded 'Zepron' and available 1 to 10mm thick in rolls, which provides the builder with a cambered, single surface (or at least very thin) wing. MacDonalds burger boxes are moulded from about 1.5mm thick material very similar to this 3mm sheet polystyrene foam that was the choice for a lot of models at Sinsheim.

Water

There was a large artificial pond in the model boat hall, which was borrowed for a few minutes for the indoor floatplanes. Some modellers have problems getting models to 'unstick' from water. All these slow flyers were so adequately powered that they all unstuck as easily as from the floor. They were able to take-off and alight so easily that boats were re-launched as the aircraft were flying and they continued to do 'circuits and bumps' amongst the boats. **EFI**

◀ If you wish to construct your own gearboxes, Lemo-Solar can supply spur gears of several sizes.

▼ This tiny geared Faulhaber motor with a big prop was in a WW2 US Navy scale model. It weighed only 300g complete but was too big to fly at Sinsheim.



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9 x 7	£11.45	£4.45
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12 x 10	£11.95	£4.95
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9.0 x 6.5	£5.95	£8.95
9.5 x 5.0	£5.95	£9.95
10.0 x 7.0	£6.95	£9.95
10.5 x 6.0	£6.95	£9.95
11.0 x 6.5	£7.95	£9.95
11.5 x 7.0	£7.95	£9.95
12.0 x 7.0	£7.95	£9.95
12.5 x 6.5	£8.95	£10.95
12.5 x 10.0	£8.95	£11.95
13.0 x 6.5	£8.95	£11.95
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With Brake ..	Y	6-10	40
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Mini/Sw40 W/BEC	Y	6-12	40
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ROBBE SWITCHES & CONTROLLERS

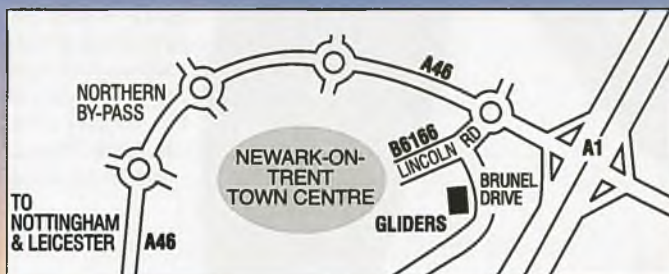
Model	BEC/PCO	Cells	Amps
RSC210	Y	6-8	10
RSC750	N	6-20	50
RSC810 mP	N	6-8	12
RSC835 mP	Y	6-12	35
RSC860 mP	N	7-30	60
RSC890 mP	N	7-30	90

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Horten IX

plan and construction

REVIEW BY: **CHRIS GOLDS**

Sixty years ago the Horten brothers succeeded with their 'true' flying wings, no fins or rudders and no fuselage if the pilot could be accommodated within the wing. They built very efficient gliders, prop driven and jet propelled aircraft.

Build your own 68.5" (1740mm) span model of the last Horten 'Wing', for two WeMoTec Mini Fan 480, or similar fan units and 7 to 8 cells.

▼ 'Proud Dad' view of upper surface.



My first operational tour as a young RAF fighter pilot was in Germany beginning in 1956; each squadron on our airfield at Wunstorf had its own palatial hangar (ex-Luftwaffe) and in one dark corner of ours lay the remains of a prone-pilot flying wing glider constructed like a huge model aeroplane but without any covering. The cockpit 'area' was fully glazed with something like celluloid which was yellowed and scratched. I distinctly remember opening the 'hood' and staring in at the leather couch complete with a chin-rest for the pilot.

It was just a curiosity laying mouldering away within a few feet of our gleaming new DH Venom Mk4 fighter bombers and I walked back to the crewroom to get changed for flying - simply to slip a flying suit on over my uniform! I do not remember where the glider went when we handed the airfield back to the newly re-formed Luftwaffe in 1957 - burned I suppose like everything else.

I have written before about my fascination with 'flying wing' aircraft but never before have I tried to design and build a model with NO fin area to damp out yaw oscillations. I have seen a number of HORTEN IX models but they have all had some fin area added - usually in clear plastic. Alec Cornish-Testrail built one and Paul (his pilot) tried to fly it but I believe Alec found that it was only stable in yaw with such a forward CG that the model was virtually unflyable.

Recently Mike Lovell of Bristol sent me a video of his B2 which flew using drag rudders as does the real aircraft. His model certainly flew and was stable enough in yaw to get down to a safe landing. This was the trigger to get me to start upon a twin electric EDF model of the HORTEN IX with as simple as possible an approach to staying safely airborne!



▲ Spar set and chuck glider built to check CG.



▲ Profile fuselage ladder frame.

I have designed it to be as scale as possible in wing plan form but with a 'profile' fuselage sandwiched between the wings primarily to contain the power pack batteries. So if you would like to try your hand at a FINLESS twin EDF semi-scale flying wing then let's go!

THE BUILDING SEQUENCE

Wings

I normally start on a new model with the fuselage (but I don't know why!); this time however, there is so little to the fuselage that I decided to plunge straight into a seemingly endless task - that of building the ribs. My YB49 model (8 x WeMoTec 480 units - 18 pounds 5 ounces) is completely built up and has flown beautifully right from the start. This I put down to its low wing loading of 13 ounces per square foot, so I have chosen to go the same structural route for the Horten with built-up ribs and spars. Lay the rib plans on your building board, cover with clear polythene or similar and place pins around the outer line at about 1/2 inch (13mm) spacing. I use the type of pins from the



▲ **Basic structure - from above, behind.**



▲ **Basic structure - from above, ahead.**

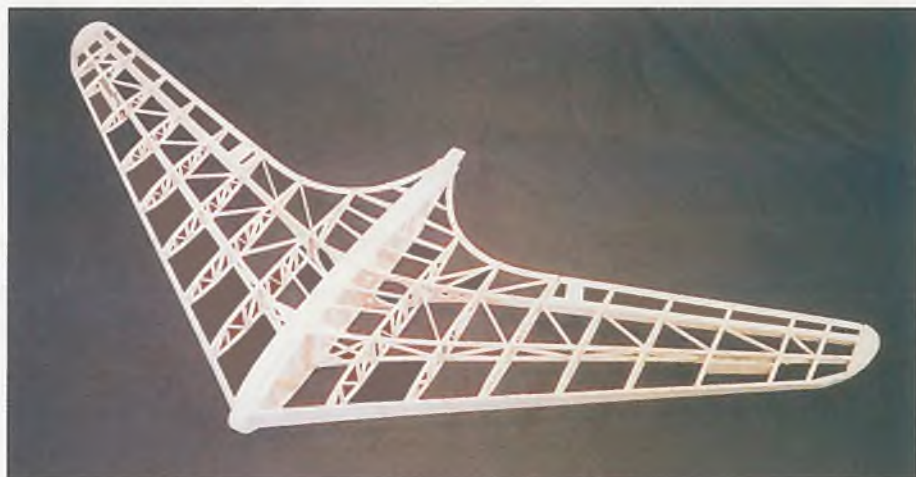
florist, which attach flower-favours to button-holes worn at weddings - long and hammerable! Lay into the pins the 1/4 x 1/8 (6 x 3mm) medium strip for top and bottom 'caps', pin in place and steadily lay in the LE strut, and spar struts all in soft 1/4 (6mm) square.

You may find it easier to bend the 1/4 x 1/8 if you dip it in a bowl of hot water for a few minutes, patting it dry prior to use. Next comes 1/4 x 1/8 verticals and diagonals until you have built one rib. I used CYANO throughout. Carefully remove the inside pins and remove the rib. Trim off the waste at the front and MARK clearly in red pen P 1 (ie: Port rib 1). This is for two reasons:

1. to identify the rib and wing
2. to identify which way up it goes

Repeat for an identical rib for the other wing, mark it S 1 (in green) and go on until you have 10 pairs of ribs. Mercifully, rib 10 is just 3/32 sheet so you have that to look forward to! Now the spars: the main spars are simple warren girder structures so follow the plan - do leave the spar 'stubs' which go inside the fuselage and help with mounting the wings to the fuselage. The rear spars carry the WeMoTec 480 units and thus have a ring-spar make up. In soft 1/4 cut the root end part of the spar with the scarf which will join it to the spar boom. Cut two 0.4mm ply shapes as per plan and cut out the various circles - the large one for the fan-shroud and the small ones for lightness. Join the spar root to the beam at the scarf with cyano then laminate the ply/balsa/ply sandwich under weights using PVA and allow to dry (probably more than 6 hours). Cut holes through balsa core when laminations are dry. Make a pair of each spar and make sure they are matched. Mark end to show tops.

Cut the inner leading edges to plan size in soft 1/4 and similarly the elevon leading edges. Cyano 'tack' the latter to the rear spars as per plan.



▲ **Basic structure - from above.**



▲ **Basic structure - from behind showing access to fans area.**



▲ **Fan shrouds fitted and troughs in place.**

On each rib:

1. Leading Edge face
 2. Rear face of main spar strut
 3. Rear face of rear spar strut
- cut chamfers to match the angle of each on the plan.

The Wing structure

On the plan, again protected by polythene, build up the 'JACKS' to support the tip ends of the spars:

1. REAR SPAR = 3 1/8" (79 mm)
2. MAIN SPAR = 2 3/4" (70 mm)

These jacks will give the required dihedral and washout angles to the wing panels. In position on the plan pin down rib No.1: NB. 3/32 (2.4mm) packing underneath the main spar strut position. This helps with the

eventual washout. Ensure the rib is VERTICAL, using a set square. Fit the spars through Rib 1 and trim them as necessary to get a good, vertical fit, with the spar ends loosely upon their jacks.

Thread the other ribs onto the spars from the tip ends trimming or sanding as necessary to get them into place. DO NOT GLUE! Pin the tip ends of the spars into position on their jacks and juggle the ribs into final positions.

Cut the trailing edges from 3/32" medium sheet and make up the graceful curve from R4 to R1. These should slip nicely into the slots at the rib rear ends. Fit the elevon root rib (1/8 soft sheet) with an 1/8 gap between it and the outside of R4.

Pin the ribs to the spars and then pin the leading edge in place. Check by eye that it is straight; shuffle the ribs as needed to achieve this. When you are satisfied that all is in



▲ Detail showing intake troughs and drag rudder servos covers.

place, that the washout angle is correct (by the jacks) and that the LE & TE are straight (the LE is well over depth towards the root to allow for the surface curvature) and that all contact faces are as 'in contact' as possible - CYANO the whole lot!

5. Now all you have to do is add the diagonal 1/4 x 1/8 strips to 'keep' the washout

and the support bars for the inner bay top sheeting from main spar to rear 'sting' tip. Add the tips as shown (1/2 soft hollowed out) and the top tip layer in 1/8 soft.

In way of the hinges, cut or file down to the thickness of the hinge blades and add the 1/4 x 1/8 soft cap strips above the rear spar and elevon hinge spar (or leading edge). This

leaves the hinge blade 'slots' nicely in line! When dry - ie. in the time it takes to make a 'cuppa tea' - remove all pins and lift the wing panel from the board. Weight should be about 3 ounces at this stage. Drink the cuppa and start all over again for the other wing! When both panels are built, turn them over and fit the 1/4 x 1/8 cap strips to rear spar and elevon hinge spar. NB. the capstrips on the bottom of the elevon hinge spar are mounted 1/8 back from the split line to allow sufficient wood after the face of the elevon hinge spar has been 'chamfered' to allow elevon downwards movement. See plan.

Now is a convenient time to fit 1/4 x 1/8 soft capstrips top and bottom of the main spar to accept eventual leading edge 'box' sheeting in 1/16 soft.

The Fuselage

I am a coward! I did not fancy 18 or so ounces of power pack rattling around inside a very lightly built wing structure so I chose to continue my 'profile' theme and build the fuselage of 1 inch x 1/4 inch (25 x 6mm) soft strips with sides of 1/16 (1.6mm) soft sheet, suitably 'holed'.

A few advantages accrue:

1. Sufficient strength in the power pack bay.
2. Sufficient 'belly' to accept landings on hard surfaces, protect the WeMoTec units and provide enough strong hold points for bungee-launch or hand-launch.

Just build it to the plan, you may need to 'hot water' treat your balsa to get it to bend without cracking. Wrap the 1 x 1/4 strips in rags and immerse in boiling water for ten minutes, remove, dry and use quickly.

Cut the sides from 1/16" soft sheet, with cyano butt joints to give enough area. Remove the ladder frame from the plan and block sand it smooth both sides. Cut out the canopy shape in two laminations of soft 1/2" balsa, sand to section shown and hollow out as much as possible. I use my DREMEL (What did I do before I bought it?) Cyano the canopy to the hatch strip and cut the strip free of the fuselage. The 'canopy' helps to keep the hatch curvature.

PVA the fuselage sides to the ladder frame and allow to dry thoroughly under weights.

Wing and fuselage mating

Cut the 'braces' as shown in medium 1/4 sheet. Offer up the wing panels to the fuselage and trim away/adjust as necessary to fit as per plan. Try again with the braces in position until everything fits, dihedral block under Rib No. 10 each side is 3 1/8 inch under main spar point, with fuselage flat on building surface. Dismantle, then PVA all mating surfaces and re-assemble. Pin all into place and check that both wing roots are mounted at the same angle of incidence. When you are happy that all is aligned and gluing - go to the pub! At this stage the airframe should weigh no more than 14 ounces; with sheeting and skinning to come



▲ View from below of intakes and servo bays.



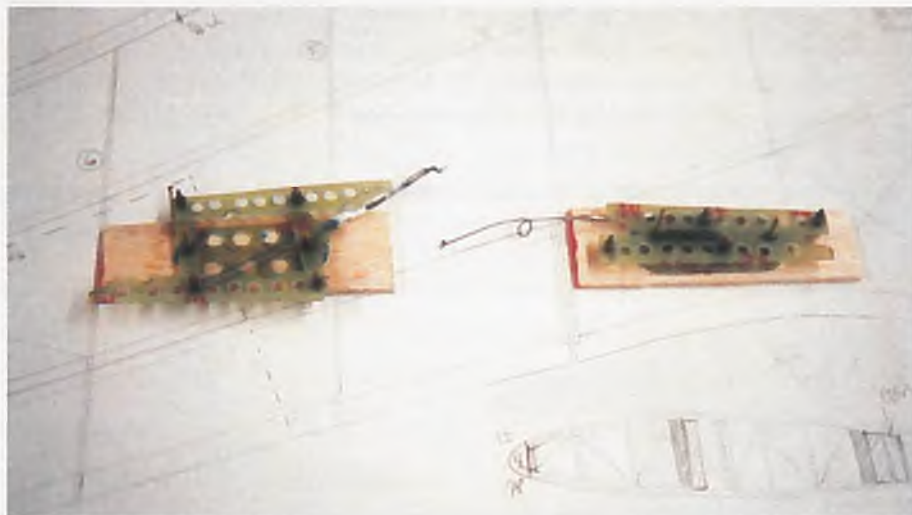
▲ Exhaust troughs viewed from below.

you should try for a complete airframe weight of no more than 25 ounces.

Drag rudders

The real HORTEN IX was flown with wing-tip drag rudders driven by the normal rudder pedals. I can find no evidence that they were mechanically coupled to the 'ailerons' but at that time all pilots were used to prop driven aircraft in which the rudder was constantly in use to keep the 'ball in the middle' ie. flying without side slip. Also most aircraft of the time would have been flown with amounts of rudder being used in any turn. I wanted my HORTEN IX to fly in the real way except that I planned to couple the DRs to the 'ailerons' in the same way as on my YB49 EDF model. The DRs are made from 1/32 (0.8mm) glass fibre sheet (available from most model shops) and I used 8 BA (M2 is close) nuts and bolts to provide the pivots. The DRs are kept shut by the return springs and are opened, proportionately, by the 'pull rods' to the servos mounted at the root leading edge - one each side. The unused part of the servo travel is absorbed by the slot in the servo arm - see plan for details. The 'pull rods' are light weight snakes, the outer covers being cut into five 1/2 inch long sections, epoxied into the rib leading edges: the whole cover is not needed as there is no "push" in the rod. The DRs backplates are glued to 1/8 sheet panels which join ribs 7 & 8, just ahead of the main spar and provide glue seating for the front box 1/16 sheeting. With the DRs in place and working freely, showing about 1/4 inch of blade depth top and bottom when fully extended. You can now sheet the wing leading edge boxes back to the mainspar using 1/16 soft sheet. Use PVA, sparingly, to attach sheeting. Next cut and fit the sheeting for the top surface of ribs 1 to 2 bay (BAY 1) with grain running chord-wise. When dry, turn over and sheet the bottom from LE to main spar leaving out that part covering bay 1 as this will be the DR servo bays with Rx in right and Rx battery in left, covered by 0.4mm ply screwed-on covers. See plan for details of the 1/8 plate supporting DR servos

▼ Drag rudders, left is open, right is closed.



▲ Drag rudders fitted and open.

and Rx battery; similarly 1/8 plates in bays 4 to carry the elevon servos, one per side. Add the 1/8 plate in the elevons which will carry the elevon horns - one each side. From the Rx position in right bay 1, run a spare light-weight snake outer, alongside the inner LE and exiting through the wing tip and fix with cyano. This gives you a good slippery tube down which to push/slide the Rx aerial to its full extension without it trailing out behind the fuselage. Also, I do not like to run my aerial between the motors as I have found that this increases the possibility of motor generated Rx interference. Finally, cut out the sheeting in way of the DRs and trim to allow extension and return.

POWER UNITS INSTALLATION Shrouds

The WeMoTec 480 unit, for which all my current models are designed, is simple, compact and well made. My only criticism is that of the necessity to 'run-in' the fans - a laborious business. You are going to end up with about 2mm tip clearance anyway because the blades creep under high RPM, so why not mould them to exact diameter in the first place? I don't know!

Fitting the shrouds is a cut 'n' fit, cut 'n' fit task so don't take off too much wood at any one time. The shroud will slide into the rear spar 'hole' from the rear; you will need to mark and cut a slot on the outer side of the 'hole' to allow the mounting lug

through until the unit sits in place. Once it is in, you can make the mounting blocks and glue (PVA) into place. You can use medium hard balsa for the purpose as this will better accept the self-tap mounting screws - about 3/4"(19mm) by 3mm or similar. The outboard block takes only one screw but the inboard takes both. See plan for details. With the shrouds in place, fit the bellmouth plastic mouldings - push fit - no glue! The bellmouth is important as the bottom half of the shroud is exposed and without it the bare - edged shroud will give poor intake conditions. With the bellmouth in place, cut in soft 1/4 the U shaped piece 'Z' which fits snug ahead of the mouth and keeps it in place without gluing. This shape also carries the 'intake' trough. This is made from light, thin card about the thickness of a Postcard OR you can do it from 1/16 soft balsa. The intake 'X' is glued to the U shape and ahead to the mainspar and sideways to ribs 1 & 2. The exhaust trough 'W' is made in the same way but it allows an almost straight exit from the shroud. Again, it is glued into place, but is loose enough around the top of the shroud to allow removal of the whole unit rearwards, removing the bellmouth after about 1/2 inch of travel. Make piece 'Y' and fit - this carries a small card fairing 'V'.

Fans

You have to run the fans in and this is best done by making a small jig to screw the shroud to while having clear access to the spinner and fan. Start at just enough power to turn the fans - possibly needing a finger start to help get going and run slowly (and noisily!) for a few minutes. Remove the fan and trim off the tip-rub-flash and balance the fan (I use a magnetic balancer - absolutely essential for small light fans - ask Electric Aeroplane Company for details). Repeat with more power and so on until both running at full power without rubbing. This also helps to run in your 480 motors - I think!

To avoid problems with the exhaust air impinging on the underside of the exhaust trough I fitted thin card extensions - as recommended in the WeMoTec 480 pamphlet - but mine were five inches long and 58mm diameter at the exit. These are simply cyanoed onto the shroud rear end; they certainly contain the jet exhaust and I think they add a little thrust - they certainly do not reduce it. Pierce the side in way of the



▲ ProFilm covering after application and dummy exhaust in place on top surface.



▲ Basic spray painting complete.

power cables and fit the shroud/fan/motor to the mounting blocks; pierce the exhaust trough 'W' to allow the power cables through to solder to the motors. Connect up your power train and run the fans in the model to check that everything is working properly.

Radio

Fit the servos, Rx, battery and switch; this can be loose in the main bay accessible via the canopy hatch - or you can do without and simply plug the Rx battery directly into the Rx - rather more fiddly but I have used

this method on a lot of small models. Check the system works properly - especially with the fans at max power. When happy, you can do the last job - covering and finishing.

Covering

The choices are tissue and dope, SOLARFILM, PRO-FILM, all of which are light enough for electric flying.

I chose to use PRO-FILM once more but this time to paint it! The three most common camouflage colours of the LUFT-WAFFE were:

HEILBLAU = light blue
DUNKELGRUN = dark green
SCHWARZGRUN = black green

These colours are available - and accurate - from Humbrol in their matt range but a very close match can be made using Halfords acrylic spray paints (for cars) and the appropriate colours are:

FORD NORDIC BLUE
VAUXHALL LEAF GREEN
FORD PINE GREEN

OK - so they are not exact colour matches but they are quick, clean, fast drying, light and go onto PRO-FILM without any preparation. With simple cross corners (see plan) in white above and black below and a few fine felt pen panel lines you have your Horten IX ready to go.

Flying

You WILL be able to hand launch this model but you will need a breeze to throw it into. For test flights of this type of EDF model I like the certainty of a bungee launch. 20 yards of 1/4 flat rubber in two loops with nylon cord at both ends - one end over an A frame to a ground stake - the other end to a metal eye to fit the hook on the model, will get you airborne with both hands on you Tx for those desperate few seconds during the take-off of an untried model.

Saturday 17th January 1998 was a weather 'window' between periods of furious gales and rain - even so, we had to dodge back into our cars as a huge rain shower passed overhead

but generally the elements were good enough to try for the Horten's first flight.

The range check brought to light a problem which we have experienced before, namely that of a wet surface (grass) on which the model was sitting on top of a sheet of foam. The wetness of the surface seems to cause a jumpy Tx signal with the aerial down, lift the model up a foot or so and the normal signal is restored.

With the charge topped up we connected the model to the bungee (also in this issue) and I went through the very last function checks before launch - elevator, aileron (elevons) drag rudders coupled in, Tx stopwatch - ready at last with nothing left in my excuses box. Smoothly up to full power, I yelled "Go!" and Rob released the model

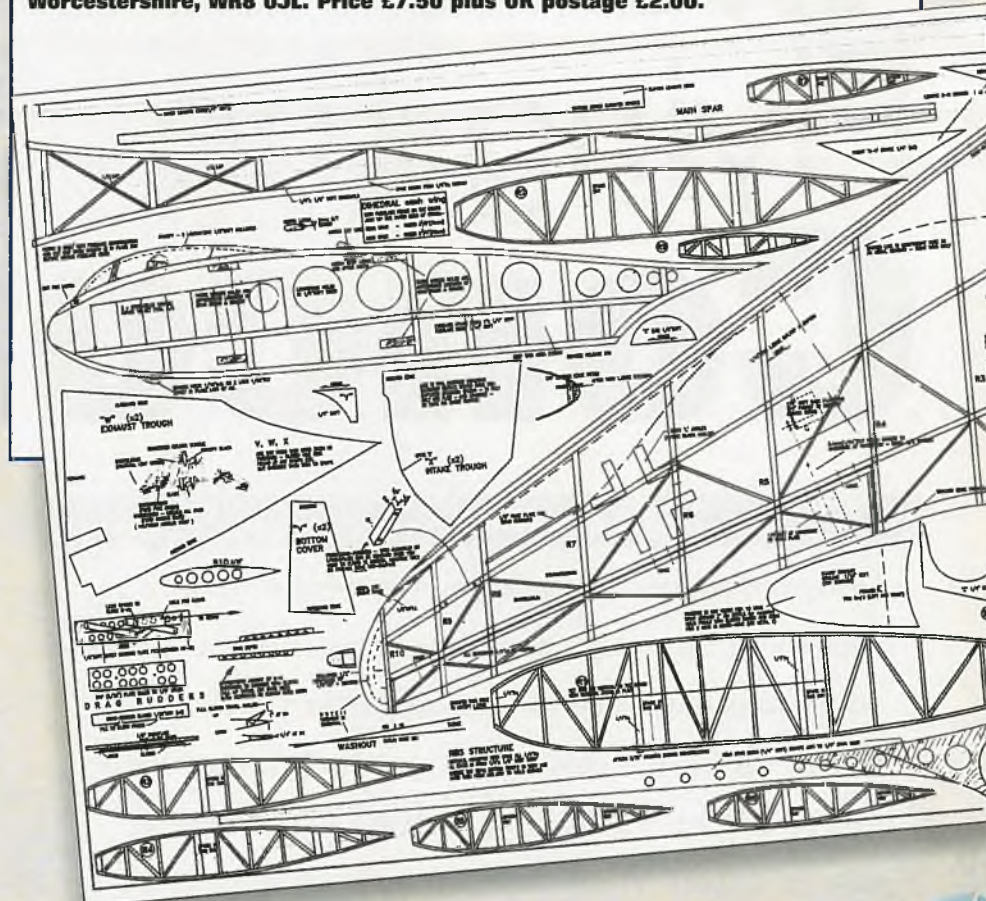


from shoulder height. It sank to within six inches of the grass as I heaved fully back on the stick and we missed the 'A' frame more by luck than judgement. NOSE HEAVY! As she accelerated, the 'elevators' became more effective and I could ease off just a touch of back-stick and begin a turn to the right to bring her around. Roll control was positive (completely opposite to my big B2 which had excellent pitch control but almost no roll and re-kitted itself some 40 seconds after take-off) and she turned easily but began to waggle her back-end. I eased the bank and the yaw waggle stopped but it began again as I once more had to turn to the right to prevent the model from flying away out of sight. The waggle was caused by large-ish 'aileron' movements and I had only a few seconds to work out whether there was a positive yaw (drag rudders too powerful) or adverse yaw (drag rudders too weak to overcome the yaw caused by the increased drag of a down-going aileron) but it definitely seemed that the model was stable if left alone (shades of John Menhennet's B2 of some years ago). I decided to land at the end of the first circuit and make whatever changes were needed in the safety of my workshop - if only I could get down in one piece. I throttled back and pointed the Horten roughly into wind over the grass and landed with no problems at all except that of the nose heaviness. We had done it - flown safely, if somewhat erratically, around a circuit without a yaw departure and all with NO fin area whatsoever. I am sure that others have done it but this was a delicious 'first' for me. The description of the flight, which lasted only fifty seconds, reads a bit like great test pilots of my youth but in fact I just hung on and tried to 'feel' the aeroplane before I was forced to land! I studied Dave Brock's video of the flight (Dave videos everything we do and his evidence is invaluable when it comes to making post-flight modifications) and decided that the bum-waggle was caused by excessive drag rudder movements causing positive yaw at large aileron angles - because they are coupled. I reduced the DR movements to half their previous value and then moved the CG back just half an inch by moving the power pack rearwards by one and a half inches, at the same time increasing the 'elevators' up - travel by about 10% in case the model is still too nose heavy. Flying wings have short pitch moment arms and so changes in CG must be made in small increments. By the end of flight test number five we had the model 'tamed' so rather than bother you with the tedious business of progressive flight testing with a new model, herewith the information you need to fly the HORTEN IX safely:

1. CG is shown on the plan - be accurate with it.
2. Launch at full thrust, from a bungee, as shown in the diagram, with a friend holding and releasing the model.
3. Hold full back stick until well clear of the bungee or until increasing airspeed allows you to ease off.
4. Allow the speed to build, then climb in

MW2668 - HORTEN IX

Copies of this plan No. MW 2668 are available from Electric Flight International (Plans Service), Traplet House, Severn Drive, Upton-upon-Severn, Worcestershire, WR8 0JL. Price £7.50 plus UK postage £2.00.



large orbits to a safe height before gently easing back the power to about half thrust.

5. Try gentle swapping of bank left to right and reverse to check that your amount of drag rudder coupled to 'aileron' is correct. The model should bank smoothly both ways without any 'bum-wagging' which would indicate too much drag rudder per amount of 'aileron up'.

6. Leave yourself plenty of power in hand at the end of the first few sorties in case you have to overshoot from the landing approach with this VERY clean aeroplane.

7. If possible touch down with fans stopped to avoid grass ingestion.

Once used to it, I have flown the Horten trimmed out at cruise thrust - hands off! Flights of six minutes duration should be easily possible from an 8 x 2000 pack. I have thoroughly enjoyed designing, building and flying this model and I hope you have just as much fun with your version. In the back of the Horten book there is an artists illustration of an aircraft which Goering commissioned the brothers to build in March 1945. Needless to say it never got built, perhaps now is the time? FLY SAFE. EFI

► View of underside showing exhaust tube extensions.



Cover Story

Flying the Concorde

WRITTEN BY: **THE EDITOR**

Designer/builder Chris Golds wrote for us a full account of the design and build process of this model, which was published in the September/October issue of EFI. In Chris's closing paragraph of this article he told us that he was looking forward to flying with other non-competitors in the fun-fly sessions at the World Jet Masters at Wroughton.

Circumstances, re-arrangement of flying schedules and the weather eliminated almost all of the fun-flying. On the two 'Air Display' days the wind velocity and wind direction limited the number of models able to get airborne safely. Concorde needs a long take-off run and there was not enough runway into wind without crowds of spectators at the end of it. Chris wisely elected to not fly there.

We need to learn from the experienced - what can be done and what cannot be done. A few models of the Concorde have not succeeded - some have crashed. The 1:1 Concorde was designed to cruise at Mach 2. Model wings at their airspeeds just do not work in the same way as those BIG ones. At model sizes we are short of wing area and we may be short of power to do the job. Chris had already discovered this when he needed to re-equip his B-52, first with different fan units and then with different motors.

Deltas are a strange planform. When they are flying wings too they will do a lot that a conventional wing cannot - but there are penalties. In the big aviation world, piloted scale 'models' of deltas have been built to

► **Take-off, part 1, Concorde is actually flying but not climbing.**





check ONLY the low speed performance of delta wings or steeply swept wings of high speed aircraft. The Avro Vulcan used 3 different 'models', the 707A, 707B and 707C, one of which was for low speed performance. The Short SB5 was built to check the wing of the English Electric Lightning and the Handley Page HP 115 was built to check low speed performance for the Concorde. Some of these very swept wing aircraft had fixed undercarriages.

Watch a delta landing. Anyone who knows will tell you that an airfoil (wing) will stall at an angle of attack (to the air through which it is flying) of about 15° . Conventional wings have certainly stalled by then - many earlier. Air flows off the tip of a wing in a 'vortex' like a corkscrew. This causes drag, this slows down the plane and it gets worse as the angle of attack increases. When a wing stalls, the plane sinks. The tip vortex usually creeps inboard as the angle of attack increases and encourages that stall. One wing usually stalls before the other and the plane will flick that way - a 'tip stall'. Deltas are forgiving. They will suffer and survive very big tip vortices. As a delta lands it can fly at an angle of attack of perhaps 30° . The greater the angle of attack the more lift an airfoil generates so it still flies. Vortices are drag but this does not matter when landing, the pilot is wanting to slow down anyway. Deltas have a very wide speed range.

That all sounds good doesn't it? Unfortunately the same effects are there at take-off time and the advantage of drag when landing is a liability because the aeroplane needs to accelerate. It either moves very fast to generate enough lift to take off at a shallow angle of attack or it lifts its nose high enough to generate enough lift at a high angle of attack. The problem is, it needs a lot of power to do either. A long runway is one solution but wheel contact and a draggy undercarriage can kill that method. It is normal to take-off, retract, then accelerate through that drag. That takes power, a lot of power. You may have noticed as a passenger in an airliner that when you take off, especially in a fully loaded aircraft and from a small airport - like Hong Kong - so much

◀ **Take-off, part 2, levelled out and struggling to gain height.**

▼ **Take-off, part 3, wheels up and she's away. Photos by David Brock.**





power is being used that the whole plane rattles. Soon after take off you hear and feel the wheels retract and soon after this the power is reduced - much smoother. This heavily loaded plane climbs tens of thousands of feet on reduced power, they have a very useful surplus.

Model deltas need a lot of power too. There are photos on these pages of the Concorde taking off. I needed to check with Chris that this was not a landing - "No it is take-off." "Did it crash?" I asked. "No, it flew for a while like that." This model stays airborne and is actually controllable. It needs persuading to gently lower its nose and climb and accelerate. It needs 'nursing' carefully. At a reasonable altitude the nose is dropped to cause it to accelerate through the high drag and fly satisfactorily - but the model loses a lot of height first to do this. Once flying, it is a very enjoyable model to fly. It is just hard work to get it up, it needs more power.

Chris used half of the eight drive units from his finally very satisfactory B-52 and estimating the need for more power, arranged battery packs and wiring in Concorde for 8 cells per motor (the B-52 was finally 6 cells per motor). After testing, this was increased to 10 cells per motor but Speed 480s on that load are not happy on more than 8 as he found out to his cost - an 8.4V rated motor on 12V is risky - short motor life.

Success stories, partial success stories and failure stories can tell the rest of us a lot we need to know. This Concorde sits firmly in the middle category at present. Since June 1997 Chris has learned more about appropriate ducting into and out of EDF units - particularly 'into'.

▲ Deltas can land at a very high angle of attack.



Putting Concorde to one side for a few months and concentrating on other models, Chris has learned a lot more. His B-52 gained a lot of thrust from changing EDF units, changing motors and finally, designing and fitting new nacelles. The ducting for his YB-49 with the same eight EDF units and same battery packs provided him with a much more lively model than he had expected. The wing loading was low - probably nothing helps a model more than this - and he paid a lot of attention to the inlet ducting. This knowledge was applied to the Horten IX, a plan and construction review for which is in this issue. EDF units are beginning to work very well for Chris.

Another model that he has built since then is the Hawker Hunter that you will see in his column 'The Light Fantastic', in this issue. This model flies well but needed more thrust

- more power. Chris was eventually persuaded to purchase and fit a Plettenberg HP 200-20-6 and 10 cells in place of the Speed 480 BB Race and eight cells. Chris is a very experienced pilot of model jets, ICDF, gas turbine and now EDF. He was astonished at the increase in thrust: "At least double!" he thinks. He is more able than I to tell you all about the development of that model and I am sure he will - this "Stop Press" news got to me just days before publication.

Chris realises now that to fly Concorde successfully he needs more power and closer attention to the ducting. The HP 200-20-6 is a wonderful small motor but much more expensive than what was originally fitted in Concorde. Four times "expensive" is "very, very, very expensive". He is determined to re-engine this model. Watch this space! **EFI**

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Kit Price £39.99 P&P £4.50



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A 48" span very impressive jet looking model for electric. Very aerobatic yet easy to fly. Designed for a 540 motor and 7.2v nicad pack. A very complete kit that features foam wings, etc.

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ELECTRIC SCAMP

The Electric Scamp is an easy to build 40" trainer for a Speed 400 on a gearbox and 600 MAH cells. All balsa construction and lightweight makes easy to fly and an ideal introduction to electric flying.

Kit Price £33.99 P&P £4.25



THE NEW MULTIPLEX SMILEY

This superb almost ready to fly trainer comes complete with 2 400 Motors and propellers etc. It is so simple to build it should be ready to fly in one evening. The Smiley flies slowly and is highly stable. No sanding or painting and no mess. Requires a 7.2v Nicad Motor Switch and R/C Gear (3 Channels).

**ARTF Smiley £74.95 P&P £5.00
Smiley Pilot Doll £5.95**



NEW FROM MULTIPLEX THE TWINSTAR

The Twin Star is a good looking quick to build twin engined electric model for 4 channel and 7 cell 1700 Mah packs. It has a 1420 mm wingspan and can be ready to fly in one evening.

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(Price includes motors, cables and props.)**

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NEW KIT * NEW KIT



PICCOLO 400

The Piccolo 400 has been designed for the popular 400 size motors and 2 or 3 channel radio, it has a 30" wingspan and is of balsa wood construction and is supplied with a comprehensive hardware kit.

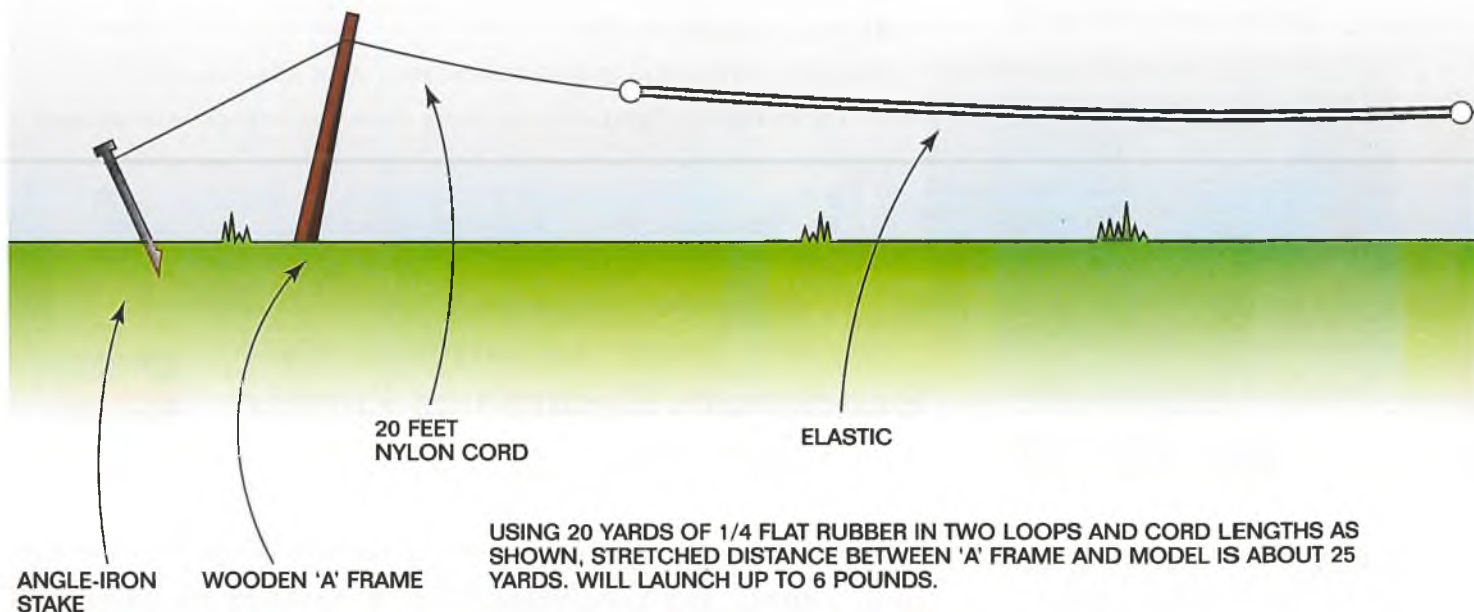
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Twang!

or How to BUNGEE without tears



REVIEW BY: CHRIS GOLDS

Bungee launching a model aircraft has a number of advantages and there are various ways of going about this sort of 'take-off'. This is the system used for the Horten IX, the plan for which is reviewed in this issue.

Launch problems?

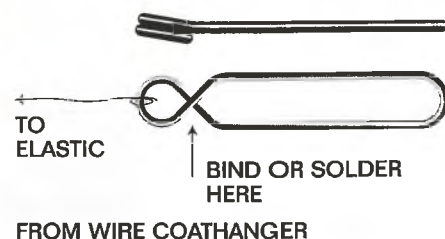
- Consider the situations when you need to:
- To launch a model which is too heavy or has too high a wing loading for a successful hand-launch.
 - To assist the take-off, of a model with an undercarriage but with too little take-off power to overcome wheel drag, especially on a grass strip.
 - To launch RC test models to try out control systems.
 - To help a ducted fan model to get going and breath enough air to keep flying.

The last one in the list is that which concerns me most at the moment as I am in the process of producing a series of EDF models most of which do not like a hand launch, viz: DH 108 - though this will hand launch easily in a breeze.

EE Lightning, twin jet.
Avro Vulcan, four jet.
Me Komet, single jet.
Horten IX, twin jet.
Hunter Mk 9, single jet.
Tornado F3, twin jet.

Before electrics came upon me I successfully used lightweight bungees to launch a line of Cox TD 020 DF models including an Heinkel He 162, Gloster Javelin, HP Victor and my first B-52 with 8 x Cox TD 020 turning home-made fans - a great model but the noise had to be experienced to be believed!

Add to these some larger 45 size DF models such as another DH 108, a KF 1R, another Hunter and a test model for my big B-2 (4 x OS46 VDF/Thor jets). This latter I still have and it provided many answers to the control problems of the stealth bomber; it was eventually great fun to fly (for about 30



seconds per launch - no power units being fitted) and it gave cheap - no frills - test flying for about forty launches before being retired.

Those of you out there who have 'bungeed' will not need telling how to do it but for those who would like to know how to make and use a 'twang' - here goes.

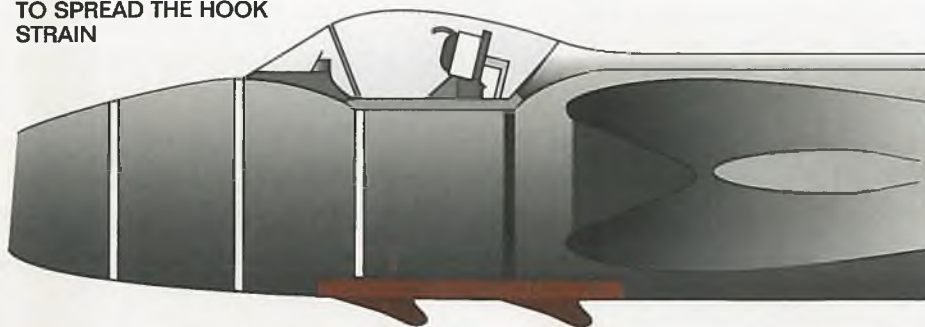
Materials needed

- 'A' frame, 3/4 or one inch (19 or 25mm) square timber legs, 5 to 6 feet (1.5 to 2m) long - 2 legs required.
- Strong nylon cord (sea fishing line).
- 20 yards (18m) 1/4" (6mm) flat model



BUNGEE HOOKS MADE FROM 2 LAMINATIONS OF .8mm PLY JOINED WITH PVA

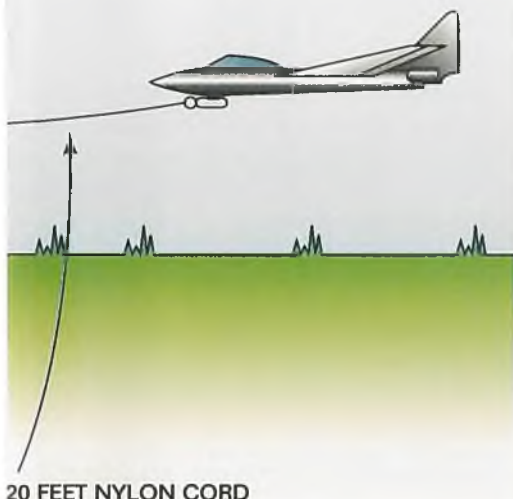
BUNGEE HOOKS LET INTO MORE THAN ONE BULKHEAD TO SPREAD THE HOOK STRAIN



allow it to be hammered into the earth - be aware of what is below your feet, don't hammer into pipes or cables! Drill the other end with a hole suitable for you to attach the nylon cord.

Cut off about twenty feet (6m) of cord and knot a loop in it about half way along, about two inches in diameter to fit over one 'A' frame leg top. At the 'stake end' attach a

▼ **Javelin AWAY! You can see the bungee and trailing Rx aerial.**



elastic/rubber, made into two 5 yard loops. OR

- d) 10 yards (9m) of elastic surgical tube - about 3/16 (5mm) thick. OR
- e) 10 yards (9m) of light weight cotton covered elastic strip available from tenting/camping shops.
- f) Wire coat hanger.
- g) 2 inch (50mm) angle iron - 12 to 18" (300 to 450mm) long.
- h) 2 pound (1kg) lump hammer.

Building method

Join the two 'A' frame legs, about three inches (80mm) from the top, with a through bolt and nut. The legs can be opened like giant shears.

Sharpen one end of the angle iron stake to



▲ **My 4 x Cox TD 020 DF, HP Victor which was bungee launched almost 60 times.**

strong metal hook which will be attached to the stake. Attach the other end to the 'elastic'.

At the opposite end of the 'elastic' join on another twenty feet or so of the cord and end up attaching this FIRMLY to the hook-eye which will connect to the model. The diagram shows a design of hook-eye which will never hang-up on launch.

Hook

The model will need a hook and this needs to be strongly built into the fuselage belly. I normally use two laminations of 0.8mm ply PVA glued overnight under weights and then cut to shape.

This shape is designed for sheet bottom surface models and all my profile type fuselages have 1/4" (6mm) sheet 'bottoms' which are slotted to take the hook and its PVA. Beware of attaching the hook to just only one bulkhead as this may not be strong enough to withstand the pull while awaiting release!

Using the bungee

Select your launch direction into wind; check the ground and hammer in the stake.

◀ **Ron Laden hangs on grimly with mini Javelin (2 x Cox TD 020 - home made fans) at full scream.**

▼ **The baby B-52 (8 x Cox TD 020 DF) thunders aloft with bungee help.**





► **Baby Hunter storms away from the bungee.**

Attach the cord and place the loop over the 'A' frame leg top so that the frame JUST leans towards the model release man. When this is done correctly, the elastic will carry forwards on launch and fold the 'A' frame down to ground level. However, for models with a higher wing loading, that will not start to climb before they reach the 'A' frame, it is wise to lean the frame AWAY from the launch man so that it folds down before the model reaches it.

Make sure that your model flying chums know WHERE your 'A' frame is to prevent them flying into it by mistake. Personally I find that anything which sticks up, tree, notice, fence or 'A' frame is magnetic and is quite capable of attracting a model!

▼ In 1984, this OD 'Mistral 7000' with Super Tigre X 45 DF was a good bungee launch model - heart attack pie!



Have a friend hold the model for you after you have carefully shown him/her where and how hard to hold onto it; having previously paced out from the 'A' frame the stretched distance to the hook-eye and left a little marker on the ground, stand your release man there and collect and stretch back the bungee and hook on with a firm warning "HOOKING ON". When ready, test the controls one last time, set your stop watch on if you use one and give a firm call "Go!" Depending on the model, you will normally need considerable back stick up to the point where the model passes over the 'A' frame whereupon you can ease

▲ **Baby Hunter WeMoTec 480 with Plettenberg HP 200-20-6 motor ready for launch.**

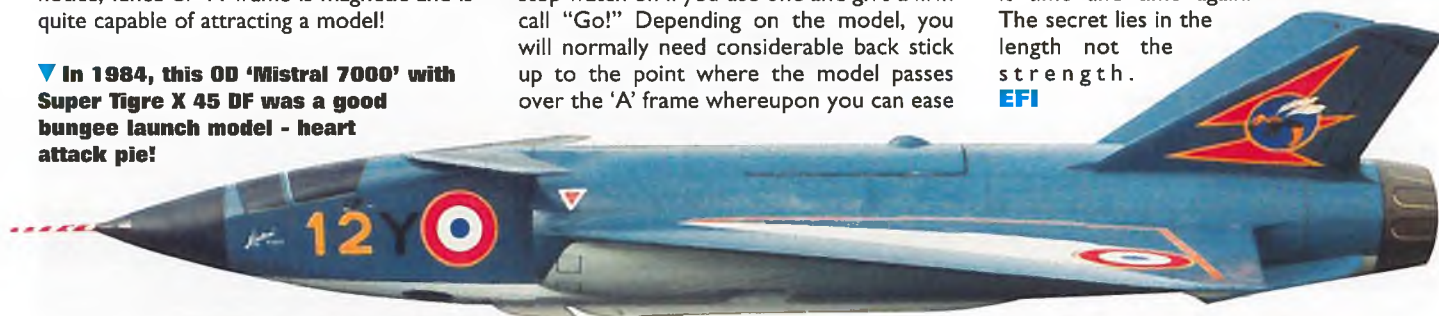
off the back pressure and proceed to climb. The reason for the back stick (full up-elevator) is that the model when released will sink until the wings and tailplanes begin to work as flying speed is reached. If you look at any of the numerous videos of the big Navy jets being catapulted off the decks of carriers you will see the same full up elevators. Simply climb away and enjoy your flight, with the added bonus of a boosted take-off.

Only on one of the many hundreds of bungee launches that I have made, have I come close to failure; the first flight of my twin EDF Horten was almost terminated because the model was so nose heavy that it would barely lift itself above grass level!

Otherwise it has been 100 percent reliable and it gives the model the chance to get away without that sinking feeling of an insufficient hand-launch. Try it! You will use it time and time again.

The secret lies in the length not the strength.

EFI



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Robb Gnat

Another view

REVIEW BY: **DAVE WILSHIRE**

When I first approached your editor about this article, his first reaction was: "I'm getting 'Gnat overload', so many readers have already told me how to improve it." - true, quite a few other articles have been written about this all foam EDF (Electric Ducted Fan).



This is yet another option you have, to get slightly more performance out of the Gnat. This article would never have happened without all the hard (expensive) work being done by my flying partner Trevor Skedge. We both spend most of the year flying IC helicopters, as I import the X-cell and Heim ranges.

Fixed wing flying came first for both of us and at any opportunity we get, we still fly the non rotor flying machines, for relaxation and fun. We also fly IC Ducted Fan and Trevor has just taken the 'Turbine' plunge. So as you can see we keep busy! My only real electric experience was a few years ago when I designed a 540 powered design called Proof, published by the opposition. This worked really well on a budget motor and cell pack, which was the whole idea.

The Gnat appealed as a DF model that we could take to meetings and not worry about the truck load of support gear needed with an IC model. I always have to prioritise

my building program, with so many projects on my 'need' list.

This being the case Trevor bought a Gnat kit from our local model shop Moor Models and started playing with different combinations. At first it was tried with a Gaskin fan on a Speed 400 6V motor using between 8 and 10, 500 or 600AE cells, obviously this gave the 400 motor a hard time and performance was poor. This set-up was used because the Gaskin fan was already on the shelf and Trevor was in a rush to get into the air!

The next step was the fitting of a Rojair unit using various motors including a Multiplex 400 BB and a Graupner 480 Race on both 8 and 9 cells, having already established that these motors didn't last very long on 10 cells. This wasn't helped by the fact that we weren't running-in motors, so they were arcing like mad and a set of brushes would only last 6 to 8 flights and the commutator was going black!

Trevor tried the shake cup ducting method, which did help but we knew from our IC fan flying that having a parallel duct

▼ **Flying at the Phoenix MFC club field.**



▼ **Cleaner wing without ailerons for maximum efficiency.**



▼ **Tallerons with minimum gaps, so important for good control response.**



AT

going into a tapered one didn't give the best thrust figures. So Trev drank some mineral water and made a full length duct, taped to the back of the fan unit. Slowing down for a while and reading some back issues of this mag, showed us where we were going wrong.

A WeMoTec Mini Fan 480 unit was purchased along with the newly available 480 Race BB motor from Graupner. This was tried on packs of 8 & 9 x Sanyo N-800AR cells. Nine cells definitely gave the better all-round performance, pulling around 16 to 18amps, we were getting 3 minutes plus and loops from straight and level flight. Some experimenting and school maths had Trevor end up with a 56mm dia outlet, which we're still using.

The only shortcoming was the standard 480 brushes, so Trevor bought some competition 540 brushes in harder material and filed them down to fit. Bingo! This was the answer to the power requirements, brushes and motor com' now last about 50 flights, which we're happy with.

About this time the mods on controlling the Gnat were published showing linked ailerons and elevators, to eliminate the linkage across the ducting. Trevor hooked up this method and we test flew it one Sunday evening - as it started to get dark - on waste ground close to where I live. It did work, but I couldn't see the point of all that control drag and suggested disconnecting the ailerons and flying just tailerons! We had one more go with the link set-up before going and I found a nice big tree!

Trev did the mods and we tried the taileron set-up, which worked well enough to convince both of us that this was the way to go. The 'test' Gnat was looking a little sad by now, so it was decided to build a new one with all the mods included.

At this stage all the hard work had been done so I decided to build mine... thanks Trev. The original Robbe tailplane/elevator

set up on the tail surfaces leaves a large gap, which reduces the available control power, so on my and Trev's second Gnat we produced flush hinges by sanding the back of the tailplane with a round Permagrafit tool and sanding the leading edge of the elevators to match. Robart hinge pins need to be used to allow for the offset hinge line.

Inside the fuselage before joining we sanded the back edge of the inlet ducts (just in front of the fan) to a sharp edge. As moulded it is about 10mm thick and draggy!

Because we have done away with the ailerons and light balsa is used in its place, the wings are much stiffer. I put a short balsa spar in the root of the wings before joining to the fuselage sides as the load at the root will be greater without the wings bending and I didn't want them folding. They have all been covered in red Solarfilm, which goes on with a cool iron.

All up weight with nine 800AR cells is 880gms.

The performance is now more than adequate with enough power for one vertical roll from straight and level, loops from head height and a nice scale roll rate.

The control balance between roll and pitch is very good, I have about 20 to 25mm of control movement each way measured at the trailing edge. My model uses a Kontronik Easy 3000, JR 341 servos, and a Hitec 4 ch Micro Rx. We have since flown the Gnat with 9 x 1000SCR and with 9 x 1250SCR cells, both giving longer flying times, but with slightly reduced agility. It still loops from straight and level, and glides reasonably well, but I would say the 800AR set up is better all-round. **EFI**



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Other pilots' models

COMPILED BY: THE EDITOR

This your page. You want to know what others builders and pilots are doing with their electric models and they are sure to be interested in yours. There is a broad variety of model types here this month. Send photos and details to the EFI editor at the "ALL CORRESPONDENCE..." address on page 2.

Sukhoi SU-26

This Graupner Sukhoi SU-26 kit model was built by Peter George, founder member of an electric club in St Louis, Missouri, USA. It is powered by an Ultra 1200 with Graupner 2:1 belt drive reducer, on 16 cells. The first flight was with an 11 x 8 prop which was "less than adequate". Peter is still experimenting with props but the present one is a Master Airscrew 14 x 6 and performance is quoted as excellent. Weight is 5.5 lbs (2.5 kg). Peter often flies at the local 'wet power' site and "That's an electric?"

▼ **1941 Boomer Bus.**



▶Peter George with his Sukhoi SU-26.



Princess does actually weigh slightly less than the BV222 because Robin has used instead of multistrand cable, single strand copper 'bell wire'. The Princess weighs 5 lbs (2.3 kg). The model is almost entirely balsa, with a few plywood reinforcements. Fuselage construction is 1/4" square longerons over formers and covered with 1/16" sheet. The wing is built up but has 1/16" sheet top surfaces. The whole model

▶Sukhoi SU-26 built from the Graupner kit.

comments are numerous. Thank you Mark Nankivil for photos and information.

Saro Princess

Robin Andrew of Birmingham, UK, is a builder who is willing to build models of the more popular aircraft but he really prefers to design and build scale models that have not been modelled before. This must always be difficult so he gets as close to this exclusivity as he can. As he said to me recently about his next model, the eight engined Hughes H-4 'Spruce Goose': "I don't think anyone has built an electric powered one in THIS country."

His last model to be completed is a 6' 5" (1956mm) span Saunders-Roe Princess flying boat, the original of which first flew in 1952 - one of the largest aeroplanes ever to be built in the UK. Three were built but only one flew as I recall, the age of the flying boat was already over. Robin is waiting for 1998's good weather but expects no problems at all. It is the same size and weight as his model Blohm und Voss BV222 Wiking which flew well last year and it uses the identical power package of 6 x Speed 400 7.2V motors connected in parallel with a 7 x 1700mAh pack which give three and a half minutes motor time. The wing/motors of the



▲Saunders-Roe Princess.

is covered with nylon and doped, Robin still prefers the old methods of covering and believes it provides a lighter covering than modern ones of equivalent strength.

Douglas A2D-1 Skyshark

This might fit the 'previously not modelled' category that Robin Andrew prefers. The Skyshark was an awesome US Navy turboprop aeroplane that suffered powerplant problems and was overtaken in 1954 by the A-4 Skyhawk after the delivery of only six production A2D-1s. This model is equally awesome! Robin has preferred the simplicity of a fixed undercarriage but included features like working flaps and

the ability to drop bombs. He says it is easy to fly despite its 7 lbs (3.2 kg) weight because the wing area is so great. Wing span is 6' 1" (1854mm) and the Robbe Pro 736 motor finds it easy work on 20 x 1700mAh cells, driving a 14 x 6 prop. A 14 x 7 has been tried with no noticeable difference in performance but a shorter motor run. Robin took the hint.

Mohawk

Robin Andrew built this "1930s light plane" from a Phil Kent design for Big IC engines. (Phil's used a Laser 4-stroke). Robin insists he did not change the design but in order to save weight he aimed for a lighter construction and he substituted balsa for spruce and some thinner wood than specified. There are so many places where electrics do not need to be so robust. After all this, Robin saved 2.5 lbs (1.1 kg) and finished up with a 9.5 lbs (4.3 kg) model. The covering on this largely open structure model is doped nylon on the fuselage and plastic film on the wing. Wing span is 7' (2134mm), the motor is a Graupner 3500 on 22 cells and Robin says "It may be overpowered, it is a real floater."

Red Zephyr

Eric Mullineux of Manchester, UK, built the vintage Red Zephyr you see here, from a Ben Buckle plan. All-up-weight is 4.75 lbs (2.2 kg) and the model uses a direct drive Keller 50/6 (obtained from ImporTekniK), 8 x Sanyo RC-2000 cells and a 13 x 6 wood prop. RC gear is two mini servos, a micro Hitec Rx and Protec 35A BEC speed controller. The Red Zephyr is covered in Solartex. On its first flight at the Tyldesley Model Club on a windless day it took off from grass in about 60' (18m). This flight lasted 7 to 8 minutes.

▼Douglas Skyshark.





▲ Mohawk.



▲ Eric Mullineux covered for flying in January in England, Red Zephyr covered in Solartex.



▲ A Long Cabin held by Eric Mullineux.

Long Cabin

This is another model built by Eric Mullineux from a Ben Buckle plan. It is powered by a Speed 700 8.4V motor with a Kavan Intro 2:1 gearbox driving a Master Airscrew 12 x 8 Electric wood prop, on 8 or 9 Sanyo RC-2000 cells. RC equipment is a Sommerauer 30A speed controller with BEC and two mini servos. It is 'Starspan' covered and weighs 4.5 lbs (2 kg). Typical flight times are 8 to 9 minutes. Eric, who is 61 years young says that in 1996 there were three members of the Tyldesley club flying electric and now there are ten. Encourage more to convert!

Boomer Bus

Your editor has not deliberately selected vintage models for this issue, this month's selection just represents the ratio in the 'your models' mailbag. I hope I have spelled his name correctly, I quote straight from Gary Brokaw's letter from Seattle, Washington State, USA.

"I have enclosed some photos of my most recent Old Timer, a "Boomer Bus". The plans were drawn in 1941 and published in "Air Trails". I enlarged them 20% to give a wing area of 650 square inches and span of 67" (1.7m). The all-up-



▲ Vickers Wellington from the RC Model World plan.

weight is 48 oz (1.7 kg) with a 7-cell 1400mAh pack. The power is furnished by a Turbo 10 Plus motor and 5 to 1 gearbox all from Model Electronics Corp. in Seattle, Washington. With a 14 x 6 prop I'm drawing 30 amps on the bench and showing 46 ounces of thrust on my electronic scale. Needless to say the climb out is spectacular. The covering is "polyspan" plus nitrate dope which I like very much and would recommend highly to anyone who wants a light but very strong covering. Yes the car is a 1967 Mini Cooper-S, my favorite mode of transportation."

Vickers Wellington

This model was built from a plan 'for electrics' in OUR Plans Service that did not appear in this magazine. RC Model World publishes plan reviews for all types of model and motive power - including electric. So too does 'Scale International', 'Quiet Flight International' and 'Jet International'. All the Traplet Publications magazines share space in the 'Plans and Construction Guide'.



▲ Bob Davidson's Wellington.

Bob Davidson of Perth, Scotland, UK, built this Wellington and it is powered by two Mini-Olympus gearboxes with standard 380 size motors. The model is tissue covered, extremely light and Bob flies it using 7 x 4 props and 6 cells.

Bob is a very enthusiastic electric flyer. Since his switch from IC to electric he now flies only electric and slope soars - mainly PSS. He has a lot of electric models and has seen a few more types he wishes to try: "In particular I want to try out more multi engined models and the 400 sized pylon racers." **EFI**

▼ Gary Brokaw with his Boomer Bus and Mini Cooper.



The Ptailless ones

WRITTEN BY: **ERIC VAN DEN HOOGEN**
TRANSLATED BY: **THEO GORDON**

After three models from Horten history it was the right time for a different approach to flying wings.

The elegance of Horten wings and their bell shaped lift distribution (see 'The Final Word' in the July/August of EFI) would be replaced by an early variation on the tailless theme. Searching for a model subject I was pleasantly surprised by some tailless designs from England. These UK experimental tailless planes were built between WWI and WW2.

One of the designers was Geoffrey Hill, who like the Horten brothers had started building tailless model aeroplanes. In his opinion the great danger for any aeroplane was a low speed stall and consequentially the spin that follows from which no recovery was possible. Hill reasoned that a tailless wing with tips that could rotate, functioning as elevators and ailerons was the solution. After testing several model aeroplanes his idea proved to work satisfactorily. His first man carrying wing was the 'Hill Pterodactyl Tailless Aeroplane', a glider with a 13.8m (45') wingspan. This was built by Hill and his wife in 1924 and was flown on the South Downs.

Later a 32 HP Bristol Cherub engine driving a pusher prop was added and in December 1925 its powered maiden flight was made. The success of this design caught the attention of the Westland factory and an agreement was made to develop a new plane using the acquired experience, the Westland-Hill Pterodactyl IA. It was a side by side two seater with a 70 HP Armstrong Siddley Genet 5 cylinder radial engine. From the IA a more advanced version evolved, the Pterodactyl IB.

This was the first Pterodactyl using combined ailerons/elevator control devices together with so called 'electroscope rudders', a kind of spreading flaps for directional control. (The words 'elevon' and 'drag rudder' had not been invented in 1925. - T.G.)

This design - just like the Horten Wings - had no fin. Stability during flight was guaranteed by the extreme negative setting of the controllable wingtips. (Hill made a sort of bell shaped lift distribution. - T.G.)

(Translator's note: In a most interesting series of articles by A. R. Weyl called: 'Tailless and Flying Wing, Evolution and Problems'.

which was published in 'Aircraft Engineering' from Dec 1944 until October 1946, I found the real reason of Hill to design his flying wings. The full story can be found on page 351 of the December 1944 issue 'Aircraft Engineering' article.

Hill reasoned that "the dangerous spin and insufficiencies or deficiencies of the conventional control by means of normal control surfaces located within a fin and tail (which is sub-

ject to down-wash and slipstream effects, and which takes effect by indirect action - hence also with inevitable delay) and of control by way of ailerons which become effective at the stall and, generally, produce also adverse yawing moments. This lead Hill to a tailless aeroplane equipped with controllers on the wingtips, which were completely unaffected by the attitude of the aeroplane and/or by the slipstreams." Hill's ORIGINAL idea was to use "floating aileron/elevators arranged as move-



▲ Wing structure, all ribs and spars. Black lumps are lead hold-down weights.



▲ The wings are planked - more weights.

able aerofoils at the side of the wing" but they did not form part of the lift generating surface, "being so hinged that they adjusted themselves in their natural position under the incidence of zero lift, whatever the attitude of the aeroplane. "Control surfaces of this sort will therefore always remain effective, since they cannot come into a stalled condition. In this way, longitudinal and lateral control seemed to be safeguarded under all circumstances. When Hill found that his good idea did not work, the floating controllers idea was abandoned.)

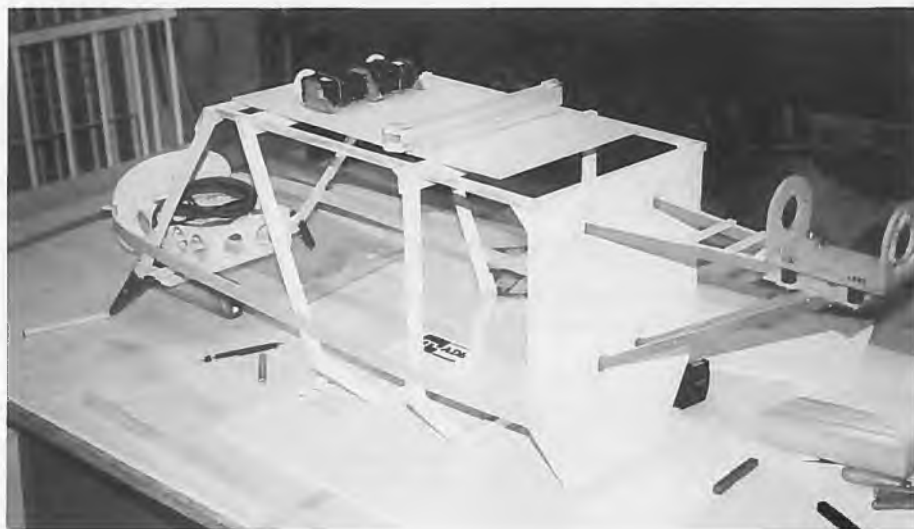
The successor to the IB was the Pterodactyl IC, a similar plane with one change - a new type of landing gear which would be used in all future designs. This gear had two main wheels, one behind the other, like a bicycle. To prevent toppling over, two small sidewheels were mounted, one under each wing.

All the dos and don'ts from the first series of Pterodactyls were taken into consideration in the next completely new design, Pterodactyl 4.

It had a closed cabin, seating three persons, the 'bike' landing gear and a 120 HP DH Gypsy III engine driving a pusher prop. The novelty of this type was the variable sweep angle of the wing, the aim of which was to be able to adjust the wing during flight to different centre of gravity positions caused by different loading (cargo).

The sweep angle could be manually altered over an angle of 4.75° . The originally mounted spreading flaps (drag) were later replaced by two fins acting as 'one way' rudders. To create more lateral area (fin) behind the CG the frames supporting the side panels were covered in linen. The aeroplane was thoroughly tested during many flights, also aerobatics and spin tests were part of the program.

With experience from Pterodactyl 4 the last version was made, a fighter equipped with a gun turret in the rear of the fuselage - this was Pterodactyl 5. This was powered by a steam cooled Rolls Royce Goshawk engine and was the only version with a tractor prop. The wing was a simplified version of its predecessors,



▲ Fuselage frame, motor mount, battery box and cables.

straight leading edge in the centre section, swept tips and straight swept trailing edge all the way from centre to tips. A tiny ancillary wing was mounted low on the fuselage. Tests with this design did not last long. The experimental Goshawk suffered overheating problems, the reason for ending many of the flights.

For 1932 it was a fast plane, over 380 KPH (237 MPH) which could have been even better if the wing had been designed more rigid. At high speed the tips twisted and lots of 'up' was needed to fly level. Like all its predecessors this one also was dismantled. The only surviving Pterodactyl is the IA which is almost complete and exhibited in the Science Museum, London.

So much for the history of these Westland Wings. In 1934 Geoffrey Hill became Professor of Engineering Science at London University (Imperial College) and later worked on several tailless projects with other aircraft manufacturers. These projects eventually led on to the building of Concord...

(Translator's note: After the valuable contact with Heinz Scheidhauer, test pilot of the Horten Wings, Erik asked me if we could get the address Harald Penrose who flew all the Westland Wings. Sadly he died soon after I met him at the White Sheet Vintage scale glider competition in July 1996. Erik started building his model in August. Harald could have told us lots of useful things if fate would have allowed...)

The Model

After the experience we gained with the Horten models and the fact that many more modellers are now experimenting with Horten like designs it was the moment to choose a different direction. After looking into aviation history two English planes fulfilled the criteria to be built. Finally it became the Pterodactyl which I will call "Ptero" from now on.

(Translator's note: Erik's other choice was on the drawing board when George Bushel showed him photos of a model of the same aircraft, built by someone else. End of project!)

The model should be electric powered, not done by anyone else (as far as we knew) and reliable information should be available.

The motor: same as my Horten XII, could be

fitted into Ptero but now used with 2 x 30 cell battery packs. After adaption of the two Robbe 240 motors (5 to 6 wind armature) this option proved not to be the right choice for this new model despite adaption of different reduction gear ratios.

After some looking around it seemed that the PLETTENBERG company produced a motor that could swing the scale prop (24 x 10) with ease for a reasonable current. This 'Dino' 500-50-8 turns a 24 x 10 prop easily at 5000 RPM at 2 x 34 amps from 2 x 30 cells. Static thrust is about 16kg (35 lbs)! This motor has 4 brushes (2 pairs) and is operated by a Schulze f120-150 Ao speed controller. (Did Mr Plettenberg know Erik wanted his DINO for a model named after a Jurassic beast? T.G.)

In the meantime the Westland Company was consulted, hoping for more info on 'Ptero'. After some correspondence with Mr Gibbings and Mr Ballam of the archives of GNK (the present name of Westland) some general arrangement 3-view drawings were received which originally had accompanied the application for 'Certificate of Airworthiness' in 1931.

Some were very welcome, the schematic plan of the 2-wheel main undercarriage was the basic information Aad (van Sorgen) needed to make the model of the landing gear. Also sketches of tip rudders/fins, elevons and side supports of the Wings have contributed to realisation of a proper scale model.

In the 1948 book 'Westland Aircraft' which Aad possesses was a reasonable 3-view drawing from which our working drawings were made.

The wing structure is conventional, spars, ribs and just like the original, only the nose section and the parts of the wing outside the strut connections are planked. Spars are laminated thin pine strips glued in a mould after soaking in water to get the proper shape. This was necessary because the wing thickness (spar height) varies a lot between wing root and tip. Also the wing twist (washout) of the outer wing panels has its influence on the shape of the mainspar.

Along the mainspar the thick servo cables (3 x 0.5 sq.mm) are positioned. Thick wiring is a must for the big Futaba S3303 elevator servos which need 4 amps for full deflection in flight.



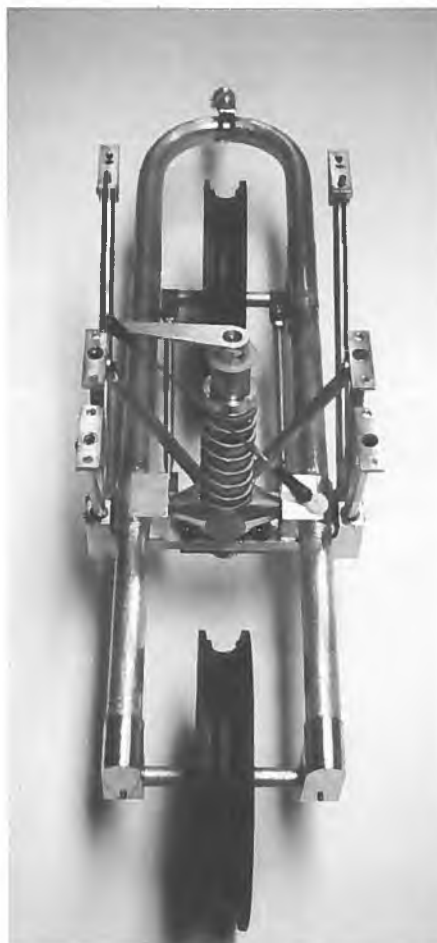
▲ A landing gear part being machined in the lathe.



▲ A lot of landing gear 'bits'



▲ Landing gear assembled.



▲ Landing gear, top view.



▲ Landing gear mounted onto the fuselage frame.



▲ Fuselage with sides planked.

The inside end of the mainspar carries the ball-joint and kingpin points which enable the wings to move for sweep variation. The wing struts are connected to the fuselage with similar ball joints. The auxiliary spar in the wing front section is connected to the servo mechanics effecting the wing sweep variation. After applying all planking and rib caps the large elevons were cut out and finished.

The elevon hinges have ball bearings (2 in each elevon) to avoid all possible 'play'. Control rods/connectors are all hidden inside the wing. After sandpapering (a lot) the wings were put aside to wait for the fuselage.

In the meantime Aad made a 1/4 scale model of the landing gear (for a 1/3 scale model this means 1/12 of the full size gear). This small test structure enabled him to see how it would function later. With this experienced gained, production of the whole lot, wheels, frame, lots of home-made (and designed) metal parts were started. All this is suspended from a mounting plate which Aad calls "the fixed world". This plate carries the landing gear, wing struts and the two bracing wires to the front of the wings.

Wheels are from a 'sports wheel chair' size: 8 x 1.25", having nice ball races and pneumatic tyres. In a U shaped tube frame the two wheels are mounted, the front wheel can be steered (we told you it's like a bike!). This frame is spring mounted and the front connects to a shock absorber so the whole unit is located in a neutral centre position the whole time. The "fixed world" is attached to the fuselage bottom with six tubular supports.

The fuselage structure follows the original, a number of formers fixed to two longerons in the sides. The rear former carries a wooden motor mount for the Plettenberg DINO. In the very front of the fuselage is a battery box in which the 60 cells are seated. If things go wrong the batteries can 'escape' through the nose without too much damage. The front cover of this battery box is a noseblock built up of balsa blocks. From this box, four 4 sq.mm cables run to the motor compartment, total cable length is 5 metres - pity about the

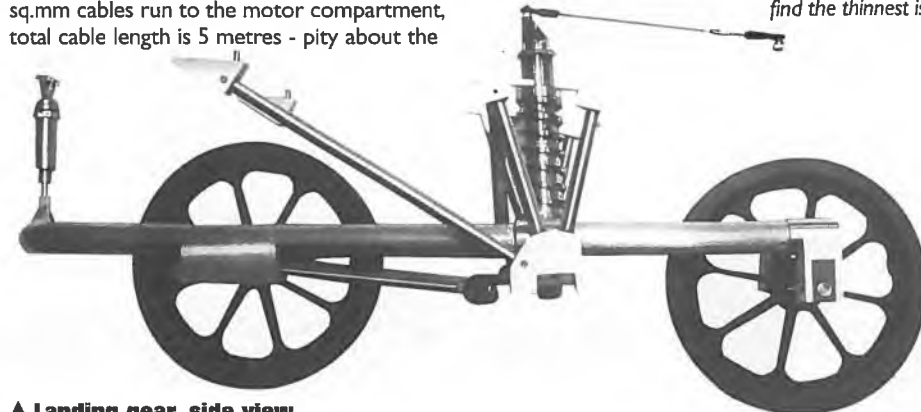
voltage drop!

The whole fuselage top is removed to reach the wing suspension ball-joints, the sweep variation mechanics, the big Plettenberg DINO with its speed controller and the receiver with its battery pack. The fuselage top covers are held down by one screw which is disguised as the scale aerial on the real plane's radio. the fuselage skin is 1 mm plywood and 2 mm balsa sheet. The skin is recessed to hold the window panels.

The undercarriage is partly covered by a large fairing built up from 0.4 mm plywood and balsa blocks. In the cabin is a bench seat for the passengers and the pilot's seat. The crew was made again by Ellie (wife to Aad). One looking like Harald Penrose (we hope, after viewing old photos) and the other one is dressed like an 1930 RAF pilot who manually operates the sweep changing wheel. A 'funny' detail is that Ellie made about 15 RAF caps to find the pattern of a satisfactory looking cap for this bloke. (It might have been easier to have an original but they are not so easy to find in Holland.)

The wings are moved by a homemade king-size power servo, from a motor and two worm drive reduction gears, 1:1200 and two output leadscrews with left and right winding screws. Feedback is a potentiometer connected to custom built 15 amp servo electronics.

Wing struts are laminations of balsa each side of 1 mm plywood for rigidity, sanded to streamline section. The very centre of the strut is 3 mm steel to which the fixing parts are silver soldered. For the side wheel supports (fins) glassfibre tubing was chosen from our kite shop - strong and reasonably priced. To allow some springing of these small wheels, Aad made packs of leaf spring blades which do the job very well. These were the first parts to be covered with thin silk like material intended as lining for coats and other clothing. (Translator: We are lucky to have a surplus market for all sorts of textiles about 8 km from where Aad and I live. Taking a micrometer with you to find the thinnest is



▲ Landing gear, side view.



▲ Plettenberg DINO 500-50-8, 24 x 10 prop and Schulze speed controller.

useful. The price is very good!) Normal dope is used.

The wings are covered in slightly thicker lining 'silk' and two coats of dope to seal the mesh. Covering is a two man job. One puts the dope on, the other rubs it through the cloth to ensure good adhesion to the wood. The fuselage is covered with thin tissue (paper) and doped for a smooth surface. After all this covering and several coats of dope all parts waited to be sprayed 'RAF Aluminium', a two-part car paint was used. A disadvantage was the poor covering properties. Many thin coats gave a nice even result.

After assembly of the painted parts, we checked to see if the CG was at the calculated 'correct' position. Putting two (!) Rx battery packs alongside the drive batteries the CG was at the safe calculated position.

Functionally the model was ready. Interior, crew members, landing gear fairing and colour finish like colour trim, roundels, and lettering had to wait until after the maiden flight. Flying weight was then 18.7 kg (41 lbs)!

For transport the trailer for the Horten XII needed modification. The supporting frame for the Horten XII centre section was made higher to house the big Pterodactyl fuselage in transit.

First flight

Everything ready and tested, the journey to the club field began with knocking knees and definitely not enough sleep.

Would it fly?

Once unloaded, assembly takes about 20 minutes. Batteries charged, then a range check. The idea was to do some rolling (taxiing) tests first, to see if power was sufficient and if the landing gear steering worked well. After some short power bursts we knew that the torque of the big propeller put too much load on the softly sprung sidewheel but ignoring that we went to full throttle...

Acceleration was terrific and after 50 metres Ptero lifted off. Very soon we were aware the CG was too far forward, nearly all the 'up' was needed to stay airborne. After one circuit I had to land. Not having enough 'up' the model came down fast resulting in a big bang.

"Hip Hip Hooray" - it had flown and was undamaged!

Checking later, we found that one of the



▲ Side support wheel strut assembled from glassfibre kite tube. The leaf spring is between top and bottom parts.

epoxied connections of the landing gear had suffered but a second flight was possible.

Both Rx batteries were moved rearwards (A lot!). Flight batteries were recharged and we were ready for the second attempt.

Full power was applied and after a 40 metre run Ptero climbed with an estimated 30 degree angle into airspace. At safe altitude some things were tested immediately such as stall behaviour. Sorry, Ptero refused to stall. Full up resulted in a lower speed and a nice controllable sink. Both tip rudders proved to be a considerable support of the elevon control. Combined aileron/rudder makes Ptero very manoeuvrable. (Those who saw it fly at INTER-EX 97 will agree.)

The no-power glide is reasonable, not as flat as the Horten but that was designed as a powered glider. After 4 minutes another landing approach was made, this time under a bit of power to flatten the glide path. After landing we opened a bottle and everyone present toasted the successful completion of testing.

In the time available before Inter-Ex the model was finished, resulting in a flying weight of 19.5 kg (43 lbs). Everything considered, it is a nice flying model which was awarded the trophy for 'Best building project' at Inter-Ex 1997.

The whole project took about 1600 man hours from the first sketches until the last finishing operation. (Translator: about 1000 by Erik and about 600 by Aad.) Of course all this would never have happened if Aad and myself had not been supported by our wives Paula and Ellie. Thanks for all that! Also thanks to GNK (the new company that was Westland) who made it possible for us to have such an accurate scale finish. In 1998 Ptero is intended to be flown on the test site of GNK, where 60 years earlier the original made its test flights... Erik van den Hoogen **EFI**

▼ Mounting a wing onto the fuselage.



▲ Covering with lining silk and hand rubbing the dope through the cloth.



▲ Erik and scale helper Ton mounting the fuselage in the transport frame.



▲ First lift-off. the model is functionally complete but without 'finishing'.



▲ Spectators eye view at Inter-Ex 1997, Nederweert, Netherlands, photo by Jerden Gordijn.

DERECK WOODWARD Over Here!

This is the 'Sport Flyer' column with news from both sides of the pond. Do you just fly for fun? Do you want to get into electric flying and don't know where to start? Ask Dereck.

Preaching to the congregation, are we? So far, I've assumed a readership that can fly, but wants to do so quietly and without smelling funny afterwards. As feedback hasn't made it so far, do I hear a plea from e-flight novices? We know you're out there, you who've never known the fun of trying to start a glow motor or getting covered in fuel on a cold, windy day but are still feeling your way round the patch.

If you want a slant towards newcomers in 'Over Here!' - let me know. For those of you who aren't "wet 'n' dry", my wife, my dear Sue is about to join the fun with her 'Amptique' trainer (you don't think I'd teach my wife on a model without an undercarriage, do you?) - so I have a perspective on the novice sports electric scene.

The E-flight attitude

Last month, we took off, half rolled and climbed out inverted, so unfreeze the flight, pull gently and the model is pulling out of the reversal, going at one heck of a lick and heading back to 'display centre'. Let's win some free flight time - with 'wet' power, I'd use full throttle, to make the departure really spectacular. With an electric, the aim is for the prop to match the model's speed. As she climbs inverted, the speed drops - so back off the power to match. Why have the prop just chewing air and sucking juice to little avail when you can save it for later? Successful electric sports flying demands that you constantly ask yourself "Can I fly on less power?" If you can, the flight lasts longer!

Downwind with high ground speed - time for a four point roll! 'Pandora' has too much drag for a field long roll, so I roll with less than full aileron roll, hesitating at the cardinals and hold the height with a push at inverted. Rolling left also gives me the chance to squeeze a little left, or top, rudder at the last hesitation. This will hold the nose and the roll. The rudder starts can be picked up with aileron to complete the roll to level.

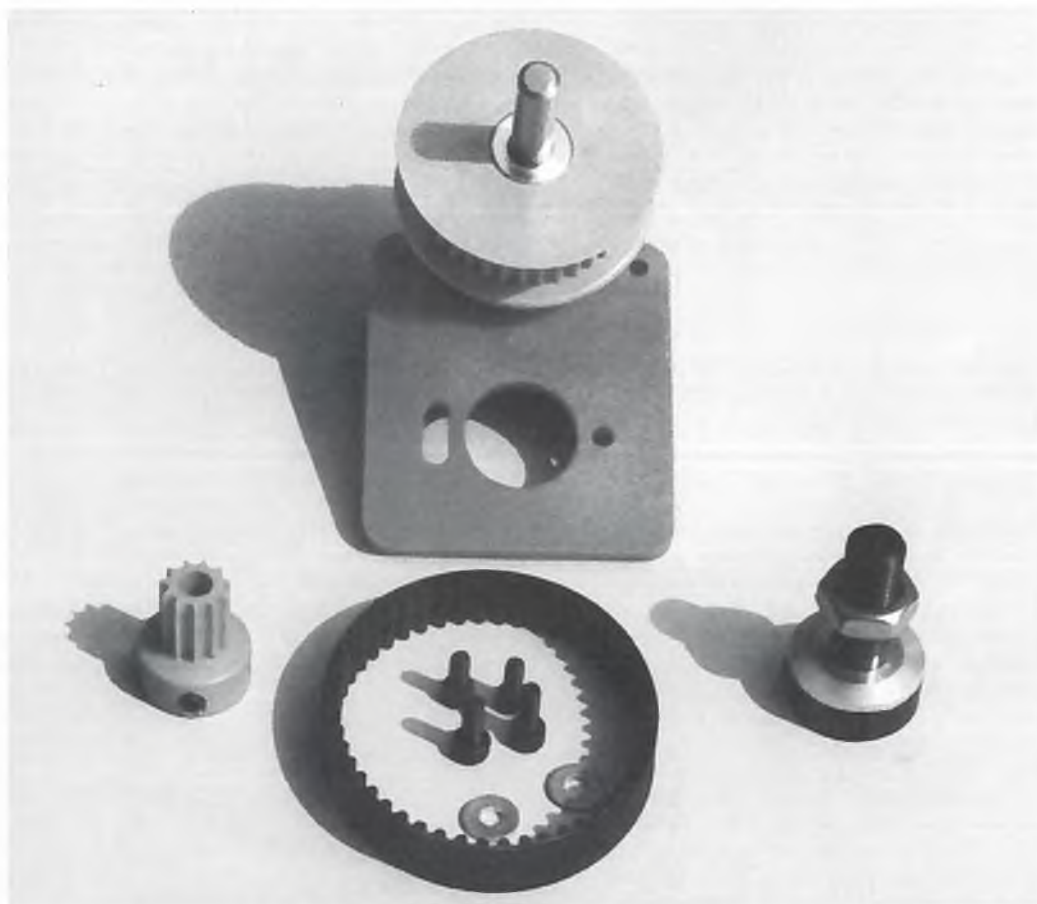
How low? Half the wingspan plus a tad over the grass height? Seriously, this is not hard to learn but practice 'three mistakes high' and always roll out if it goes a funny shape. I have a bad trait of trying to pull out - downwards! Usually, right at where I left the ground...

For the technologically inclined - a modern RC flight simulator is great to learn on, I've been told. As soon as I get one, I will spend untold hours testing this for you. (He's tried

several approaches to this - Sue).

Gear up for fun

All my sports models have gearboxes. Before that, I used motors from my gliders - hence the weird prop drivers and folders rotting in a workshop corner. The only one that flew well on direct drive was my beloved Ace 'PuddleMaster' flying boat; the rest lacked both sparkle and duration. So I 'geared up' my



▲ Anatomy of a belt drive - this is the ModelAir-Tech H-500 - that's maximum wattage, meaning it'll work with everything from a 540/600 ferrite to an Astro 15 or a small brushless - from around a Lazy Bee to seven pounds of slower scale model at a guess! Unit has two ball races, a prop adapter that fits the props you'd use for those models and can be mounted in a bulkhead, on beams or by the motor.

Sam Stitzer 'Stunt Runt' - for seven 1000mA cells and direct drive, mine sprouted eight 1700s and a geared Astro 05. Though handicapped by a folding prop (they don't like being slung around!), she would out-fly everything on our little patch.

These gearboxes needed more investigation - so when the Electric Lazy Bee joined the fleet, it got the lot. The Bee's front end is an experimenter's paradise - motors lashed on with rubber bands can be traded in moments. The Bee flew on every 'box I could find, but we'll draw a veil on the direct drive attempt - flying in circles is boring.

Gears give longer flights; bigger props give more thrust. As electric models, even my pretty hot 'Pandora', flies fairly slowly (compared to my hooligan glow models!), a large prop delivers better than a little one under most circumstances. Straight drive comes back at really high speeds - I've seen a Quickie 500 racer with an Astro 25 on 14 cells and a 9 x 6 and it was one fast model. However, both my 'Pandora' and 'Wimpy' would be sad without gearboxes.

Pointers!

It can be fun or frustrating, depending on viewpoint, as the gear ratio adds another variable to an already tortuous picture. For example, I had little luck



▲ More of the MAT belt drives - the H-500 is at the top, the similar smaller version at bottom is for 400- 480 motors. The big fellow at the rear is the long bearing type that takes the likes of the bigger Astro units - this one has a Speed 700. Up front is the neat \$400 unit that MAT sells.

with the Astro 05G on its 2.38:1 ratio and seven cells. In my 'SkyVolt' on nine cells, it lit up the sky. 'Pandora' now has an Astro 035G with 11 tooth pinion for 2.8:1 - close to Ken Myers' very successful 3:1 in his similar 'TigerShark'. On ten cells and a Bolly 10.5 x 5 prop, its performance keeps me real happy.

The 'Wimpy' - a typical

"work in process" started at 3:1 and is now flying with an Astro 'Superbox' with 13 tooth pinion for 3.7:1. The glider guiders look shocked at 'only' a 10 x 6, but 6,000 RPM at 15 amps means nine spirited minutes of flight and a taxi back to the pits. That's a sports electric, folks! The ratio is a tad high, but superb engineering means minimal friction losses. While

15 amps is not very 'macho', she flies just like she should - a good deal for sporty electric-flying.

Gearboxes come in more shapes and sizes than the entries at Crufts (Westminster for US readers!). Astro's have superb standards, but naturally fit better on their own motors, if you want to gear down a ferrite, look to the 'Leisure' range or



▲ Count the props - not the blades! Tom Hunt built this contra-rotating unit for his 65" Spitfire, straight from the 'Pica' glow power kit. One Aveox brushless drove this unit, a lot of experimentation sorted out prop sizes - the rear needs higher pitch than the front, for one point. Model is not especially light and has retracts, potential is there - anyone for a 'Shackleton' patrol bomber with four sets of contra-props?



▲ **Getting quarts from pint pots - John Swain's elegant twin motor/single prop gearbox from 'Fanfare'. OH has one - intended to power a 65" 'Porterfield Collegiate', it proved too powerful! However, this unit effortlessly hauls a big Lazy Bee around - guess what is in the shop pile of kit boxes?**

Fanfare's excellent units from England - ferrites can last years in low power cruisers.

I love having lots of ratios to mess with, the 'Leisure' boxes are good for tinkering, but there is a viewpoint that you don't need many ratios, change the cell count instead. Do you know how much faster a pinion swap is than adding or subtracting cells? I can pull a motor out and swap a pinion before my 80 watt iron is fully warm!

Even faster - belt up!

The belt drive has a long history, with the MFA unit being one of the first available. Tom Hunt at ModelAir-Tech (PO Box 1467, Lake Grove, NY 11755-0372) has been campaigning belt drives for years and has a range from Speed 400 up to the awesome unit that fills the nose of Keith Shaw's 82" Bearcat. If that won't do you - he has a counter-rotating unit and can also fasten two motors onto one shaft. If you have a need for two Astro 60s, 60 cells and one big prop - go talk to Tom, I bet he'd listen.

It's swings and roundabouts - a belt cannot handle high RPMs as well as gears, but they run quiet and can handle torque. A belt drive has higher propshaft offset - not so good for long skinny noses, for a sports model - who cares? Tom's latest H-500 takes from 540/600 ferrites to the Astro 15 and smaller Aveox brushless units, with

gear ratios from 2.4:1 to 3.6:1. The pinion is at the front and can be swapped at the field with a couple of Allen keys (hex wrenches for US folk!).

Another solution is two motors geared onto a common shaft. There are examples on both sides of the pond, though it is less worth the effort with big Astro's at US prices but I'd look more closely in England. The 'Fanfare' 600 twin will fly a big Lazy Bee on 15 cells. That's a model with a 60 x 21" wing weighing 90 ounces. No way that those motors would move that mountain without help!

One last tip - most US gear boxes use the same 1/4" - 28 thread as mid range oilburners. Lose the prop nut, get a spinner nut - OS part number 23024008, for the 20/25 FP series is one - cool is good in the pits!

Tales from Bob

Bob 'AstroBob' Boucher visited us at Mt Trashmore early this year - the day before the best flying day of early 1998! As well as lots of Astro goodies, Bob recalled some tales of the early days of e-flight - talk about narrow-minds!

Bob was one of the first e-flight sports fliers - his early models included a Fournier that he flew in the 1973 AMA Scale Nats. He'd gone to demonstrate his motors and kits, but the Great Iams wouldn't let him fly unless he competed - so he entered scale. With no documentation, he was 38 from 39 in static, but made 19th overall after a strong flight performance. Not bad with 1200mA cells and a clockwork charger. Despite its low wing, the Fournier flew fine on rudder, elevator and motor control. Bob reckons that 'Spirit of Yesteryear' has the kit now and it would convert to ailerons. Now we have the long legged 2,000 cells...

Unless someone knows better, it was 1997 before another electric scale model appeared at the US Nats, when Bob Benjamin and Randy Smithhisler put on a great show with their quarter scale ships. An electric powered English Electric Wren bravely took on the gales at the British Nats around the early 1980s. Scale is definitely one discipline where electricians can compete with the oily birds on the same turf!

Slow Down!

Hands up those who think 'Slow Fly = Indoor'. Thought so, but most of the slowly models bought (mostly the Bleriot II) are making small spaces near modellers' houses into flying sites. Yours truly got



▲ **AstroFlight's brushless 05, the size can be gauged by the 11" diameter folder cunningly placed next to it. Very compact shape to please those with long skinny noses. That is a planetary gearbox from Switzerland - one of the few items Astro buy in, which says much about its quality. Normally used in gliders, planetary boxes could find a good home in a pointy fronted sports model - like some piston engines fighters or simulated prop driven jets. You need a big prop though - for blades, anyone?**

his intro to SF courtesy of Horst Fenchel and his 'Stubenfliege' (translates to 'Housefly'), definitely outdoors and within fifty feet of the Woodward's stately back door! It's one of the smallest and lightest of the Slowfly crop too.

Several American modellers are flying Bleriot II's outdoors; these are 48" span but light. Their size would make them appear much handier outdoors but they fly well indoors. As a handy photo should show, Alan Perrin's 'Dragonfly' handles the great indoors - at around 60" span, it is no small model. 'Dragonfly' may well be commercially available soon - its use of regular small RC gear should make it very popular when the kit appears. Incidentally, Allan has told me that however light you think you build, it's probably still too heavy for a true slowfly.

I've got a WesTek controller - it is smaller than a regular RC plug and socket! True indoor RC gear is remarkable and still very much under development - it is reliable but what it will look like in a year or so boggles the mind! Horst's 'Becker' gear

features two servos and a receiver in one case, for example.

Shop Talk

Just so you don't think I am biased - I have an electric soarer. It's the 'Thermic Traveler' from the 'Aveox' series of well produced and priced electric flight kits. Gives them a technology spread from their leading edge brushless motors to trailing edge all wood kits!

'Thermic Traveler' was designed by Jim Zarembski and revised by Bob Sliff in 1997. She's 72" span and features a Wolf Hirth planform wing that breaks down into three flat pieces and a removable tailplane, so the model can fit into a travelling case. She's getting my 'Fanfare' geardrive with a low ratio to turn a big folder (like one I just happen to have!) and a cheap low rate controller that does fine if used as a soft start switch. Some are willing to spend lots on high rate controllers that just increase power gently from zero to full - I'm using a \$30.00 unit and my throttle stick to achieve this.



▲ Meanwhile, Alan Perrin's 60" span 'Dragonfly' - a monster by slowfly standards - finds the IMS/Model Engineer hall quite adequate. You'll be hearing much more about this model soon - uses a 300 size geared motor and standard micro RC gear for exceptional performance.

Next, or even simultaneously, comes a real gem. The Porterfield Collegiate is a re-release of Astro's kit by 'Spirit of Yesteryear' and is a showcase of what a larger scale model for electric should be - okay, 65" span is big for me! Pretty close to scale, the model is a lightweight, practical flier - Piper Cub-like in attitude, without being 'Yet Another Cub'. She's a three channel design - the original had dihedral - though many

have sprouted ailerons. There is scale data available and mine will get a decent cockpit with pilot plus a 'real' colour scheme.

I had intended to use my Fanfare twin 540 gearbox, which fits physically, but two motors weighed more than the model could take, and the power output is for the next size or two up! Call me old-fashioned, but if I model a 90 Kt trainer - that's the performance I intend to replicate best I can. Sharp intake of breath - I'm getting a geared MaxCim brushless system on 12 or 14 2000s, that will be charged and cooled in situ. Tom Cimato at MaxCim reckons I can expect way over the 12 minutes I was looking at originally - more like 15 to 20 - and brushless flexibility will allow the same package to light up an aerobatic scale job by pouring on the nicads later on. Guess I'll have to build the Big Bee for the Fanfare now.

BECs kicked in

Please - PLEASE - send contributions to me via either Traplet Towers or the Woodward Stately at: 11159 Captains Walk Ct, N. Potomac, MD 20878 - whichever is handier. If you just want to chew the fat, either send me some return postage or use my beloved e-mail:

weekendpilot@juno.com

That can't take attachments, by the way. For photos, our beloved artsy department need glossy or matt colour prints or slides. They can use electronic formats but I cannot. Also, please send spare prints, as it is impossible to return them.

Thought for the month - if you keep going around in circles, isn't it time you figured out how to stop? **EFI**



▲ Horst Fenchel and the ultimate field box - comes with charging source and runway, and you can rent them at airports when you go on vacation! This was shot outside Washington DC when Horst was on vacation in 97. I don't think it would be viable for a B-52 though - you might have to rent a larger size and source a regular runway.

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Advertisers Index

Apex Models Stranraer.....38	Kontronik17
Benchmark Electronics Ltd.39	Mirage R/C Enterprises38
Back Issues63	Modellhaus37
Binders37	Plans Service.....53
Competition43	Robbe Schluter UK.....68
Electric Aeroplane Co.....62	Sandown Show.....10
F2A Supplies62	Sequoia Systems.....49
Fanfare38	Subscriptions Offer48
Flair Products67	Thermal Technicks38
Fleet Control Systems62	Traplet Publications66
FVK.....37	Traplet Video Productions .10
Galaxy Models.....39	West London Models....44, 45
Gliders26, 27	Wings & Wheels Model
Gordon Tarling.....9	Spectacular.....65
H K M Modellbau10	

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Small - Scale aerobically electric powered 'Me' fighters. Available in painted or un-painted high density Robbe Styrofoam. The model is powered by a powerful 600 series motor. These models are ideal for those multiple model 'streamer' dogfights. Wingspan: 1,025mm - 1,880mm. RRP: Painted: £94.99 Un-Painted: £69.99



K-RAT (3087)

Latest electric glider from Robbe epoxy fuselage with foam composite one piece wing. Wide range motor combinations from tame to ballistic! Wingspan 1800mm



CT2 / CT4 (4048)

Versatile and low cost highly efficient gold connector system in either 2mm or 4mm format (to 4077) RRP: CT2 (PAIR): £4.25 (to 4048) RRP: CT4 (PAIR): £3.99



POWER PEAK INFINITY CHARGER (8153)

The ultimate charger, charges/discharges up to 30 cells, fully programmable microprocessor controlled yet simple to use.



2-3 Channel Motor Switch (8061)

This small lightweight relay switch is designed for 400 - 600 series motors. Allows electric motor control even with 2 channel radio equipment. Ideal for economic electric flight. RRP: £27.99



RSC 836 SPEED CONTROLLER (8348)

Full range of speed controller ranging from a simple soft start switch to microprocessor controlled unit with up to 110amp capacity. Something to suit every model

All of these products and many more are now available from your local model shop, for further enquiries contact us at:

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