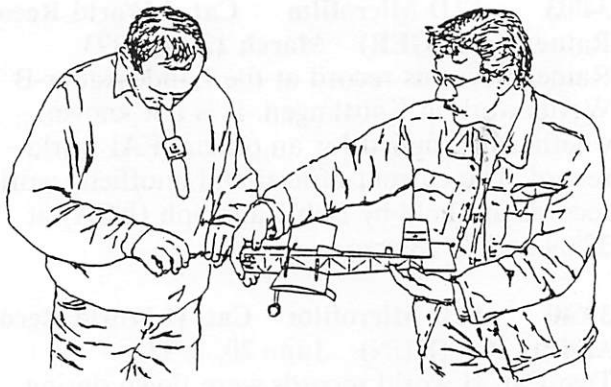
Indoor News



Issue 23 September 1993

Interscale Special Issue

It is a pleasure to present to you the first Indoor News Special Issue about scale models on the occasion of the second Nottingham Interscale '93 open international event for indoor flying scale models.

I am sure you will all enjoy reading it as it contains a lot of high quality plans and articles. I am greatly indebted to all who contributed, especially to Reg Boor who collected the British material. In fact I received far too much material even for this double-size issue. This issue is sent to all regular subscribers and to the Interscale participants. To those who do not yet subscribe to Indoor News: Indoor News normally has 16 pages and covers all types of indoor models, scale as well as duration.

As I said there is some excellent scale material left for future issues and there is also a lot of duration material waiting for publication. This makes me confident enough to announce that Indoor News will appear four times a year from now on.

Having watched Wijnand de Joode's video of the last Interscale there can be no doubt that you will all have a most enjoyable week-end and if you cannot be there - just enjoy yourself by reading on.....

DIARY

25/26 Sept Nottingham England	**INTERSCALE '93** Reg Boor, 103 Crow Hill South, Middleton, Manchester M24 1LA, England
25-26 Sept Slanic Pradova Romania	**Slanic Pradova Cup, F1D.** Federatia Romana de Modelism, Str Vasile Conta 16 Sect 2, 70139 Bucarest, Rumania. Tel. 40 131 20160, fax 40 131 20161

Before we carry on with the scale stuff first on to the latest news.

F1D EUROPEAN CHAMPIONSHIPS Brno - July 8-10, 1993

1	René Butty	SWI	41'32	44'06	**85'38**
2	Thomas Merkt	GER	37'41	37'03	**74'44**
3	András Reé	HUN	35'41	37'14	**72'55**

Note René's 44 min. flight which is reported to have reached only 16 meters height!!! Full results, report and technical details in next issue.

COLOPHON

Indoor News is published at least four times a year and covers all types of indoor models, from peanuts to microfilm. Texts can be sent in Dutch, English, German and French (I can read the latter two, but not write them). Please type your texts on 12,5 cm width. Texts can be sent on floppy disk (3½ or 5¼) in Wordperfect or ASCII format. I can make the drawings, if you are no draftsman. I prefer payment of subscriptions per six issues. Paying by Eurocheque, Postal Money Order or sending bank notes is free of handling charges to the recipient. Please bear the handling charges yourselves when paying by Eurogiro or with foreign cheques. The Eurogiro account number is 4406860.

Editor:

Thedo André
Meijhorst 35-43
NL-6537JD Nijmegen
The Netherlands

Subscription: (per 6 issues)

Holland NLG 20,-
Europe NLG 30,-
Airmail USD 20,-

RECORDS

34'03 F1D Microfilm Cat. I World Record
Rainer Lotz (GER) March 13/14, 1993
Rainer flew this record at the Landeskader-B Wettbewerb in Knittlingen. It is not known whether he applied for an official FAI world record. The current official and unofficial world records are held by Bob Randolph (USA) at 32'09 and 34'18 resp..

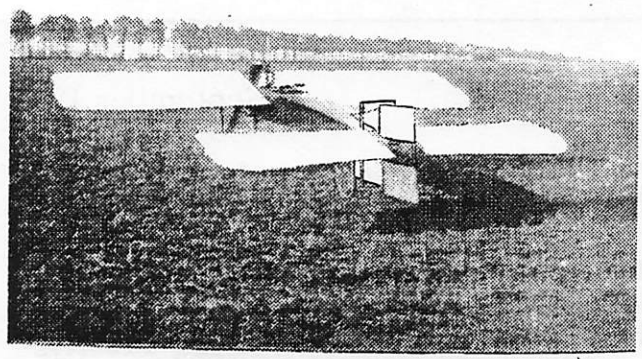
39'40 F1D Microfilm Cat. II World Record
Andras Ree (HUN) June 20, 1993
Two Cat. II world records were flown during the Várszegi Memorial contest in Budapest. On the first day Andras Ree flew 37'11, just 1 second below the existing record. On the next day Dezsö Orsovai made 38'54, then about 2,5 hours later Andras succeeded to fly 39'40. The record dossiers are sent to the FAI, more details later.

The world's smallest CO_2 motor
Rainer Gaggl (AUS)
A record of a completely different nature: Rainer Gaggl built a CO_2 motor of 0,75mm³ displacement! Details and plan in the next issue.

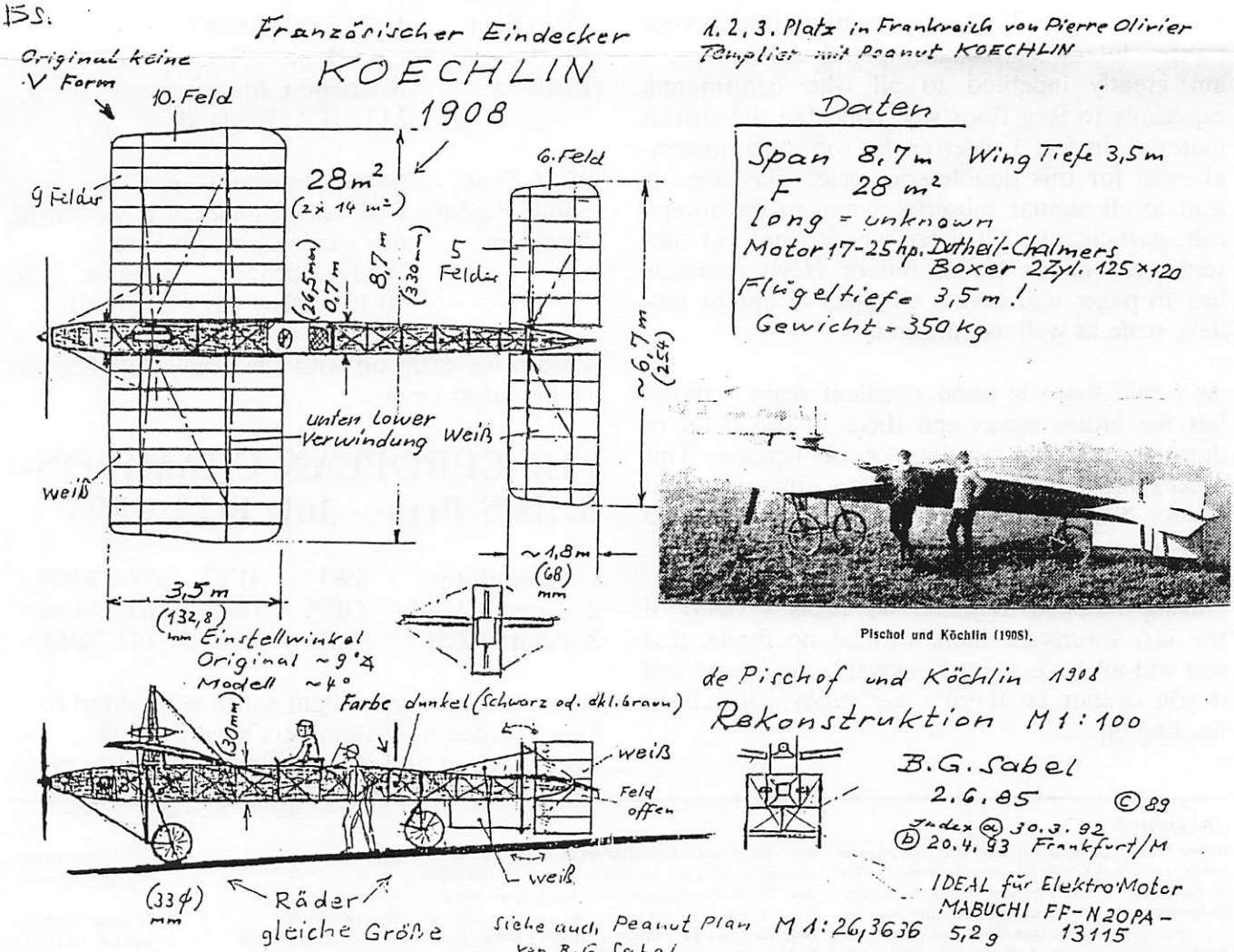
KOECHLIN 1908 Revised

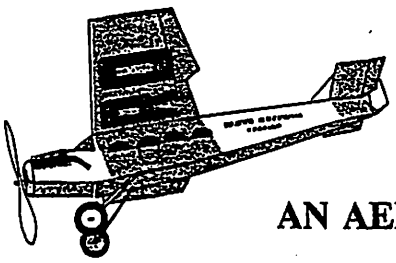
by Benno Sabel (GER)

Benno published a wonderful plan of this airplane in Vol Libre 64. But recently he discovered an unknown photograph which showed that modifications are necessary. The wing should have 9 rib fields and the tail span has to be increased with one field. See plan for further details.

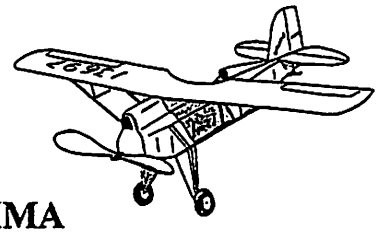


L'aéroplane de Pischof-Koechlin





MONTEVIDEO 28/11/91



AN AEROMODELLERS MAXIMA-MINIMA

(Self reflections in my spare time)

* The success of a Peanut is a synthesis of two realities: its artistic value and its flying abilities.

* As a rule the success of a Peanut depends upon the absence of superfluous massive parts.

* A well built Peanut is at its best when the components do not exceed their minimum required strength.

* A Peanut can be expected to be unsuccessful when the main structural components have a decorative function only.

* In the process of building a successful model the weight and strength of its parts pre-condition further possible additions.

* Aircraft designers have spent many hours of work to figure out light structures. Therefor a good modeller should keep this in mind when scaling down a flying model.

* In model building only a few things turn out to be impossible; it just depends on the will to make it possible and the spare time available.

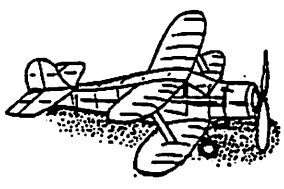
* In our hobby certain jobs are a real task, some are impossible. Separating them into single steps becomes a good tool as the number of stages equals the moment of leverage.

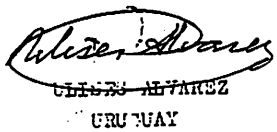
* A small scale, a micrometer and magnifying glasses are a must for a good Peanut builder.

* Designing and building a Peanut should be a pleasant job, so will be the final result.

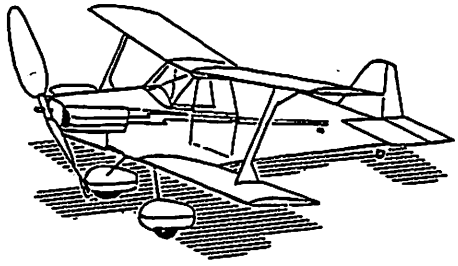
* Building a flying model is, as with a dream, unpredictable and its time of life is unknown; sometimes we surprise ourselves working on a typical model, many months later we are surprised having finished it, but it is impossible to calculate how long it took.

* Money is the reward for a remunerative job; good flights are the reward that a modeller hopes for.....





URUGUAY



(Thanks to aeromodeller MIGUEL QUARTINO for helping me in the translation to english)

A THEORY FOR SCALE SPEED

by Reg Boor (GB)

I am standing on an airfield with two aircraft circling around me but I can only see one of them. How can this be? The readers of Indoor News, I have no doubt, will be able to think of many answers to this question, but the answer that I am going to propose is that one of the aircraft is a scale model and the other is the full-size prototype. The model, obviously, is closer to me than the aircraft, they are rotating around me at precisely the same angular velocity and the flight attitude of the model is identical to that of the prototype. Also, their distances from me are such that the prototype is just hidden by the model. Under these circumstances it may be fairly said that the scale model is flying at scale speed and attitude. Is this possible and what are the necessary conditions?

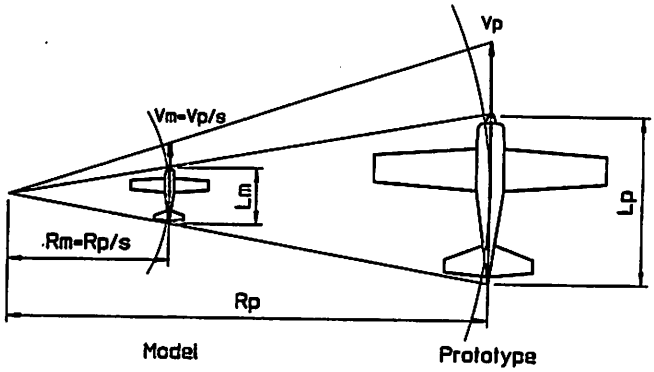
In the following article we shall make only two assumptions, based on the scenario just described and reach some interesting but possibly controversial conclusions which will include a simple formula for calculating the mass of the model to ensure flight at scale speed.

The article will contain little mathematics. This should make it more readable for non-mathematical modellers. Instead, the mathematical formulae will be given in an appendix so that those readers who wish to can follow the reasoning and see that I am not cheating! For this concept of separating the formulae from the main text, in order to make the text more readable, I am indebted to my friend and fellow modeller John Barker.

SCALE SPEED We shall define the scale of our model using the letter "s", as follows, 1/20th scale means that s=20. So the length of the model, Lm, is the length of the prototype, Lp, divided by s. See equation (1). We shall use this nomenclature throughout, m for model and p for prototype.

Any reader puzzled by the concept of angular velocity should think of a motorcar wheel with a radial line drawn on it. When the wheel rotates the line does not distort, because every point along it rotates with the same angular velocity. However, every point on the line has a different linear velocity. A point halfway between the hub and the perimeter (the tyre) has half the linear velocity of a point on the tyre and so on, in proportion to radial position. When we speak of the speed of an aircraft we are talking about its linear velocity.

Returning to our circling scenario, we imagine the plan view. From ourselves at the centre of the circle we draw two lines, one just touching (tangential to) the spinner of the model and continuing on to end tangential to the spinner of the prototype and the second line tangential to the trailing edges of the two rudders. We



have drawn a sector of the circle which contains both aircraft and in our plan view it approximates to two triangles, the smaller one with its base as the model, inside the larger one with its base as the prototype, but with a common apex, which is myself at the circle centre. Geometrically speaking these two triangles are "similar" and this property means, in our case, that the flying radius of the model, Rm, is the flying radius of the prototype, Rp, divided by s. See equation (2).

Going back to our car wheel analogy and the relationship between radius, angular velocity and linear speed, we can now see that the speed of the model, Vm, is the speed of the prototype, Vp, divided by s. See equations (3) and (4).

You may feel, justifiably, that we have spent too much time showing that the scale speed of a model is simply the prototype's speed divided by the scale. However, there are other views on this question and it was necessary to establish the basis for the assumption in this article rather than produce it from nowhere.

The consequence of our assumption for the definition of scale speed can be stated more simply: the model and the prototype each fly their own length in the same time. We extend this definition from circling flight to flight in any flight phase and say that if the prototype flies its own length in t seconds the model should fly its own length in t seconds in order to fly at scale speed.

SCALE ATTITUDE As the definition of scale speed alone is not sufficient to enable us to ensure realistic flight at the same attitude as the prototype we shall now make and justify an assumption which will enable us to do that. Our second assumption is that the model flies at the same lift coefficient as the prototype. See equation (5). Stated so bluntly it sounds an unlikely assumption. However, the numerical range of flight lift coefficients is quite restricted, except for specially equipped aircraft with slots and flaps and consequently a large variation in flight phase can be achieved with lift coefficients up to 1.0. Small models are capable of realising about 0.5 and larger models almost 1.0, so all models have the capability of simulating some full-size flight phase.

Flight attitude is the angle between earth horizontal and some imaginary reference line in the aircraft, usually a draughtsman's longitudinal datum line. In level flight the flight attitude and the flight incidence of the wing differ only by the wing setting angle on the fuselage. An accurate scale model will have this angle represented correctly. In non-level flight the incidence is affected by the climb or descent angle, but we should hope to simulate these angles correctly also. So the problem of flight attitude reduces to flying at the correct incidence and we now have to show that the model and the prototype have the same relationship between incidence and lift coefficient.

But this is simply the principle of wind-tunnel testing! A wind-tunnel engineer is quite happy to predict the relationship between incidence and lift coefficient, the lift-curve slope, from tests on quite a small model. There are conditions to this of course. The same Mach number is required during the test and flight, but our Mach numbers are low enough to be ignored. Also, for complete fidelity, the same Reynold's number is necessary. This is rarely achieved but can be simulated to some extent by ensuring turbulent flow over the model wing and even then it is only entirely required near the stall. Models stall at lower lift coefficients than full--size aircraft, but except near the stall Reynold's corrections to the lift-curve slope are small.

For completion we have to mention one other factor. The model should have the same aerofoil section, or a foil of the same camber, as the prototype. This will ensure the same zero-lift incidence.

We conclude that flying the model at the same lift coefficient as the prototype is possible in some flight phase and that this will ensure the correct flight attitude in that flight phase.

COMBINING THE ASSUMPTIONS The linear dimensions of our model, in particular wingspan and wing chord are those of the prototype divided by the scale, s. This means that the wing area of the model, Am, is the wing area of the prototype, Ap, divided by s squared. See equation (6).

The lift coefficients of the prototype and the model are defined in equations (7) and (8) but if we substitute the definition of scale speed, equation(4), and scale wing area, (6), into (8) we obtain the lift coefficient of the model expressed in terms of the prototype speed and wing area. See equation (8a). If now, as we assume, the lift coefficients of the model and prototype are equal we can equate equations (7) and (8a), rather than equations (7) and (8) and almost everything "cancels", as the mathematicians say and we are left with equation (10) which says that the mass of the model should be the mass of the prototype divided by s raised to the fourth power.

Let us try and verbalise this more clearly. If we want our scale model to fly at scale speed and attitude we must construct it so that its mass is that of the prototype divided by the scale four times. Which is the same as dividing it by s to the fourth. Having done this, it does not matter how we fly our model, it will be simulating some flight phase of the prototype.

SOME EXAMPLES The North American P-51D Mustang has a mass of about 5000 Kg and its wing-span is 11.28 m. A Peanut model of this aircraft would have a wingspan of 330 mm, which implies 1/34th scale. Our formula tells us to divide 5000 by 1336336 (34 to the fourth power) and this gives us a target mass for the model of 3.74 gm. This figure must include the rubber motor and is quite a challenge. Note that we have multiplied by 1000 to convert Kg to gm.

But perhaps we are not too interested in the flight realism of a peanut model, as they are flown for duration, so what should a 1/20th scale Mustang of 56.4 cm wingspan weigh? Our answer is 31 gm (5000 divided by 160000).

For the radio control modeller who might wish to build to 1/4 scale and who will most certainly be looking for flight realism, his Mustang should should be 19.5 Kg.

In between these figures, if we think about a

1/10th scale Mustang with a wingspan of 1.13 m, which might be an outdoor free-flight power model, we get a value of 500 gm for its mass.

These figures, for the Mustang at least, appear to be quite reasonable. For indoor scale flight a 1/20th scale model is a good size and building one to a mass of 31 gm, although difficult, is not impossible.

SUMMARY AND CONCLUSIONS We postulated a flying scenario with a model and its full-size prototype where it could hardly be denied that the model was flying at scale speed and attitude. This was used to show that scale speed is the full-size speed divided by the scale, which we defined in a certain way. It was then argued that the model and prototype should fly at the same lift coefficient and therefore the same incidence in order to reproduce the correct flight attitude.

Combining the definition of scale speed with the concept of equality of lift coefficient between the model and its prototype we obtained a formula for the mass of the model if it is to satisfy the requirements of scale speed and flight attitude.

Finally, we calculated some examples of mass given by the formula for the case of models of the North American Mustang and the answers obtained appeared to be reasonable.

We have shown that the concept of scale speed need not be totally subjective but that the application of a simple formula combining the mass of the prototype aircraft with the scale of the model will give an indication of this aspect of flight realism.

MATHEMATICAL APPENDIX

Lm=Lp/s .....(1)
Rm=Rp/s .....(2)
Vm/Rm=Vp/Rp .....(3)
Vm=Vp*Rm/Rp
=Vp/s .....(4)
CLm=CLp .....(5)
Am=Ap/s^2 .....(6)
CLp=Mp*g/0.5*roe*Vp^2*Ap .....(7)
Clm=Mm*g/0.5*roe*Vm^2*Am .....(8)
=Mm*g/0.5*roe*(Vp/s)^2*(Ap/s^2)
=s^4*Mm*g/0.5*roe*Vp^2*Ap .....(8a)
from (5), (7)=(8a) .....(9)
(9) gives Mm=Mp/s^4 .....(10)

THE FOKKER SPIN OF 1912
AN EXERCISE IN PISTACHIO LUNACY

by Peter Smart (GB)

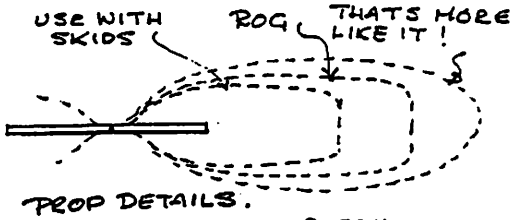
I was first attracted to this strange aircraft when I saw it in Kenneth Munson's book "Pioneer Aircraft" but when a copy of a Czech publication entitled CESTA DO OBLAKOV came to me, via Sams, I found I was the proud possessor of a three view drawing and three view colour details plus, for me, two pages of totally unintelligible Czech text.

Why did I decide to interpret this design as a Pistachio model, I hear you cry? I can only put this down to the prevailing phase of the moon!

There is no way that any explanation of my own can possibly unravel the intricacies of the design now before your eyes. I can only direct you with a few pointers.

1. When I say FINE piano wire I really do mean it!
2. That dotted rigging really is essential unless you require ever increasing up elevator as the turns go on.
3. And now, the bit you have all been waiting for, THE WING. Select your tissue. I didn't use condenser paper, but you may. Cut a mask for the lettering, this is not as on the plan but is to be read from the underside of the aircraft, use the lowest tack mask you can obtain. Lightly spray in black cellulose. When dry, invert the covering onto the plan and using thin white glue attach the 1/32" ribs, over length. When this is dry lift or peel carefully from the plan and invert it with ribs down on the plan. NOW you can add the 1/20" square spars and trim the whole to outline. EASY. Now do the same for the tail.
4. I cannot tell you how to trim it bacause mine flew straight from the board and I believe in leaving well alone!
5. If you really want to make life easier, find a photo copier and blow it up to 13" span!

Anyway, thanks for your interest and lots of luck.

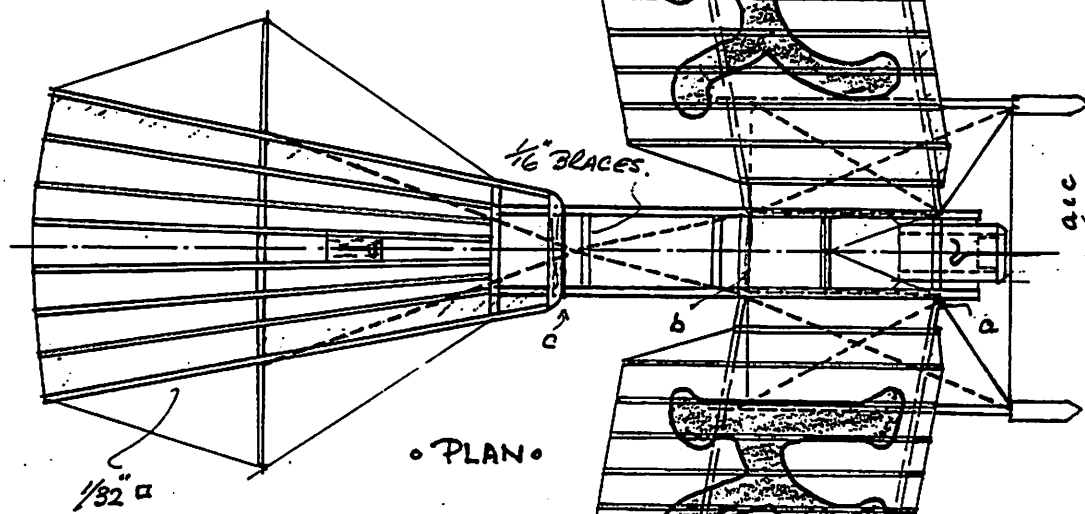


PROP DETAILS.
EXPERIMENT WITH PITCH
MINE FLEW AT ABOUT 45°

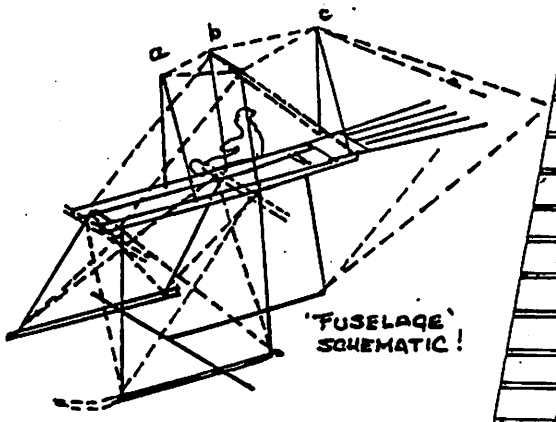
TISSUE 'COVERING' IS SANDWICHED BETWEEN SPARS (BELOW) & RIBS ABOVE.

FIRST J6B IS TO SPRAY THE MAKERS NAME!

ADDITIONAL RIGGING LOOKS GOOD IN FINE LYCRA. BUT THINK ABOUT ALL THAT DRAG!!

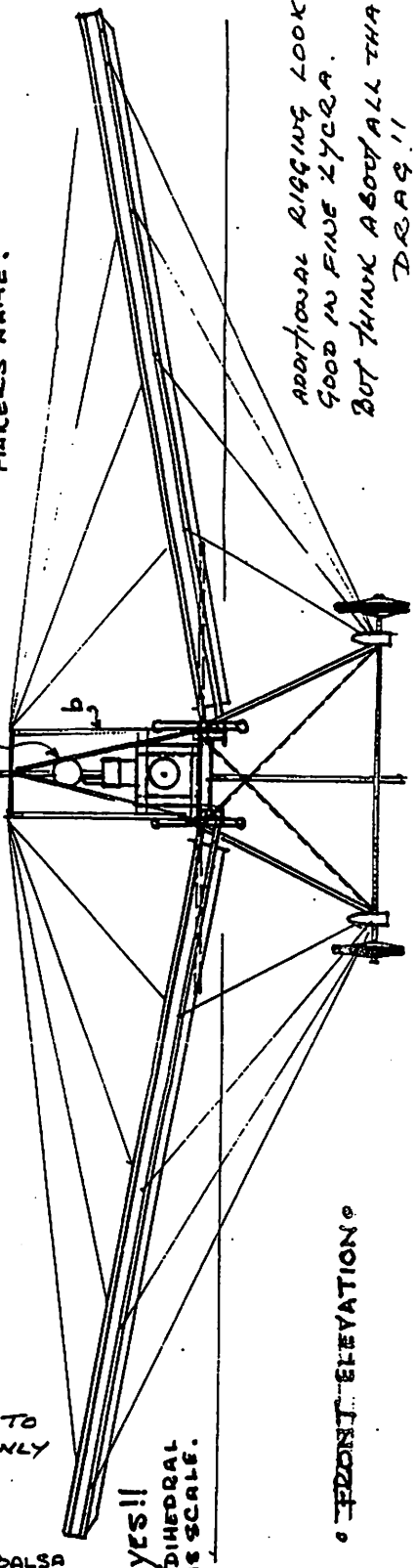


• PLAN •



RIBS 1/32" □
SPARS 1/20" □

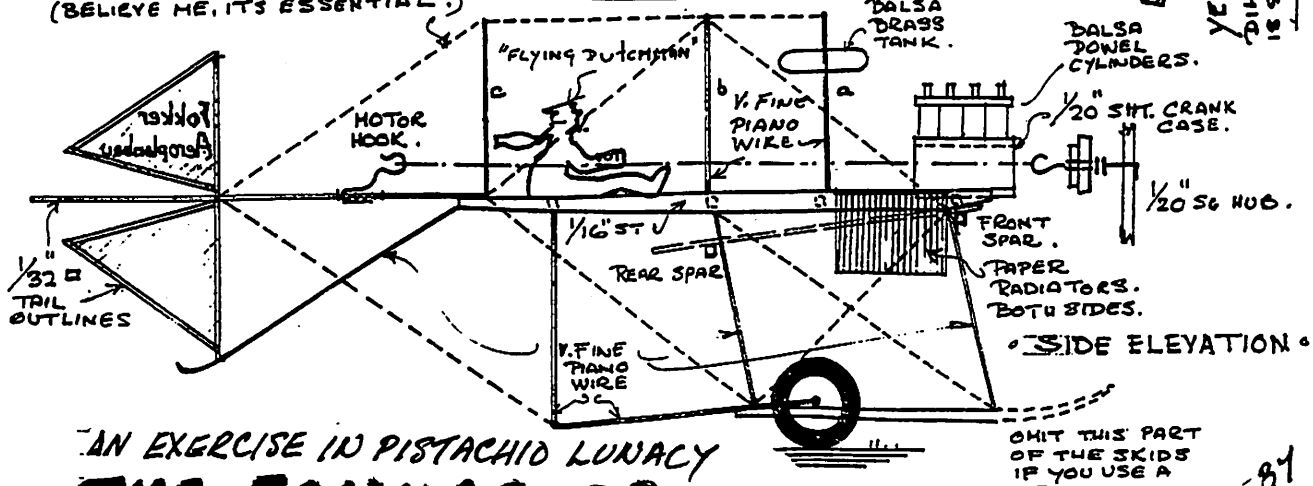
TISSUE COVER TO SHADED AREAS ONLY



• FRONT ELEVATION •

YES!! DIHEDRAL IS SCALE.

THE HEAVY DOTTED RIGGING IS FROM FINE FISHING NYLON. (BELIEVE ME, IT'S ESSENTIAL.)



• SIDE ELEVATION •

OMIT THIS PART OF THE SKIDS IF YOU USE A DECENT SIZE PROPELLER.

AN EXERCISE IN PISTACHIO LUNACY

• THE FOKKER SPIN •

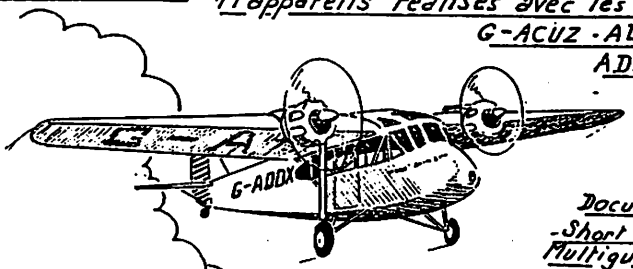
BY PETER SHART.

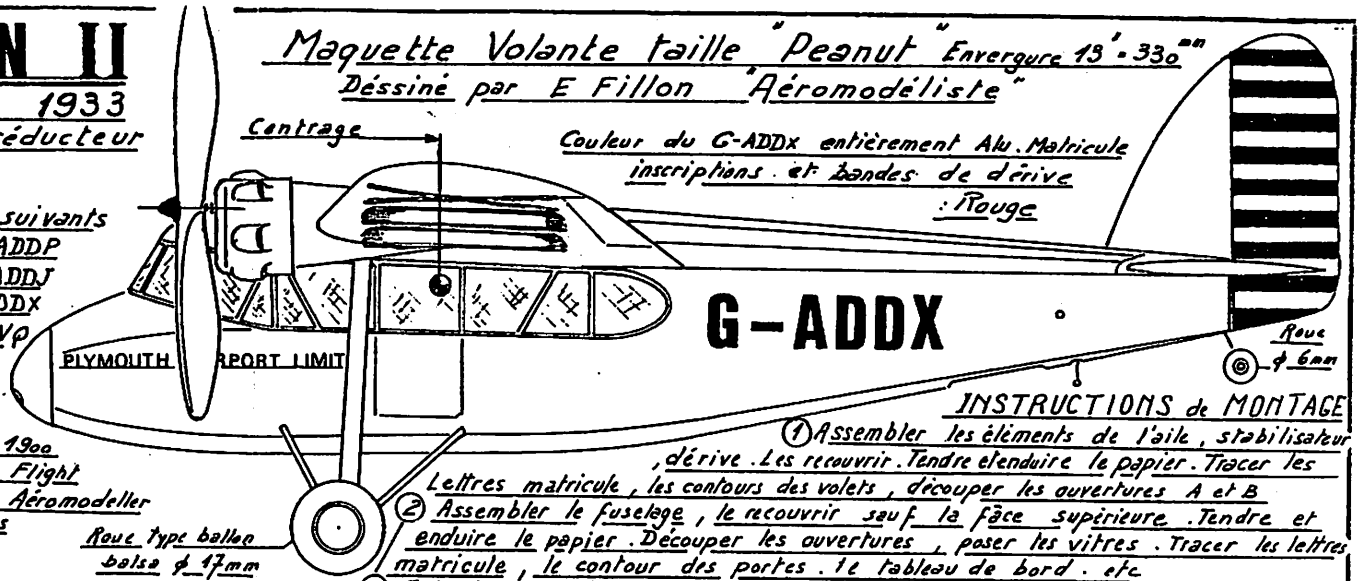
SHORT S·16 SCION II

Bimoteur Anglais de transport de 1933
Moteurs Pobjoy Niagara III 7 cyl à réducteur
cabine pour 6 passagers
11 appareils réalisés avec les matricules suivants
G-ACUZ - ADDN - ADDO - ADDP
ADDR - ADDS - ADDJ
ADDV - ADDX
VH-UTV VH-UVP

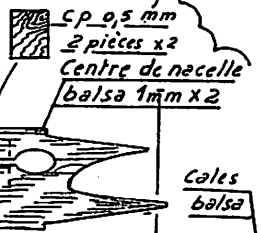
The French Arachide

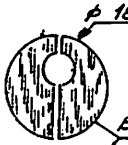
Maquette Volante taille "Peanut" Envergure 13'-330mm
Déssiné par E Fillon "Aéromodéliste"





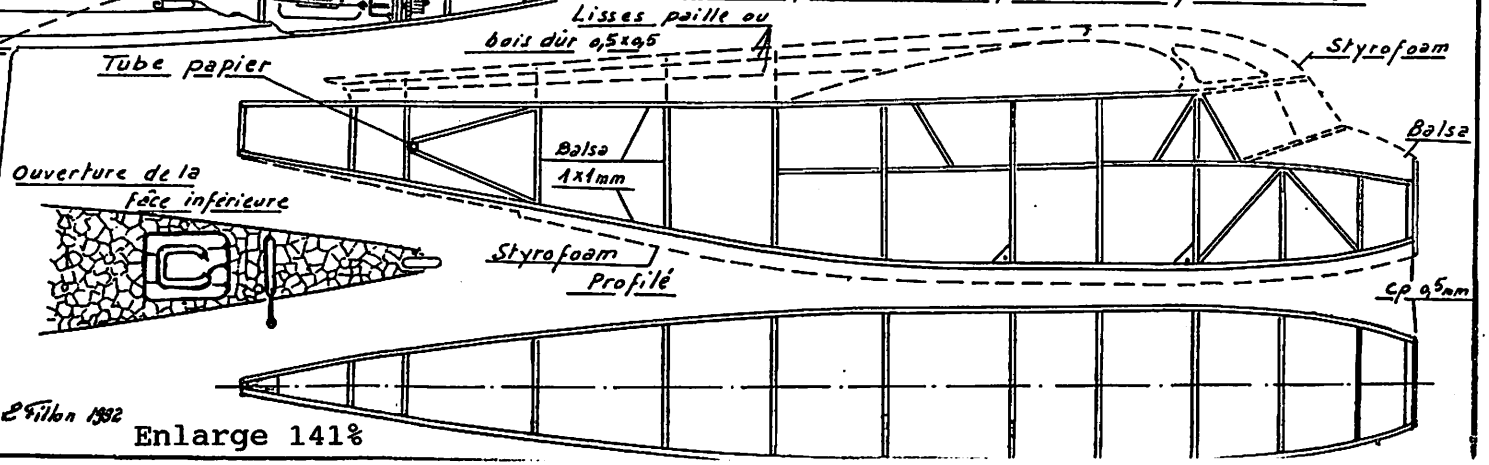
Documentation
- Short Aircraft since 1900
Multiguide Elsévier Flight
Aéroplane Monthly Aéromodeller
Aircraft Paintings







Echelle 1/38,7



INSTRUCTIONS de MONTAGE

1. Assembler les éléments de l'aile, stabilisateur, dérive. Les recouvrir. Tendre et enduire le papier. Tracer les lettres matricule, les contours des volets, découper les ouvertures A et B
2. Assembler le fuselage, le recouvrir sauf la face supérieure. Tendre et enduire le papier. Découper les ouvertures, poser les vitres. Tracer les lettres matricule, le contour des portes. le tableau de bord. etc
3. Introduire et coller en place dans le fuselage le mécanisme. Si nécessaire enlever et ensuite recoller à leur place les entretoises gênantes
4. Glisser les deux cables flexibles dans l'aile entrant par l'ouverture : A sortant par l'ouverture : B passant par le trou de la nervure 2 et le passage de la nervure 3. Ne pas plier le cable flexible
5. Coller en place l'aile sur le fuselage, s'assurer de sa perpendicularitée
6. Enfiler les centres de nacelles sur les cables flexibles. Enfiler les aiguilles ϕ 0,7 axe d'hélice. Coller en place les centres de nacelles sur l'aile et vérifier alignement at parallélisme des axes. S'assurer du libre fonctionnement en entrainant à la main le mécanisme à laide d'une tige de cp 1mm terminée en crochet
7. Retirer les axes d'hélice, Finir l'assemblage des capots moteur, des profilages de nacelle. Remettre les axe d'hélice, les hélices et souder un fin fil de laiton enroulé sur le cable flexible et accroché au doigt d'entrainement. Couper l'excédent de longueur des cables flexibles. coller en place les cônes d'hélice
8. Poser les faux couples sur le dessus du fuselage, les lisses, le bloc styrofoam façonné sur la cabine. Recouvrir Tendre et enduire le papier
9. Poser le train d'atterrissage, la roulette arrière, Coller la dérive
10. le stabilisateur fixé provisoirement par un fin fil de caoutchouc sera collé définitivement après mise au point en vol

News Indoor

E Fillon 1992

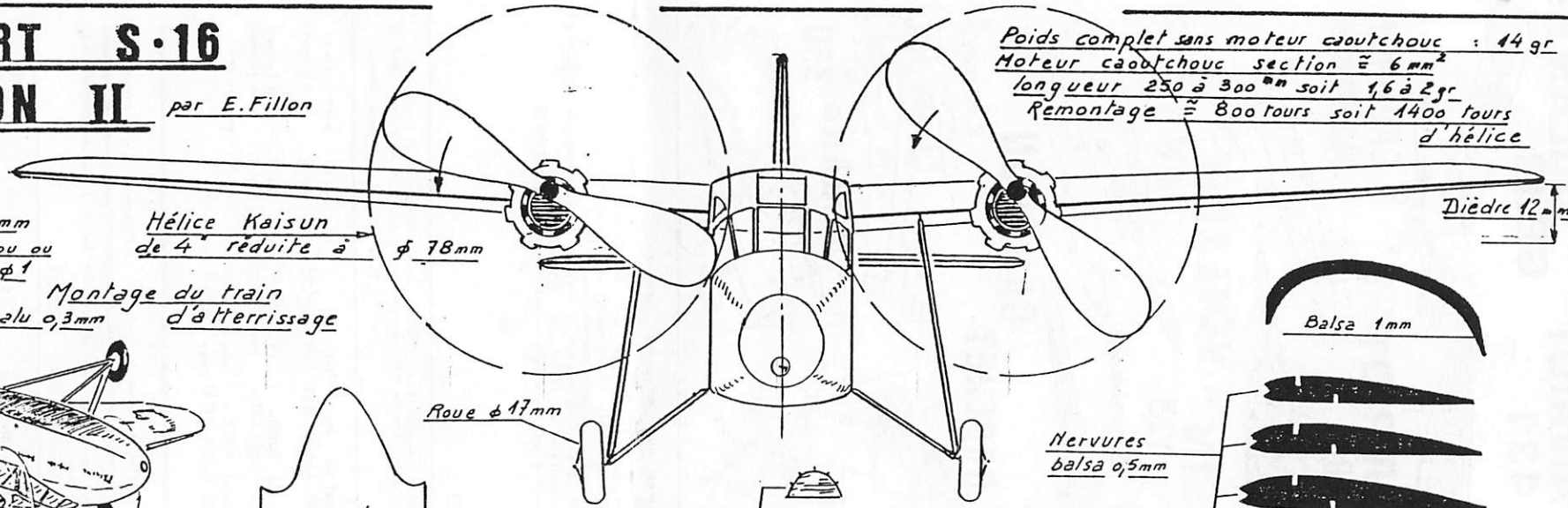
Enlarge 141%

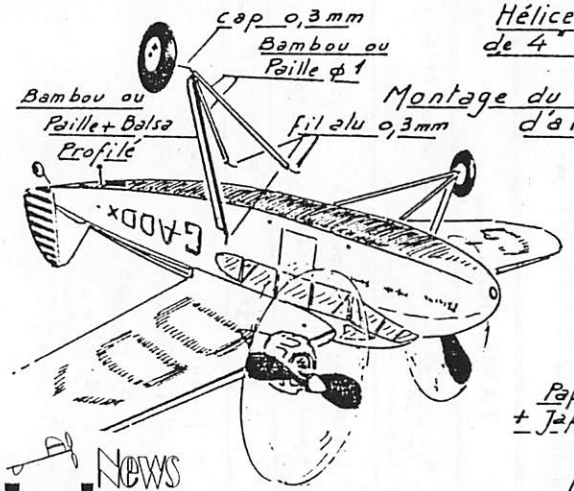
The French Arachide

SHORT S·16 SCION II

par E. Fillon

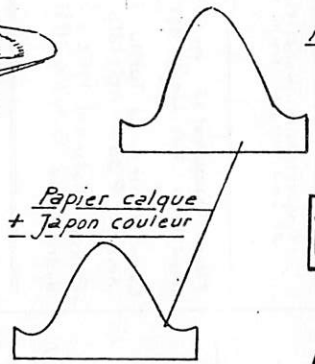
Poids complet sans moteur caoutchouc : 14 gr
Moteur caoutchouc section ≈ 6 mm²
longueur 250 à 300 mm soit 1,6 à 2 gr
Remontage ≈ 800 tours soit 1400 tours d'hélice

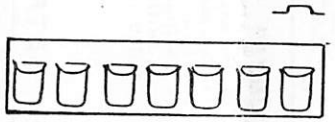


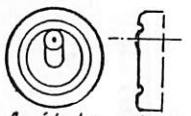


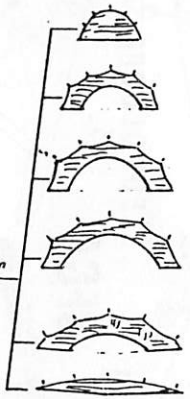
News Indoor 6

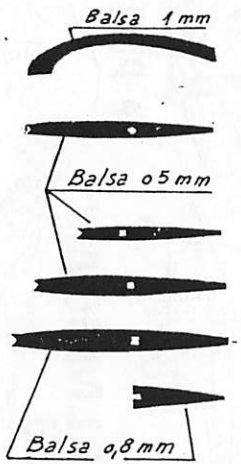
Enlarge 141%

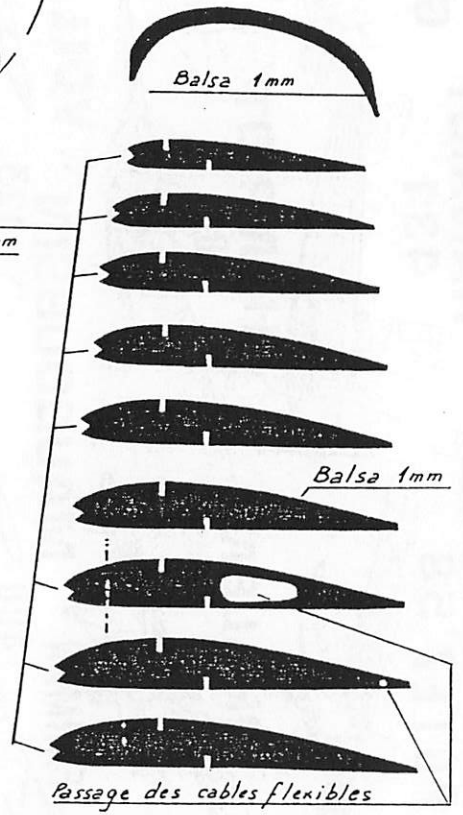


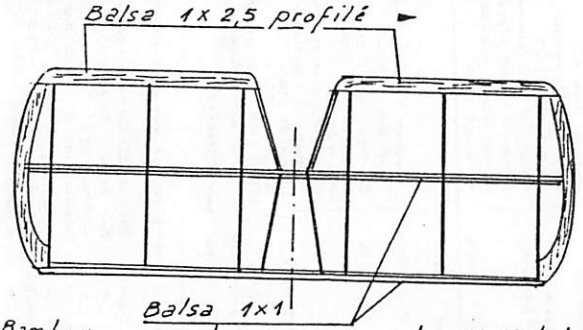


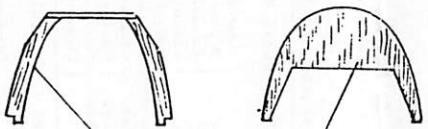


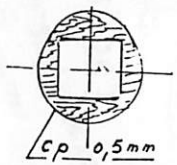


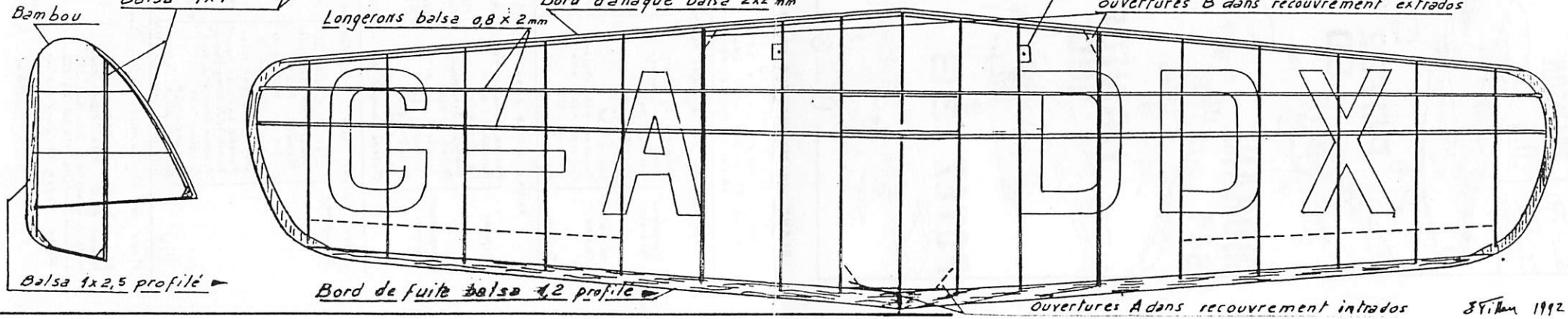




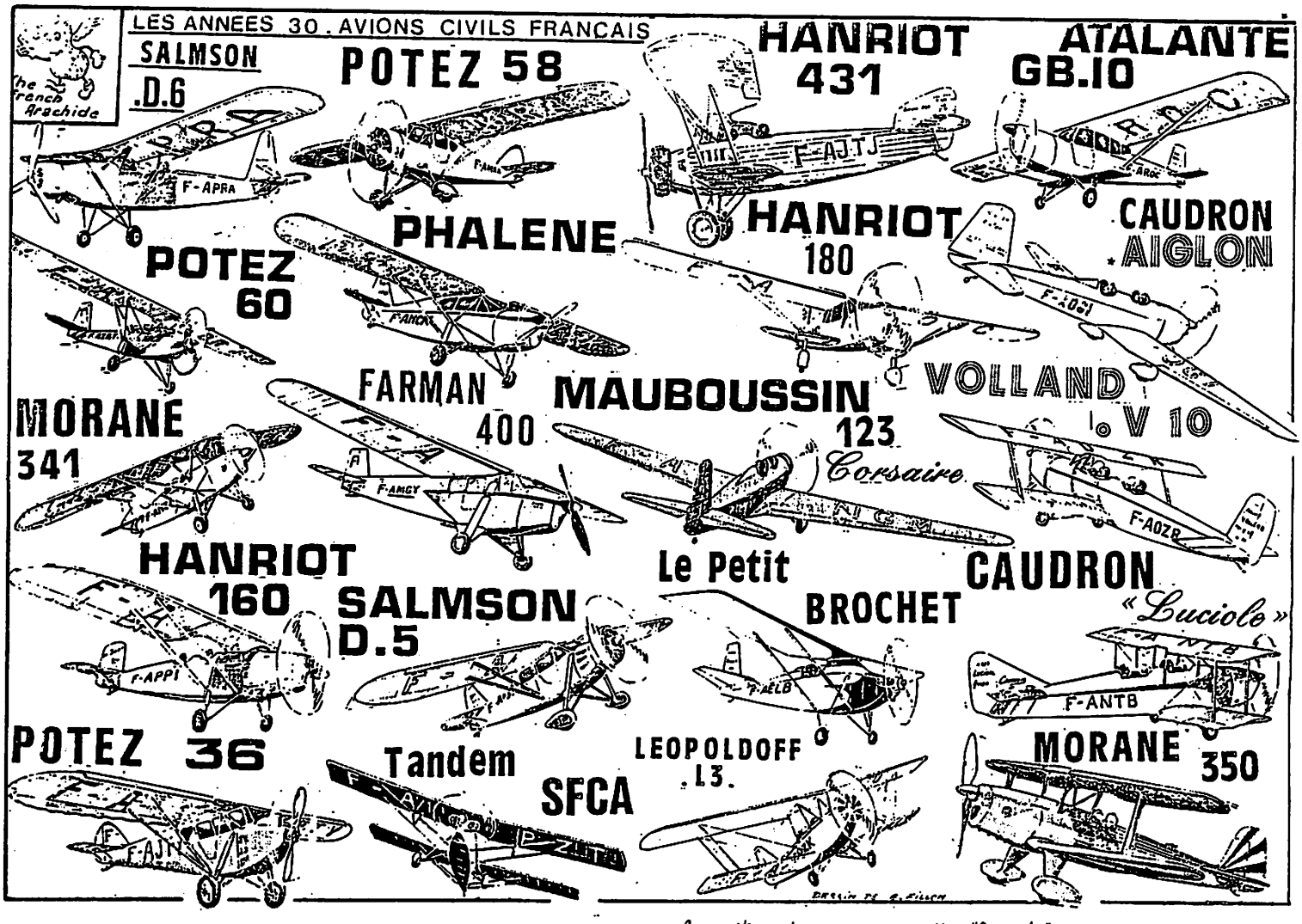








E Fillon 1992



PLANS de MAQUETTES VOLANTES taille "PEANUT"

ENVERGURE : 13" - 330 mm OU LONGUEUR : 9" - 230 mm
TIRAGE FORMAT : A3 = 297 × 420
ETUDE ET DESSIN DE : EMMANUEL FILLON TEL. 04 95 62 06
60 RUE DU BOCAGE 83700 SAINT RAPHAEL FRANCE

Série spéciale sur le thème : AVIONS CIVILS FRANÇAIS DES ANNEES : 30

Monoplans Parasols	Salmson D6 "Criéri"	Biplans	Hanriot 431
	Potez 60 "Sauterelle"		Biplan Volland V.10
	Morane 341		Caudron "Luciole"
	Hanriot 160		Léopoldoff "Colibri"
Monoplans Cabine	Potez 36	Sesquiplans	Hanriot 180
	Potez 58	Cabine	Atalante GB 10
	Caudron 410 "Phalène"	Monoplans Aile basse	Caudron "Aiglon"
	Farman 400 - 404		Maubousin "Corsaire"
	Salmson D5	Monoplaces	Petit Brochet
Tandem	Payrat "Loupin" SFA		Morane 350

AVIONS CIVILS FRANÇAIS DES ANNEES : 30 SUITE 2ème série

Biplans	Morane Saulnier 140	Parasol	Farman 201
	Romano R80	Monoplans Cabine	Bernard 201
	Le Moineau		Maubousin X
	Bourgeois Sénemaud		Gérard Club 45
Monoplans Parasols	Ayrat Nässler		Salmson "Phrygane"
	Sablier biplace	Formules Spéciales	Poudu Ciel HM 21
	Albert TE 1		Fauvel AV 10 (2 formats)
	Fellot Lacour		Maubousin "Hémiptère"
	Greisch Thust		Canard Nicolas Claude
	Morane Saulnier 180	Aile basse	Wibault 344

Autres plans sur 1 Format A3

Monoplans	Blériot Gouin XI	Monoplans	Caudron 450 Coupe Deutch
	Blackburn Airedale		Prest Baby "Pursuit"
	Renard R 31	Parasols	Brochet MB50 Pipistrelle
	Stinson Modèle O		Boisavia 880 Chablis
	Fike Modèle E		Renard R 33
	Dayton Wright racer		Morane Saulnier type L
	Morane Saulnier type H		Farman Carte postale
	Poullin 3P2a Globe trotter	Biplans	Darmstad 18
	Caudron Renaud "Simoun"		Albatros DV a
	Caudron "109"	Tandem	Lignel. SFCA. "Cross Country
	Bellanca CF	Expérimental	l'Ecole de l'Adar
New	Blériot XI 2 Prigoud		Mécanique pour bimoteurs
	Blériot XI Souverain Manche		

Plans sur 2 Formats A3 . Pour certains plusieurs variantes par plan

- Biplan : Poli Karpow P02. U2. S13
- Parasol : PZL P7a . P8/11 . P24g
- Monoplan Dewoitine 500. 501. 510
- Aile basse "Spitfire" MK VIII. XIV. XIX
- Biplan Potez 25 - 25A2 . 35 Toc

Biplans	Bréguet XIX Point d'Interrogation	
"	Ray Hegys "Chuparosa"	
"	Gotha 145	
"	Hawker Fury II . Spanish . High Speed	
"	Armstrong-Withworth "Siskin"	
Bimoteurs	Glooter Survey AS 31	New
"	Short Scion S16	

Appareils autres que maquette "Peanuts"

Le "Big Boxom" avion d'intérieur cat SAINTE FORMULE .
Le "Ratapenate" appareil expérimental à aile battante
L'Hélico" modèle d'hélicoptère genre Bell
Le "Soufflant" appareil à réaction à turbine Tangentielle — 2 formats
Le Camille . modèle de début cat SAINTE FORMULE
L'ATROU . modèle en Styrofoam début cat SAINTE FORMULE

RETRO .

Cinquantenaire WaKefield 1937. sur Formats A4 (210 x 297)
22 plans trois vues Echelle 1/8e de WaK ayant participé à la Coupe WaK 37
Prix 50 F - port inclus

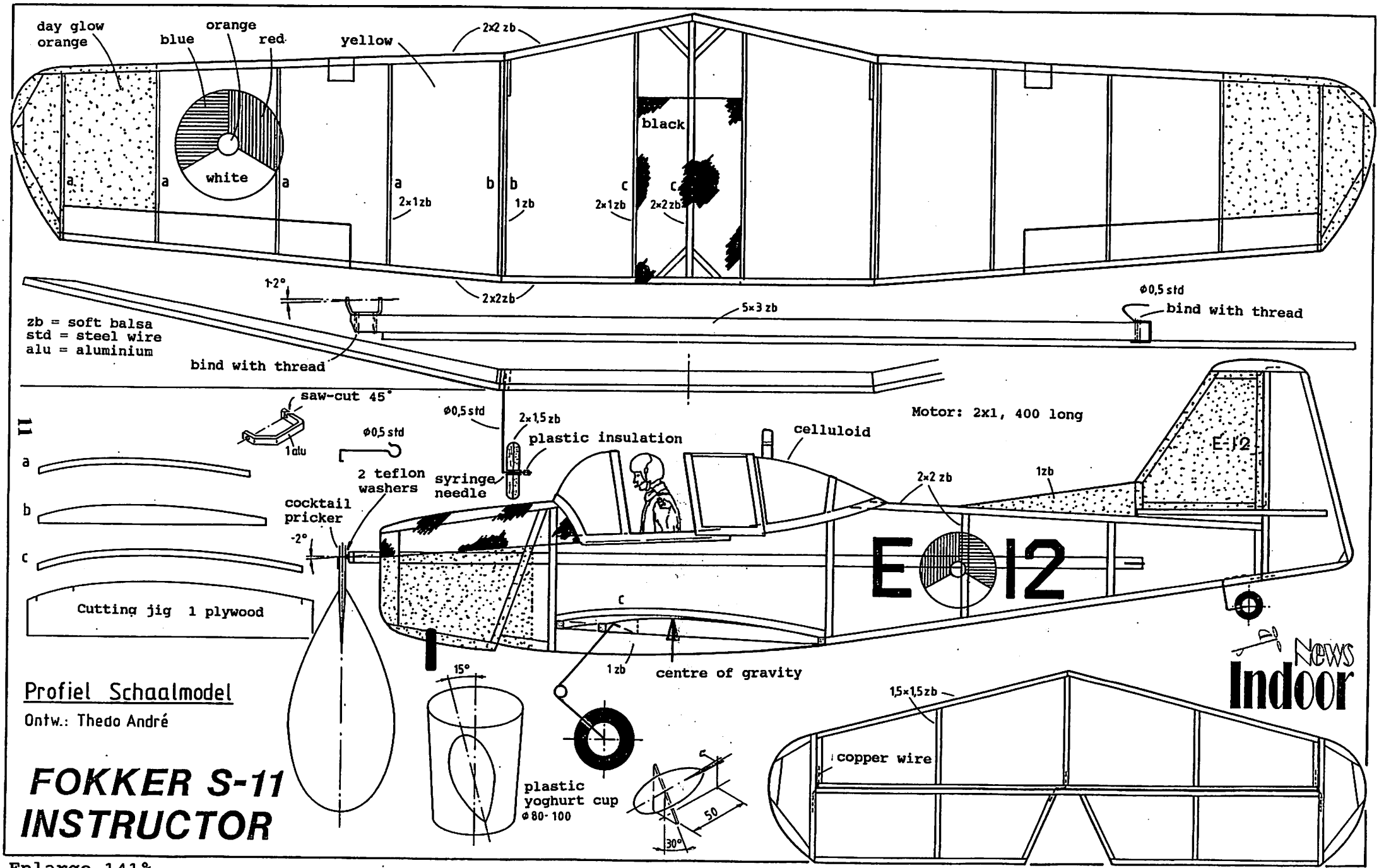
Planeur Championnat 46	env = 2m525	Prix	100F	port inclus
Coupe d'hiver Théo Landes 1953	env = 1,420m	"	20 F	2 formats
Coupe d'hiver La Tordu	env = 1,210m	"	30 F	3 Formats
Avion P30 Aristoto	env = 0,760m	"	20 F	2 formats
Planeur National 1942 -	env 2m00	"	60 F	port inclus
Hydro coque Bi hélico 1941	env 1m32	"	60 F	"

TARIF : Prix de base + Postage Réglement à la commande

Prix spécial "les Années 30" et Années 30 Suite : séries complètes non panachables
20 plans sur 20 formats = 150 F

1 plan sur 1 format = 10,F40
1 plan sur 2 formats = 16,F80

Postage	FRANCE tarif 1992
1 format	= 2,50 F
2 à 4 formats	= 4,00 F
5 à 8 formats	= 6,20 F
9 à 15 formats	= 12,00 F
16 à 22 formats	= 15,00 F
23 à 30 formats	= 20,00 F


day glow orange
blue
orange
red
yellow
2x2 zb
black
white
a
a
a
a
b
b
c
c
2x1zb
1zb
2x1zb
2x2zb
2x2zb
1-2°
5x3 zb
ø0,5 std
bind with thread
zb = soft balsa
std = steel wire
alu = aluminium
bind with thread
saw-cut 45°
1 alu
ø0,5 std
ø0,5 std
2x1,5 zb
plastic insulation
celluloid
Motor: 2x1, 400 long
E-12
2 teflon washers
syringe needle
cocktail pricker
-2°
2x2 zb
1zb
11
a
b
c
Cutting jig 1 plywood
E 12
c
1 zb
centre of gravity
15°
plastic yoghurt cup
ø 80-100
50
30°
1,5x1,5zb
copper wire
Profiel Schaalmodel
Ontw.: Thedo André
FOKKER S-11
INSTRUCTOR
News
Indoor

Enlarge 141%

APPLYING MARKINGS TO SMALL FLYING SCALE MODELS

by Nick Peppiatt (GB)

Lettering, markings and logos can make or break the finished appearance of a scale model. This article outlines methods used by the author which have been acquired over a number of years of building models for indoor flying scale competitions. They are mainly applicable to traditional balsa stick and tissue construction and assume that Jap tissue has been clear doped, either on the model or on a frame prior to covering. Condenser paper is best predecorated prior to covering. As with any aspect of building and flying small scale models, there is no substitute for planning, patience and practice. Before detailing the techniques I am providing a list of suggested tools and consumables.

TOOLS
Cutting mat of suitable size (A3,A4,A5)
Sharp knife (scalpel or similar) - keep sharp with a sharpening stone
Airbrush (single acting) and compressor
Good quality paint brushes
Draughting pens (e.g. Rotring)
Old-fashioned style adjustable draughting pen
Compass with ink pen
Circle cutter (OLFA type or cutting blade in compass)
Frames for shrinking tissue
Some form of light-box (glass sheet with light behind).

CONSUMABLES
Tracing paper
Low tack masking tape (Betto)
Masking film (Frisk, Magic Marker)
Staedtler Lumocolor pens (permanent ink)
Waterslide decal sheet (Formadec or similar)
Letraset, Decadry or similar transferrable letters
Inks
3M Spray Mount

PAINTS The techniques to be described in general work with coloured cellulose dopes (unfortunately no longer widely obtainable) or Tamiya acrylic paints which are sprayed on with an airbrush. Some modellers use Humbrol enamel paints in cellulose thinners but I have not tried this. The adhesive on Betto tape does not appear to be affected by paint thinners, whereas that on masking films can be attacked by cellulose thinners and may require cleaning up after removal of the film with white spirit. I would suggest the following paint dilutions:
Cellulose dope: base colour, 10% colour/ 10% clear dope/ 80% thinners. Spray markings with 50/50 colour dope/thinners. Tamiya acrylics: 80% colour/ 20% Tamiya thinners. Clean airbrush with cellulose thinners.

LARGE LETTERING AND OTHER MASKED DECORATION The golden rules are:
(a) light colours first (which I will illustrate later by examples).
(b) decorate the major parts before final assembly of the model.

Firstly, the lettering will need to be drawn out on tracing paper, so that the proportions can be checked by overlaying on the plan from which the model has been built and compared with any other documentation. Once satisfied, sufficient photocopies should be taken to provide secondary masters for preparing the masks. The masks can be made from Betto tape secured to a clean cutting mat or from masking film which has a paper backing. Betto tape can be overlapped to give a greater width. Tape the secondary master in position over the masking material, and cut out the letters or designs with a sharp knife. After the base colour has been sprayed on the model and allowed to dry the masks can be positioned on the model by a process of trial and error. A few strategic soft pencil marks on the model can help aid alignment as can a partial interleaving of a piece of uncut backing paper to which the mask will not readily stick. Once in the correct position the mask can be pressed down firmly and an instrument such as the rounded end of a scalpel handle run around the critical edges to seal them. Areas which need to be protected from overspray should be masked off with pieces of newspaper attached with masking tape. Before spraying the colour of the decoration it is a good idea to spray the mask with a light coat of the base colour. This will further help seal the edges and prevent bleeding. The darker colour can now be sprayed and allowed to dry to touch. The mask should be removed by peeling back on itself at 180 degrees and this process can be helped by the aid of tweezers. Now sit back and admire your handiwork or if necessary touch-up carefully with a fine brush.

Examples:
Gloucestershire Gannet - fuselage blue with white lettering. Covered with white tissue and fuselage sides sprayed white. Separate masks of each of the letters are applied to the fuselage

which is then sprayed blue.
Wings white with black lettering. Covered in white tissue sprayed white. Apply mask with cut-out letters and spray black. Tamiya acrylic paints used thoughout.
D.H. Puss Moth - fuselage black with gold lettering and gold and silver pin stripes. Covered with black tissue and fuselage sides sprayed gold. Separate masks of each of the letters applied and also thin strips of masking tape to cover the gold pin stripes. Note uncut tape edges should not be used because they can pick up dirt on the roll. The tape should be stuck to the cutting mat and the strips cut with a straight edge discarding those with the original tape edges. Masked fuselage then sprayed black. Nose then masked to allow silver pin striping to be sprayed. Silver paint is dense enough to do this.
Wings silver with black lettering. Covered in white tissue sprayed silver. Apply mask with letters cut out and spray black. Note that silver is particularly difficult because of its low adhesion and tendency to be removed with the masking medium. Tamiya acrylic paints used throughout.

SMALL LETTERING AND LOGOS If letters or markings are too small to be applied with masks and an airbrush, they are best prepared off the model on a medium such as water-slide decal film. This is available with different texture finishes and also as an adhesive layer on which a couple of coats of thinned dope or clear polyurethane can be applied to give the backing. The marking can be applied using a suitable draughting pen, felt pen or brush. As the paper backing for the transfer is opaque this is where some sort of light-box is handy, as the pattern for the logo can be seen through if the transfer film is placed over the pattern and light shone from behind. The fact that these markings are made off the model means that a good number of attempts can be made to achieve a suitable result at relatively little cost. An alternative to drawing letters is to apply rub on letters such as Letraset or Decadry of the correct shape and size, to the decal sheet.

Example:
Wheel hubs of D.H. Puss Moth - silver rim with black centre and gold DH logo. The hubs were made of plasticard formed against a warm light bulb by pressing with a piece of 3mm ply with a suitable hole cut out. The hubs were then sprayed silver and a black circle drawn on with a pen type compass. The centre area was then filled in using a brush. The gold DH was prepared as a waterslide decal and applied to the centre of the hub.

OTHER TECHNIQUES FOR LETTERING
The following techniques are less stressful methods of applying letters to your model and are particularly useful on silver finishes. Larger letters can be cut directly from waterslide decal sheet and sprayed with the appropriate colour. They are then soaked off and applied separately. Another option for black letters on cellulose finishes is to cut the letters from black tissue which has been preshrunk and doped on a frame. These can then be positioned on the model one at a time by spotting on cellulose thinners with a small brush. The thinners will dissolve the dope locally thus causing the letter to adhere. Further thinners should then be applied, to the letter only, to attach it fully.

IF ALL GOES WRONG... I generally use aliphatic resin for construction and apply the tissue using a dope and thinners technique. This means that if a disaster occurs with the decoration the structure can be immersed in a bag containing thinners. The covering will float off, the structure will remain intact and can be recovered when it has dried out. It works. I know because I've done it on several occasions.

CONDENSER PAPER I use a different technique for this medium in that the covering is predecorated before being applied to the model. A piece of the condenser paper is stuck to a suitable frame and sprayed with an ink of the base colour using an airbrush. This process sometimes seems fairly close to disaster because runs occur as the dampness causes the paper to sag, but it usually comes right as the paper dries. When dry cut the paper from the frame (notice the tension) and store flat between the pages of a large book before use. Decorations are applied by taping a piece of condenser paper over a suitably marked up view and drawing on and colouring with Staedtler Lumocolor pens. Note that this technique will give a translucent finish which some will find unacceptable but which I feel is perfectly suitable for very small models such as Pistachios where weight is at a premium.

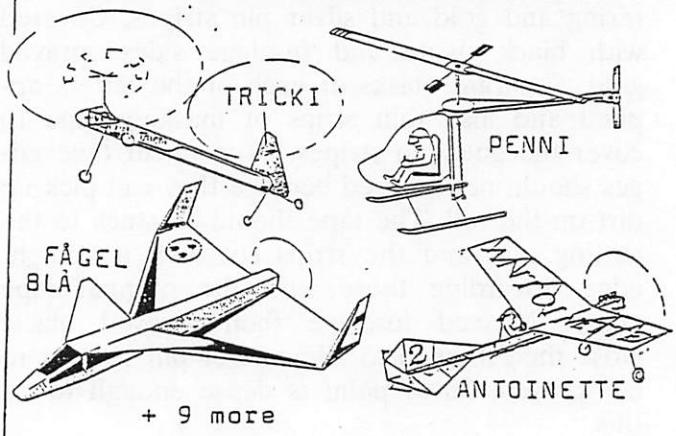
It is worth noting that some modellers have used acrylic paints with Betto tape masks on condenser paper but I have not yet tried this.

I have made RAF roundels from condenser paper sprayed with white ink and with the coloured spot and circles drawn on with Staedtler Lumocolor pens. The discs were then cut out, a light coat of 3M Spray Mount applied to the back and fixed to the condenser paper paper covering.

FURTHER READING Air-brushing techniques are dealt with, for example, in "Airbrushing for Modellers" by Goldman and Rubenstein published by Almark 1974 (ISBN 0 85524 177 2) which covers plastic kits and also in Ian Peacock's series of articles published in the Aeromodeller in 1978. Useful snippets of information often appear in the modelling press such as the "Scale Matters" column in Aeromodeller but apart from the superb series of photographs and captions in Doug McHard's article on Building and Finishing in the Model Builder publication "Flying Scale Models of WW11" I am unaware of an in depth treatment of this particular subject. It is hoped that this article goes some way in redressing the balance.

Acknowledgements: I would like to express my particular indebtedness to the late Butch Hadland who, apart from his fine example to us all in his willingness to share his vast fund of hard-won knowledge, personally showed me his techniques of airbrushing and finishing a peanut scale model. I have used these methods on many subsequent models and they form the basis of much of this article.

Helped and inspired by Burkam, Hannan, Hattum, Scott and SIG Co.
I have made a new line of models suitable for INDOOR & OUTDOOR use.
They all fly beautifully and are simple to build with exception for PENNI & TRICKI who need more experienced builders.
ARE YOU INTERESTED IN GETTING VERSIONS FOR YOUR COUNTRY?
So far English (American) and Swedish instructions are ready but I am looking forward to getting YOUR help with translations into your language.

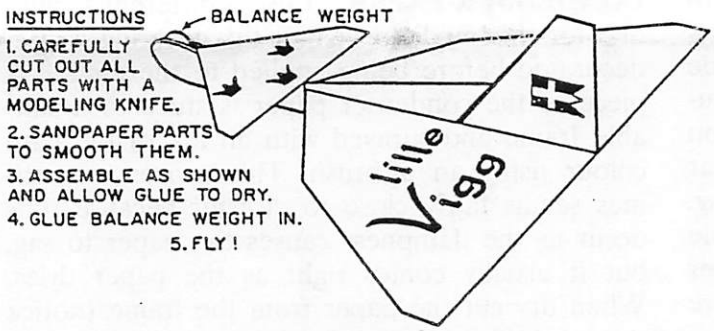


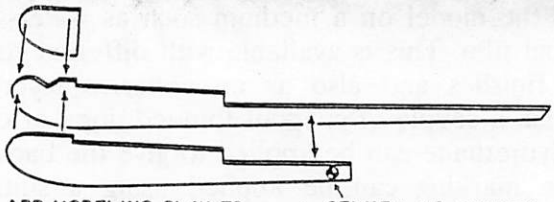
+ 9 more

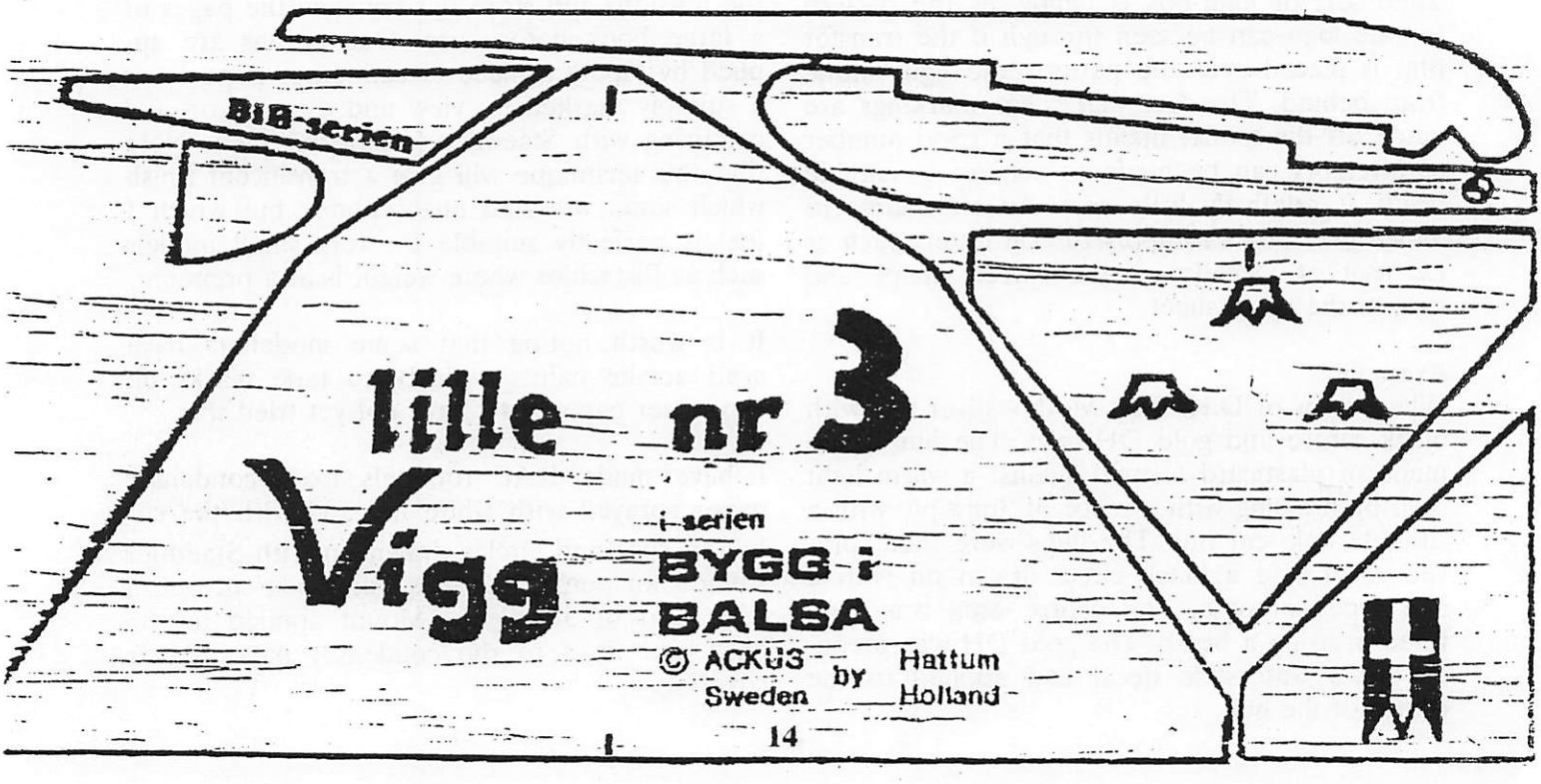
THE KITS ARE SUITABLE FOR CLUBS BUT ALSO FOR INDIVIDUAL MODELLERS SINCE A LOT OF WORK HAS BEEN DONE ON PICTURES IN THE BUILDING INSTRUCTIONS. LOW PRICES BUT HIGH QUALITY!

PLEASE WRITE ME IF YOU WANT TO BUY OR GET MORE INFORMATION.
In Britain you can get most of the kits from BALLARD's.

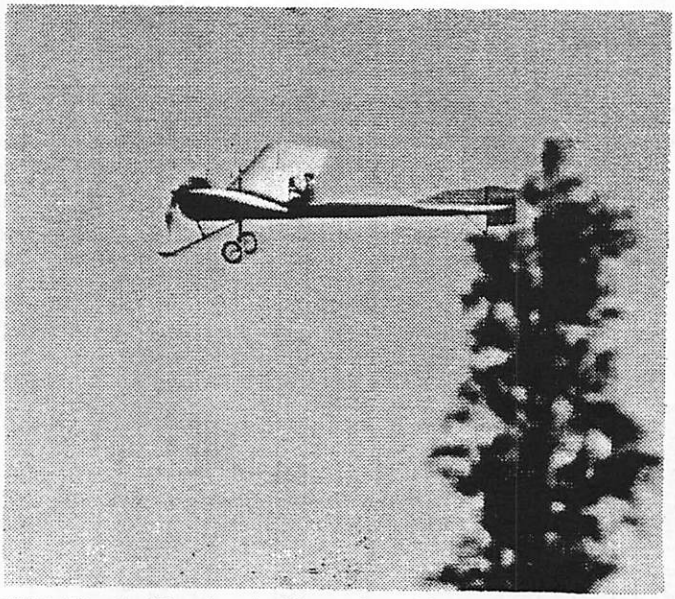
ACKUS, Rune Johansson, Åkersliden 3, 446 41 ÄLVÄNGEN, SWEDEN.



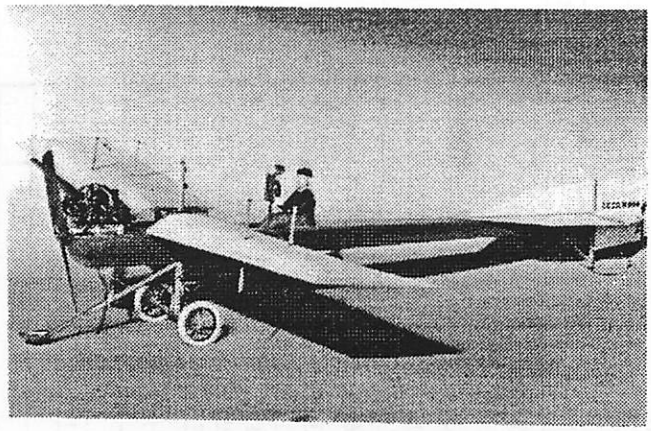


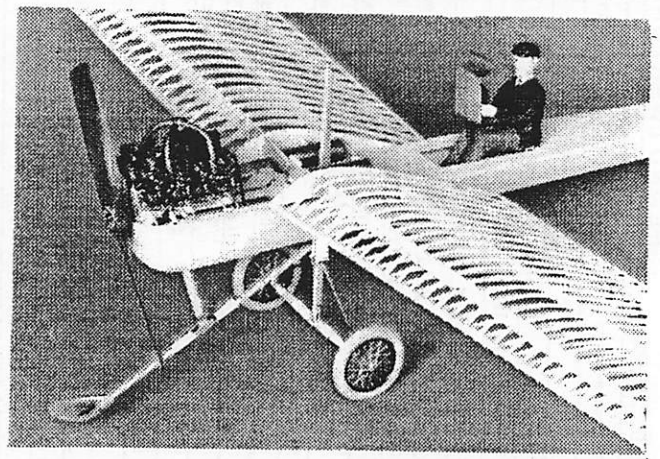


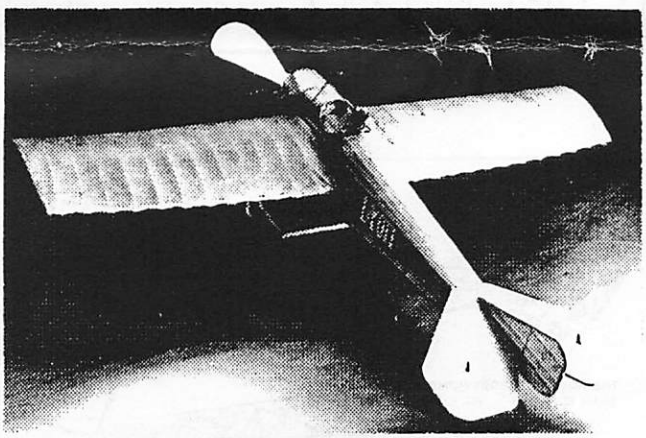
The models on the following photographs are all built by Peter Forster from New Zealand:



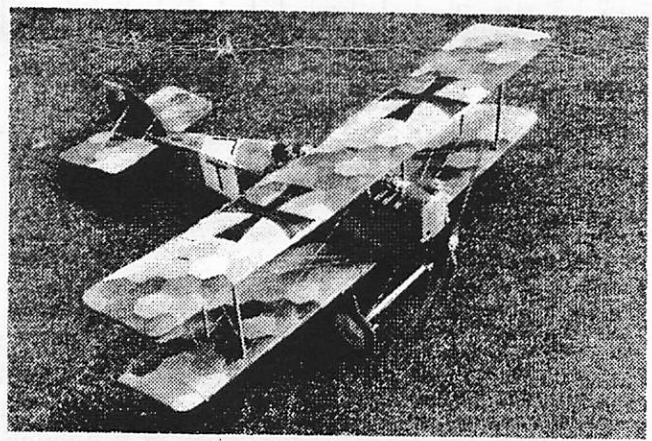
1911 Martin Handasyde Monoplane No.3
- Telco CO_2 powered.
- Span 700 mm, weight ±60 gm.



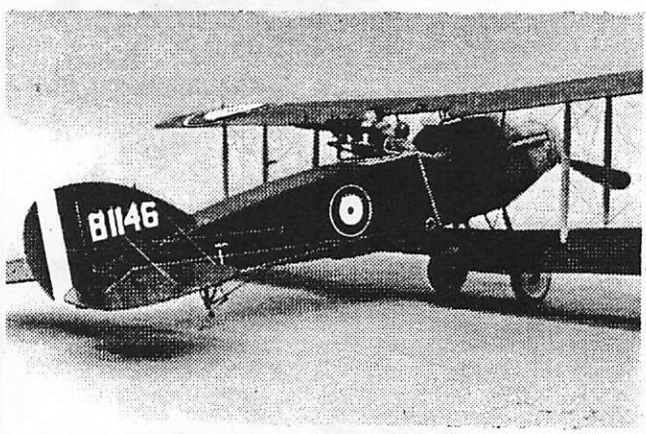


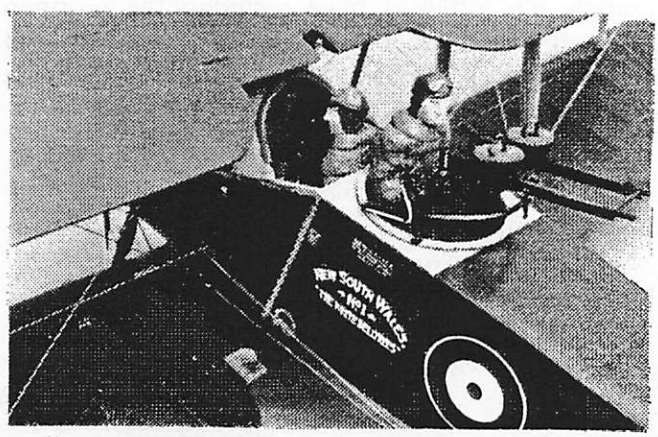


1913 Dyott Monoplane, Peanut scale.
Flies well but duration not great.

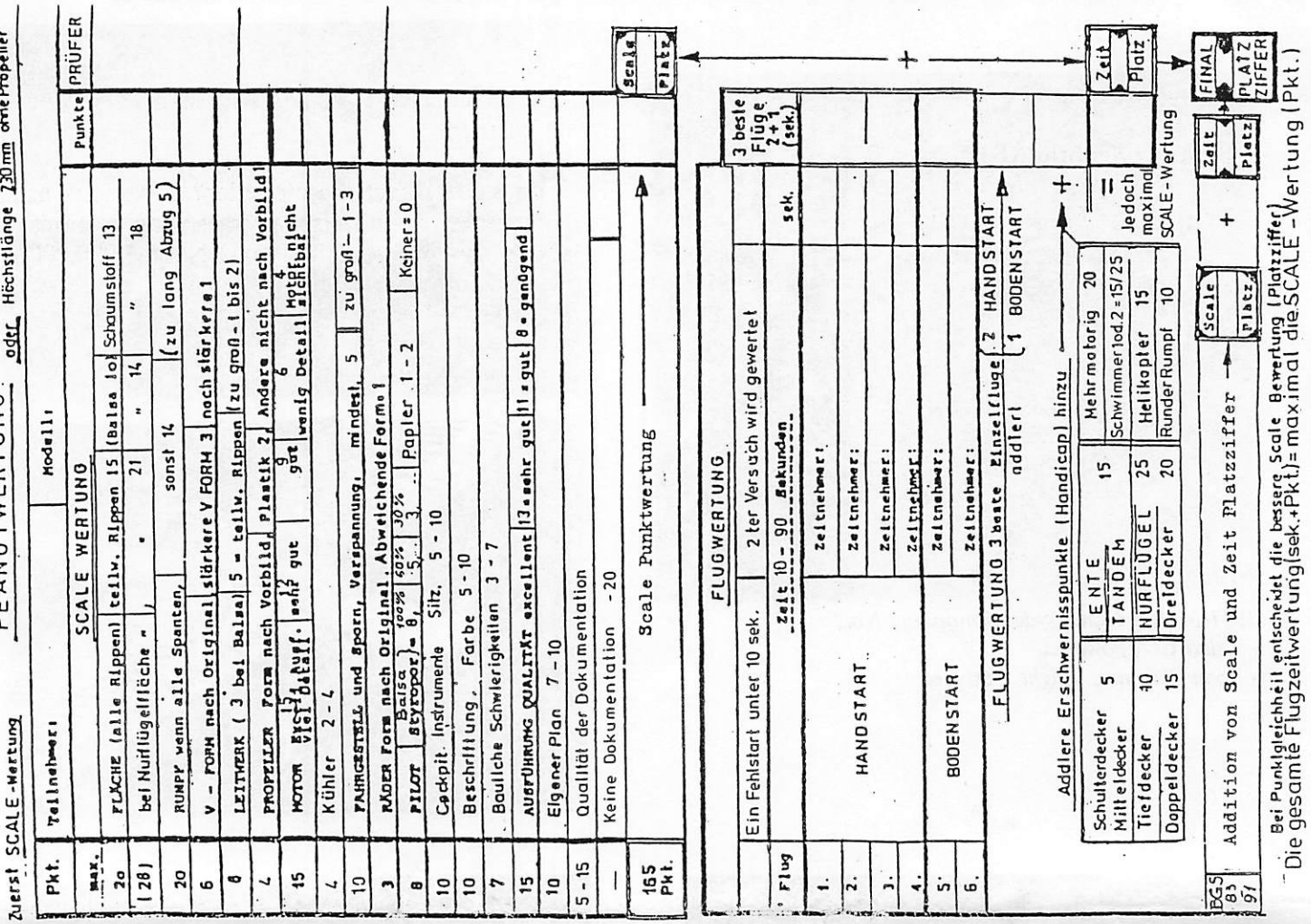


Austro-Hungarian 'Berg' Scout.
Telco CO_2 powered.





Bristol Fighter F2B which won the CO_2/Electric evant and took second in open rubber scale at the last Interscale event.
- Scale 1:19, span 630 mm, weight 57 gm, wing loading 5,46 gm/m^2
- Telco CO_2 powered or interchangeable with rubber powered gear box.



COMMENTS ON PEANUT RULES

By Benno Sabel (GER)

In my view there are quite some faults in the new Peanut rules. Why should I build a detailed engine when I can get only 1 point? 9 points for a colour doped model is too much, 7 is enough. The points allocation for covering does not satisfy me either. I have included the German Peanut Scoring sheet, which I developed in 1983 and improved ever since. I also doubt whether a fly-off is really needed. What are your views?

"MAKING SCALE MODEL AIRPLANES FLY" (Revised)
The whole story under one cover
How to select, improve, construct, adjust and troubleshoot all types of scale models. Also non-scale duration models. Widely recommended in model press. $14.95 ppd. Aircraft Data, Dallas, TX 75376-3576. Order today! For more info send SASE.

MINIATURE Peanut Scale AIRCRAFT
The 1929 HEATH PARASOL
SP. 13" LN. 9" WT. 6 GMS.
THE 1929 ALCO SPORT HOME BUILT
SPAN 13" LN.9" WT. 6 GMS.
SUPERB DETAIL & INSTRUCTIONS
• Illustrations • Iron-on Transfers
3 Views • History • Flying Instructions
The 1921 WATERMAN RACER
ULTRA SELECT SHFET & STRIP BALSA
Japanese Tissue • Plastic Prop • Washers
Prop Shaft • Bearing • Rubber • Engine Parts
PLASTIC CYLINDERS INCLUDED
Sp. 13" Ln. 9" Wt. 7 gms. ½
BLACK & RED TISSUE
THE SKY RIDER
Sp. 13" / Wt. 3 gms.
The 1982 ZIPPY SPORT A.R.V.
Sp. 13" Ln. 9" Wt. 6 gms.
BLUE TISSUE
The 1937 AERONCA K
SP. 16" LN. 9" WT. 7 GMS.
HOW TO ORDER
FOR FREE RUSH SERVICE, INCLUDE PAYMENT WITH YOUR ORDER. VISA and MASTERCARD ACCEPTED
U.S.A. We ship U.P.S. Send check, money order, or we C.O.D. Include 10% shipping, MINIMUM of $3.50, $5.00 maximum.
OVERSEAS. We ship air with inclusion of adequate postage; $8/lb. If overage, we will refund dollars, or include extra supplies. Please include WITH YOUR ORDER, a Bank Draft in Dollars, International Postal Money Order, or Dollars.
CANADA. We ship Air; please include 10% shipping; $5.00 MINIMUM.
INDOOR MODEL SUPPLY
Box 5311
Salem, Oregon 97304
PHONE
1-503-370-6350

AERODYNAMICS AND THE INDOOR SCALE MODEL

by Andy Sephton (GB)

Why Am I Doing This

A few years ago I was asked to give a lecture at the British Model Flying Association's Indoor Scale Model Championships on Indoor Scale Model Aerodynamics. More recently, Reg Boor asked me to base an article for this publication on my lecture notes, and there lies the problem. I rarely if ever speak from notes, and what little I write down normally gets lost within a few weeks of the lecture. So, the following is my recollection of what I thought I meant to say at that time; it may have little relation to what you think you heard if you were there!

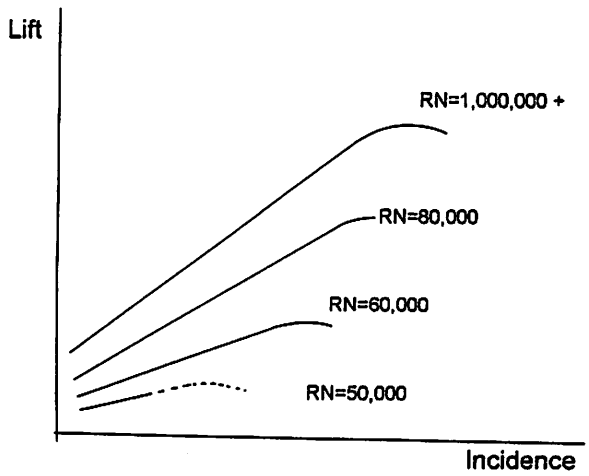
The lecture was of three main parts each looking at one aspect of the problem of operating a small scale model. To illustrate the chat, reference was made to two of my most successful scale models, a Peanut Lacey M-10 and a 1/12th scale Rubber/CO_2 ABC Robin. Photographs of both aircraft have been included in this article.

As part of the introduction to the lecture, I do remember that I gave the following statement: 'To interpret the formulae describing the stability of an aircraft in flight at the aeromodellers level requires far more information as to the models characteristics than most aeromodellers are privy to. Assumptions have to be made, and in some cases, these become blatant generalisations. In order to get my points across, I may have taken some liberties with the (aerodynamic) truth. If you wish to shoot down my arguments, then do so. But you must first look at the results and then try to find a different reason to describe them. All I try to do is explain why some models fly well; the explanation may not be wholly correct, but the result speaks for itself'.

Part 1: The Problem of Low Speed Aerodynamics Reynolds Number (RN) is a term that most laymen shy away from. But, to the aerodynamisist, it is as fundamental as the meaning of life. In very simple terms it describes the number of air molecules that pass between the leading edge and trailing edge of a wing in unit time. So a broad chord wing will have a higher RN than that of a wing flying at the same speed with a narrow chord. If the span were the same, then the two wings would be described as having low and high aspect ratios respectively. Similarly, the faster flying wing of a pair with identical chords would have a higher RN than its slower flying partner.

How does RN effect the modeller? If we look at the lift curves of full size aircraft wing sections (Clark Y say) we see that for RN of 1,000,000 and above the lift gained at a given angle of attack (AOA) is pretty much a constant. However, if the RN is reduced, the lift at constant AOA reduces. Also, the lift reduces at a greater rate for each step reduction in RN. More significantly, the maximum lift available is reduced and it occurs at a lower incidence. So, as we reduce the size of our model (smaller chord) and we reduce its weight (slower flying speed) we find that our wing section becomes less and less efficient. In the limit, the efficiency may reduce to such an extent that it will not fly at all.

Lift Curve for Typical Wing Section



If you wish to test this, then build an ultra light peanut with a thick wing and then try to get it to fly! After you've given up alter the wing section as described in the next paragraph and compare the result.

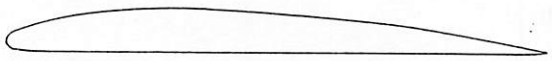
Unfortunately, there is little information on the aerodynamics of wing section below RN's of 1,000,000. To give you an idea of where our interests lie, the following table appears in Martin Simons Model Aircraft Aerodynamics book (highly recommended reading):

Light Aircraft:	1,000,000 and above
Pylon Racer:	500,000 - 1,000,000
RC Glider:	400,000 - 600,000
Wakefield:	30,000 - 80,000
Indoor scale model:	10,000 - 30,000

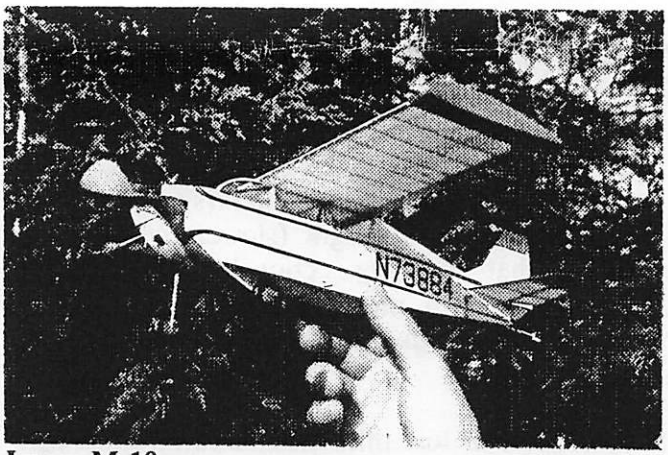
However, all is not lost. If we study what information is available, we find that as the thickness of a wing reduces, its relative efficiency at low RN increases. Further, if we make a passive study of aircraft at a model meeting we see that the thinner wing gives by far the best results on the slow flying model. Single surface covered indoor duration models illustrate this point quite nicely. From practical experiments, I've found that the section Gottingen 795 works very well

Gottingen 795

station	0	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	95	100
upper	2.4	4.4	5.3	5.95	6.45	7.15	7.65	8	7.9	7.4	6.5	5.25	3.85	2.2	1.3	0.4
lower	2.4	0.9	0.5	0.25	0.15	0.05	0	0	0	0	0	0	0	0	0	0.1



on scale indoor models. It has a thin section and thus a better lift/drag ratio at low RN than standard sections such as Clark Y, this effectively gives us more efficiency. The disadvantages are that it looses scale points on front and side elevations owing to its thinness and the lift characteristics require a slightly forward centre of gravity (C of G). As an example, my Lacey M-10 flies for the same time as that of a late colleague but mine weighs some 8 grams more at 17

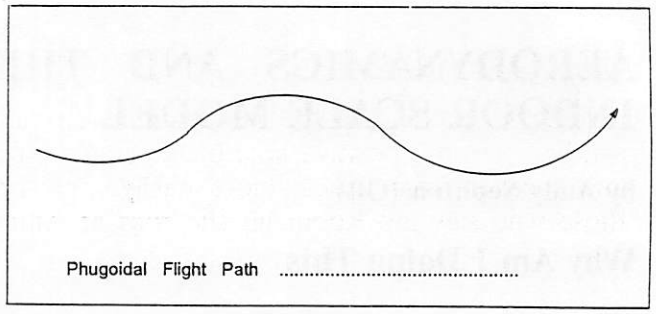


Lacey M-10

grams. The differences are that mine has a slightly longer nose and a Gottingen 795 section. It also has more detail, which is where the weight comes from!

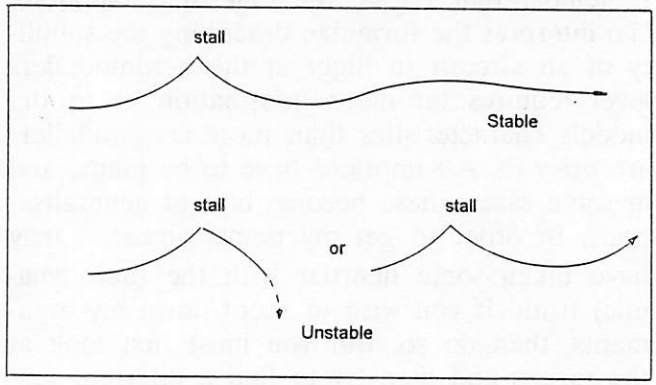
Next time you build an indoor scale model, try the Gottingen 795 section, you may be pleasantly surprised at the results. In any event, I would like to hear from you.

Part 2: The Forward C of G Longitudinal or pitch stability of a model in flight can be seen in two ways. Either by looking at its phugoidal flight path or by looking at the model after some perturbation, such as hitting the roof or after a stall.



The phugoid can be seen quite nicely on most models after takeoff. The model pitches up as it clears ground effect, climbs and slows, pitches down as it turns, swoops low and picks up speed, pitches up, climbs and slows, etc, etc. If one looks closely enough, most models can be seen to exhibit this pattern of flight, the same applies to all fullsize craft, in fact. The cure is easy, just add more weight to the nose and adjust the trim of the elevator to suit.

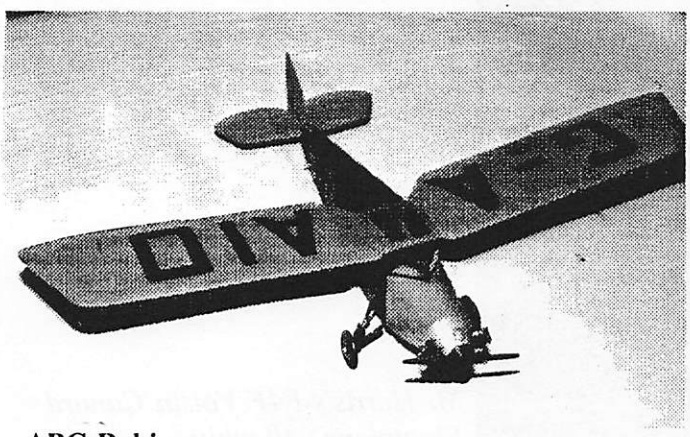
The second pitch stability phenomena mentioned above is perhaps far more important. A significant proportion of the models that I have seen at indoor meetings have longitudinal stability characteristics that tend towards the neutrally stable and unstable categories. A gust of wind from an open door hits the model, the nose drops, it picks up speed, it climbs, stalls and then either pitches nose down to destruction, or continues the stalling cycle with progressively greater amplitude until the same result is achie-



ved. A similar phenomena can be seen during initial trimming when a model is ultra sensitive to elevator angle. A much closer inspection of the flight path would probably reveal a positive pitchdown following a stall, or the above described undamped stalling sequence both of which are a characteristic of the longitudinally unstable model. Again the cure is easy, add weight to the nose and retrim.

The disadvantages of the extra weight are twofold. One, we carry more weight into the air and two, the up elevator produces what is referred to as trim drag, which reduces efficiency. Both disadvantages are negligible when compared to the possible gains. In competition, stable smooth

flight scores far more than slower unstable flight when considering realism. More important however, the model will be more stable on take off, have a more positive take off (see next part) and recover from upsets more easily. I'm sure those who saw my Robin hit the roof at Alum-



ABC Robin

well two years ago would agree. Under power, the nose dropped in a vertical dive, but the model pulled out in about 20 of the available 30 feet and continued in a steady climb after quickly slowing to normal speed. The model is in fact, almost ultra stable. The C of G is just behind the front of the side window, at about 15% chord. For stable flight, this requires a wing incidence of +4 degrees and a tailplane set at -1 degree, i.e. decalage or longitudinal dihedral of 5 degrees. Normally one would expect 3 degrees decalage on this type of model. 5 degrees is excessive, but the safety in flight makes it more than worthwhile and it does also allow a smaller than normal tail.

Part 3: The Free Flight Take Off How many times have you seen an indoor model spinning on its vertical axis at the end of a landing run, or worse, during take off? The reason is simple, especially if the model has a tailwheel rather than a conventional (tricycle) undercarriage. With two mainwheels both creating ground drag in front of the C of G, if the nose should move just marginally to the left or right of aircraft travel, the drag force on the wheels will tend to accentuate the movement of the nose. The turn will tighten, drag will increase and the turn will tighten further. The torque of the prop will start the process, the rest will follow and you have already seen the result.

So how do we stop it? Analysing the movement will show that it is accentuated by: the width of the undercarriage, the drag of the wheels and by the distance of the undercarriage in front of the C of G. We can do nothing about the first point on a scale model, but to alter the other two is easy. A little toe-in on the wheels will increase the drag on the side away from the turn, giving a righting force, and, yes, you've guessed it, moving the C of G forward will reduce the destabilising couple caused by the forward wheels.

Moving the C of G forward has another important effect on the take off. The further forward the C of G, then the more the static stability of the machine. This relates to model flight in the following way: consider two identical models, one with an aft C of G (model A), the other with the C of G forward (model B). It follows that model B will have a greater decalage than model A. So, if both models are trimmed to fly at the same speed and that speed is increased slightly, then model B will pitch up more than model A. Stability wise, model B will slow down and return to level flight quicker than model A, but for take off, the greater pitch up of model B will cause an earlier and positive lift off. One could argue that a quick unstick is not required for scale competition, but better that than no take off at all!

Summary To summarise then, aerodynamics in the region that the indoor scale modeller uses requires thinner than normal wing sections to be used, try Gottingen 795, for example.

To achieve a stable and therefore, realistic flight a more forward C of G is required. This has the added advantage, with a little toe-in on the wheels, of helping take off stability and success.

Good luck and successful modelling!

You too can be Famous!

Earn the Respect and Admiration of other Indoor Flyers!

Contribute your knowledge and experience to

Indoor News and Views

Your INAV editor is soliciting any of the following:

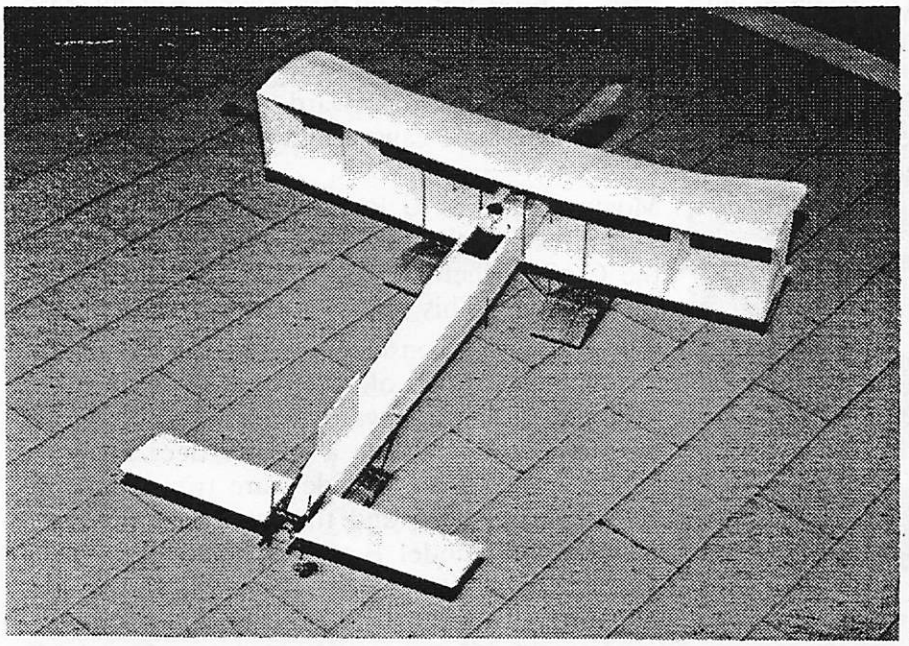
- **Covering and Building Techniques.**
- **New Indoor Designs and Plans.**
- **Indoor Aerodynamics and Experiments.**
- **Contest and Other Activities in your Area.**
- **Rules, Rumors, Humorous Stories, etc.**
- **Historical Notes, Opinions, etc., etc., etc..**

Send whatever you like to:

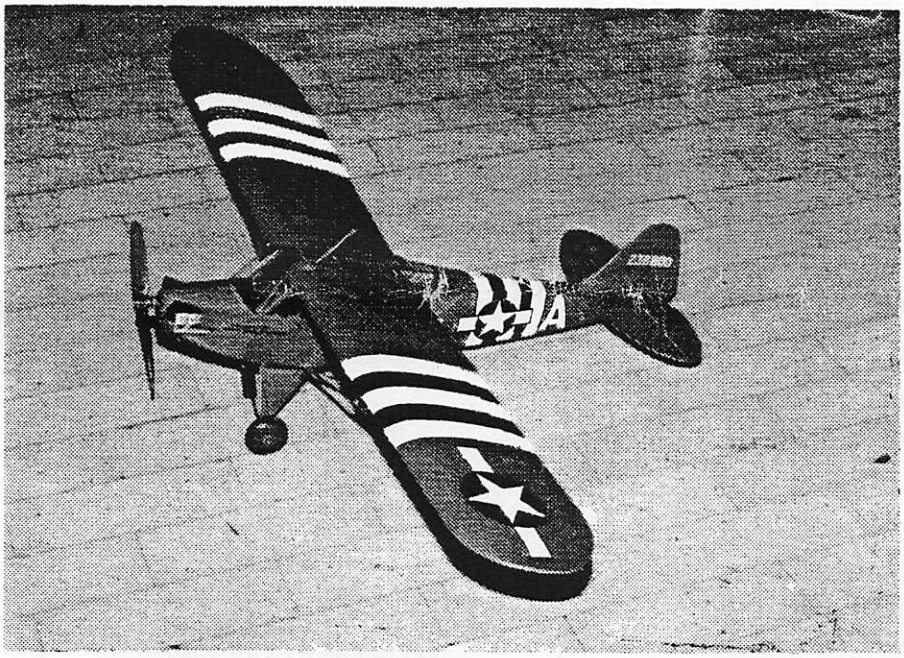
Lester W. Garber
Editor Indoor News and Views
2324 East 5th Street
Duluth, MN 55812

Voice: 218-728-6827
FAX: 218-728-6841

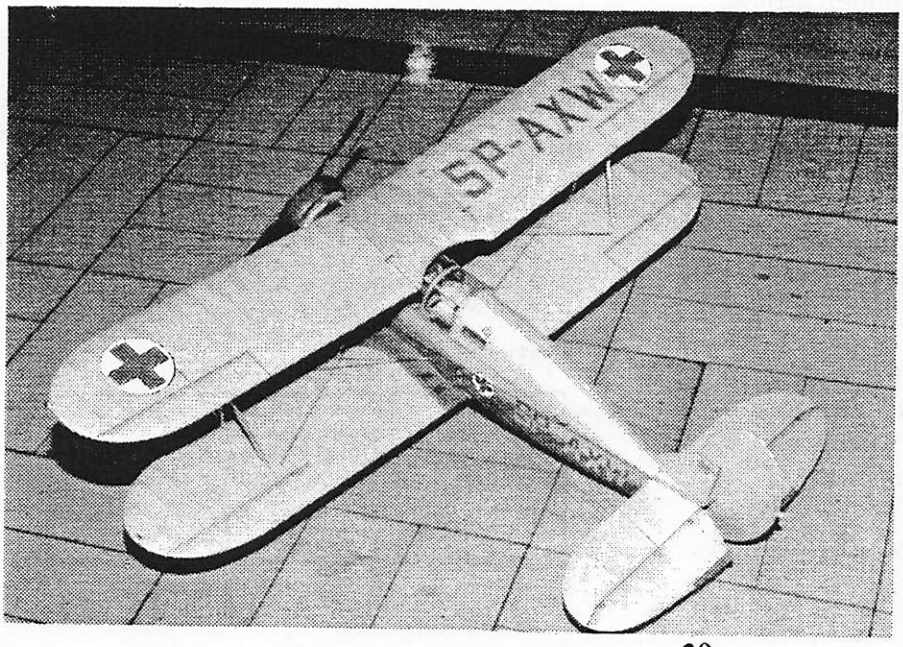
Photographs on this page by Bill Dennis, former scale correspondent for Aeromodeller.



M. Harris's F4F Voisin Canard Floatplane. All white.

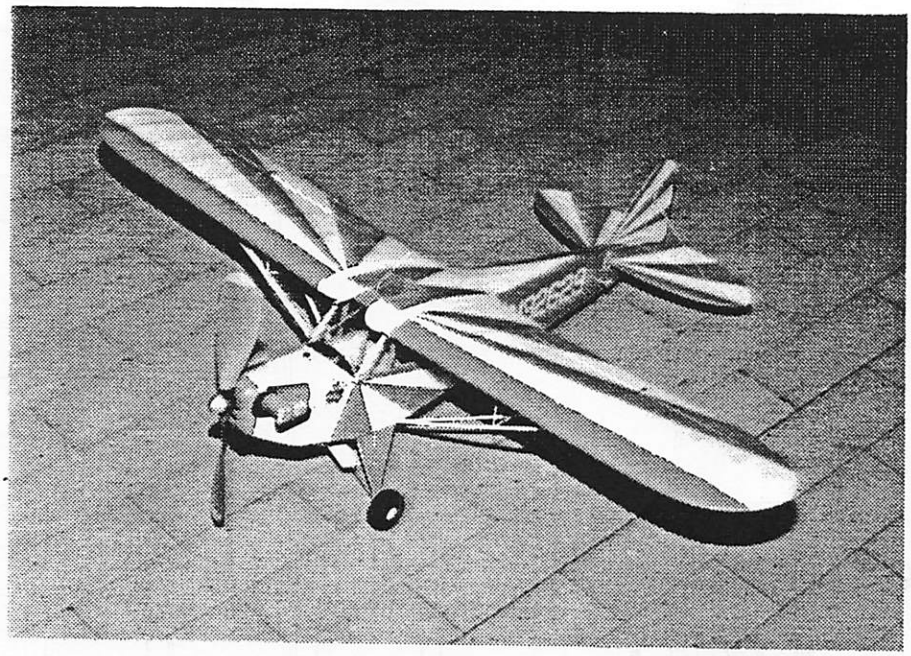


Peter Smart's F4E Piper Cub. Telco CO_2 Dark green.

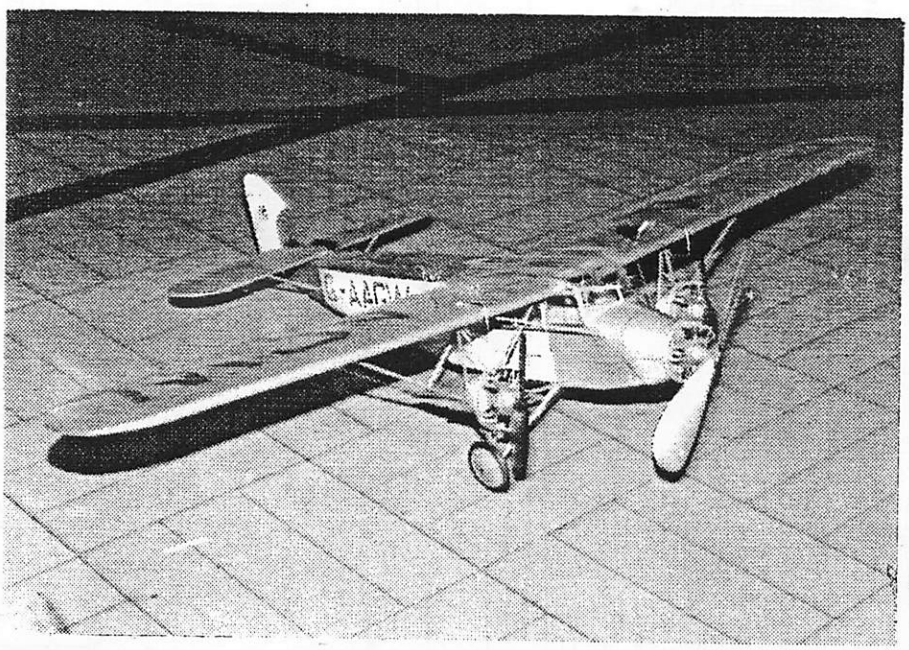


D. Deadman's F4E Polikarpov. Telco CO_2. Blue and silver.

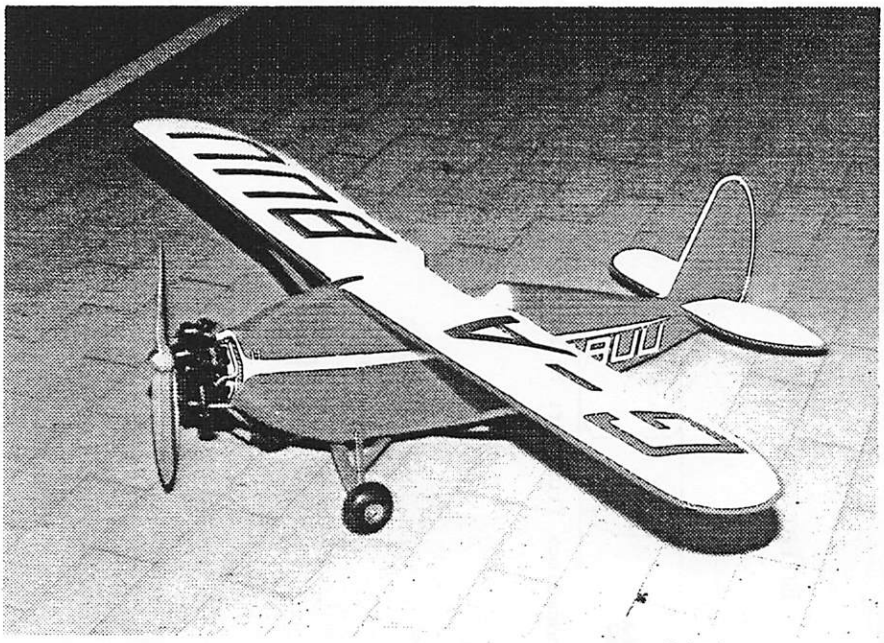
Photographs on this page by Bill Dennis, former scale correspondent for Aeromodeller.



Butch Hadland's F4D. Hazel Sig's clipped wing Cub. Rubber. Blue and white.



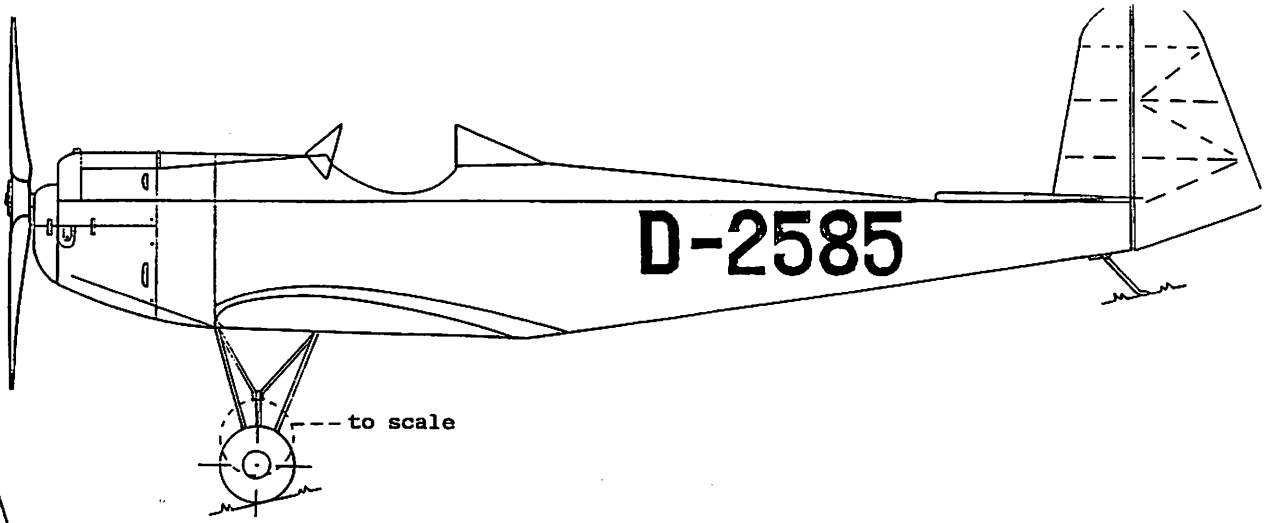
B. Hetherington's F4D Westland Wessex. Rubber. Blue, silver and white.

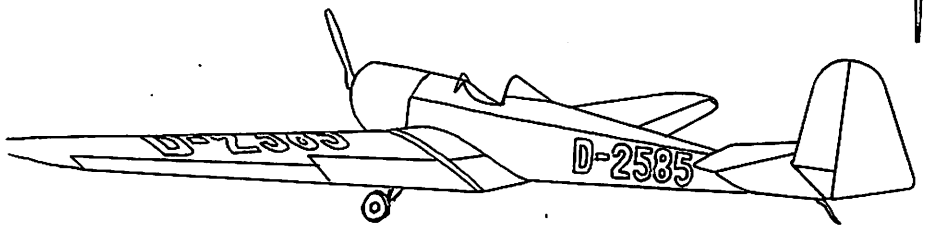


Charlie Newman's F4D Comper Swift, Pobjoy engine. Much plastic moulding. Rubber. Red and white.

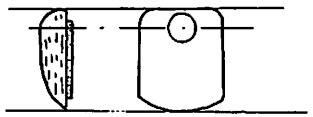
Erla 5-5 D

Scale 1:28,05
Span 39 cm
Drawn by Niels Brendel (NL)

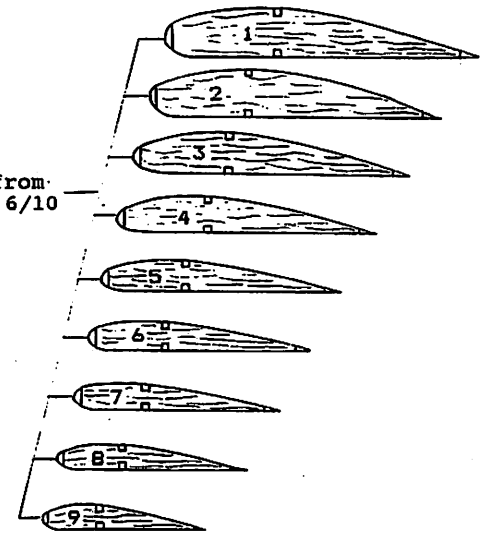




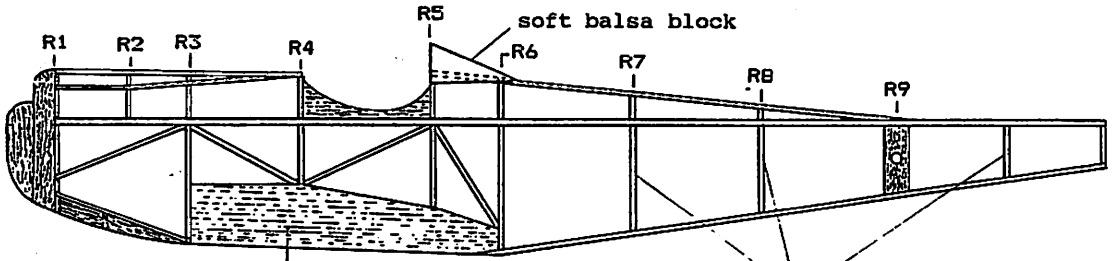
Enlarge 141%

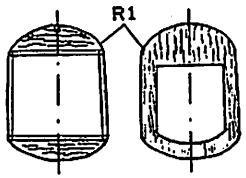


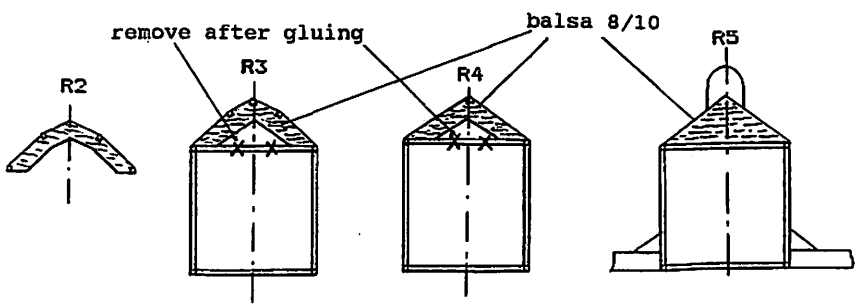
noseblock from soft balsa

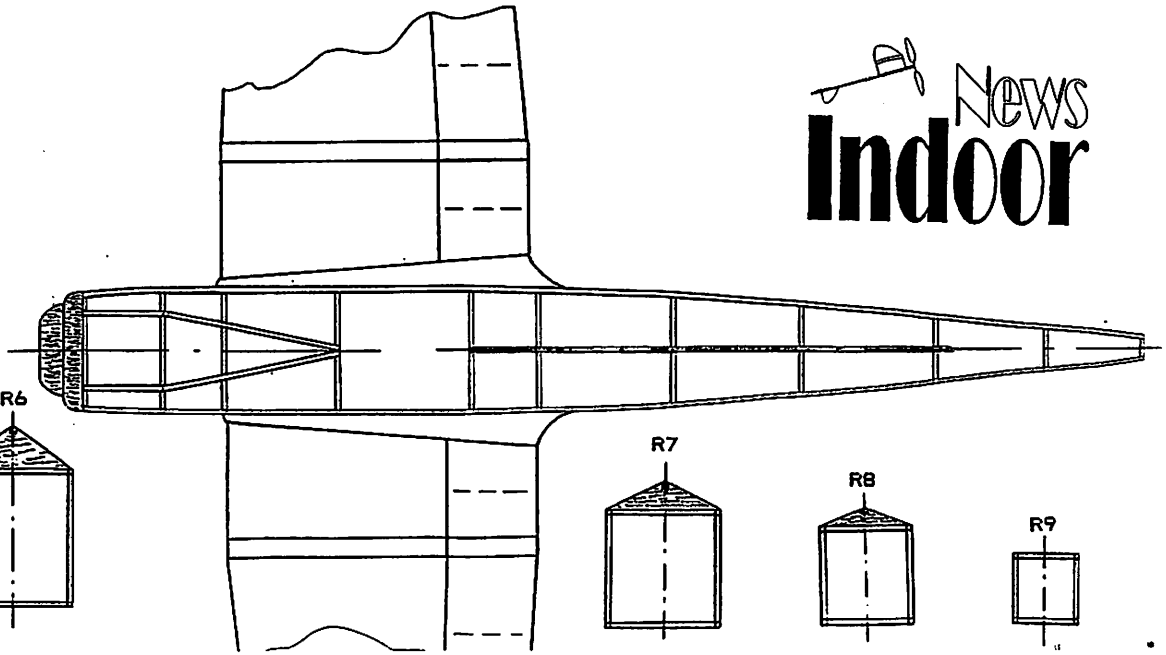


ribs from balsa 6/10

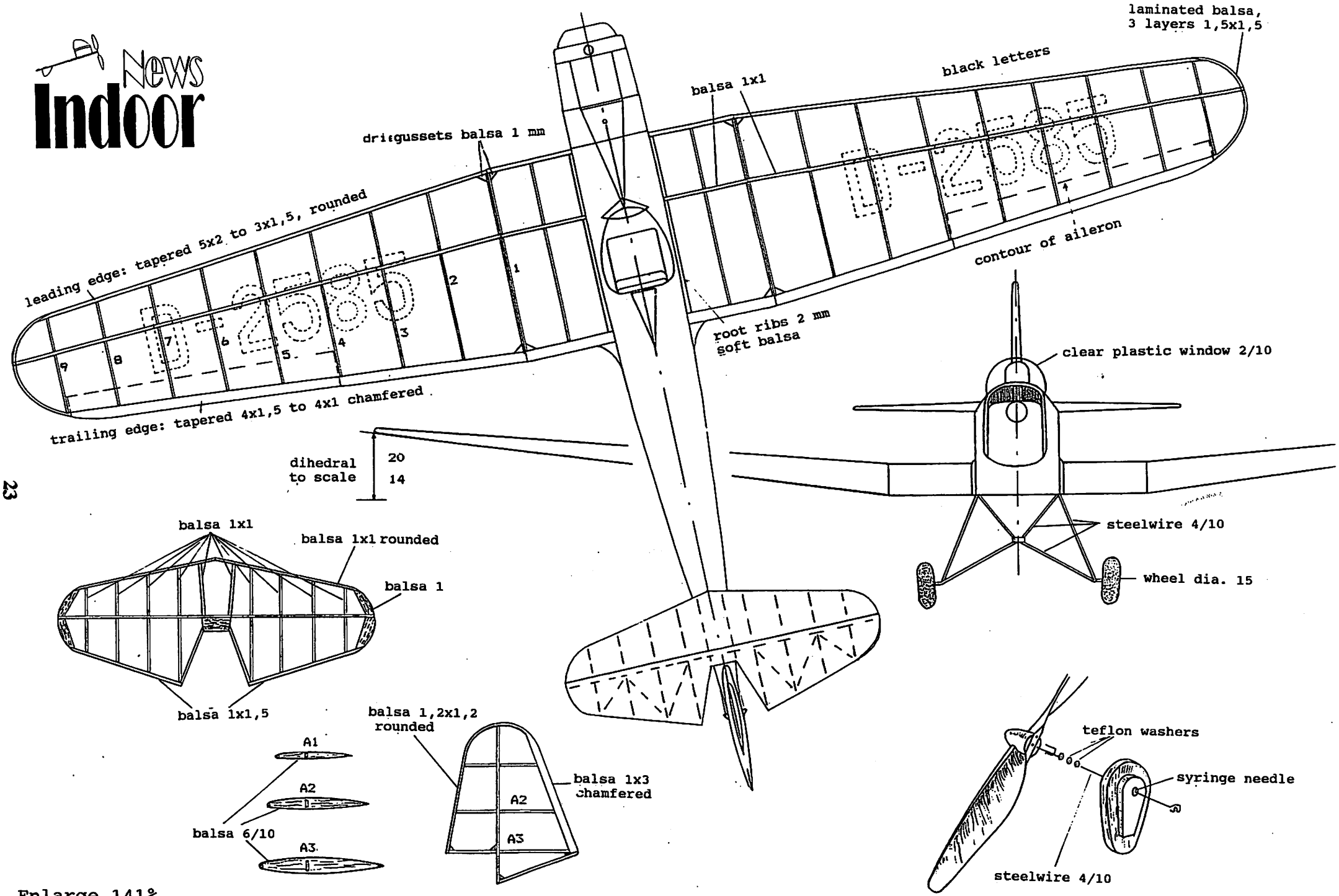








News Indoor


laminated balsa,
3 layers 1,5x1,5
black letters
balsa 1x1
drigussets balsa 1 mm
leading edge: tapered 5x2 to 3x1,5, rounded
contour of aileron
root ribs 2 mm
soft balsa
clear plastic window 2/10
trailing edge: tapered 4x1,5 to 4x1 chamfered
dihedral
to scale
20
14
steelwire 4/10
wheel dia. 15
balsa 1x1
balsa 1x1 rounded
balsa 1
balsa 1x1,5
balsa 1,2x1,2
rounded
balsa 1x3
chamfered
A1
A2
A3
balsa 6/10
teflon washers
syringe needle
steelwire 4/10

Enlarge 141%

FOCKE WULF 190 D-9
Particular instructions

by Ulises Alvares (UR)

FUSELAGE:
- Built into two parts. Rear: two halves of carved polystyrene foam. Front: turned polystyrene foam. See general instructions to carve fuselages from polystyrene foam.
- Nose reinforcement: 0,5 mm plywood.
- Removable noseblock: two 1 mm balsa discs, ϕ7 mm. Brass bushing ϕ0,7 inner.
- Longitudinal reinforcement: 2 longitudinal longerons 1x1 balsa, glued into each side with epoxy. Balsa 100 g/dm^3, straight grain.
- Motor peg hole reinforcement: 0,5 plywood glued with epoxy.
- Please enclose central wing section between both fuselage sides before glueing them.
- Canopy sliding system: make part "l" from 0,5 plywood, make part "m" from 1 mm balsa sheet and glue it to "z" of rear canopy. Insert "m" in "l" groove and glue "n" to "m", trying not to glue part "l". Finally glue "l" (with the canopy) to the fuselage.
- Cockpit: complete it with head protector blindage (01-02-03-04).
- Translucid canopy: mold it from very thin acetate (see general instructions to molding canopy); cut off windscreen and glue it to fuselage; glue translucid canopy in line with windscreen.
- Instrument panel: glue it (p) before gluing windscreen.
- Manifold exhaust (s): carve them from styrofoam (30 g/dm^3) and glue them into holes previously made into fuselage sides (make this on both fuselage sides).
- Air intake: carve from styrofoam and glue in right fuselage side.
- Machine guns: turn them from styrofoam and glue on top of fuselage. Make upper machine gun fairings from carving styrofoam and glue on top of fuselage.

WINGS:
- Longerons: 1x1 balsa wood - 100 g/dm^3 straight grain.
- Ribs: 0,6 and 1 mm balsa sheet - 100 g/dm^3 straight grain.
- Leading edge: 2x1 mm - idem -.
- Trailing edge: 3x1 mm - idem -.
- Rounded edges: laminated balsa wood.

TAILPLANE:
- Central longeron: 0,8 balsa sheet - 100 g/dm^3 straight grain.
- Leading edge: 1x1,2 mm - idem -.
- Trailing edge: 1,5x1 mm - idem -.
- Rounded edges: laminated balsa wood.

RUDDER AND FIN:
- Central longeron (2): 0,6 balsa - 100 g/dm^3 straight grain.
- Ribs: 0,6 balsa - idem -.
- Outline: laminated balsa 1x1 mm; 1,5x1 mm streamlined with sandpaper.
- Hinge: 0,3 mm copper wire, inserted into rib grooves.

SPINNER:
- Turned balsa wood - 200 g/dm^3 or 0,5 mm white poplar plywood disc.
- Propeller shaft: ϕ0,7 mm steel wire; 0,3 mm steel wire spring; 3 BIC plastic tubes glued with epoxy.

NOSE BLOCK:
- See fuselage.

LANDING GEAR:
- Main landing gear: steel wire 0,5 or 0,6 mm (depending on total weight).
- Legs: rounded styrofoam divided into two halves and glued together, enclosing the steel wire.

"W6" ARTICULATED CONTROL ARM:
- 0,7 mm aluminium sheet inserted into wings h1 - h2 holes.
- Undercarriage door: 1 mm balsa - 100 g/dm^3 straight grain.

WHEELS:
- Rounded styrofoam with brass bushing 0,7 mm inner ϕ and painted paper disc.

PROPELLER:
- See general instructions to mold propeller blades.
- Blades 1 mm balsa sheet streamlined - 100 g/dm^3 straight grain.
- Blade shaft: bamboo dowel inserted in plastic tube (BIC).
- Spinner: see Spinner.

MOTOR PEG:
- Bamboo dowel 1,5 mm.

COVERING:
- Condenser paper 5 g/m^2 or japanese tissue decorated and dyed with indelible ink.

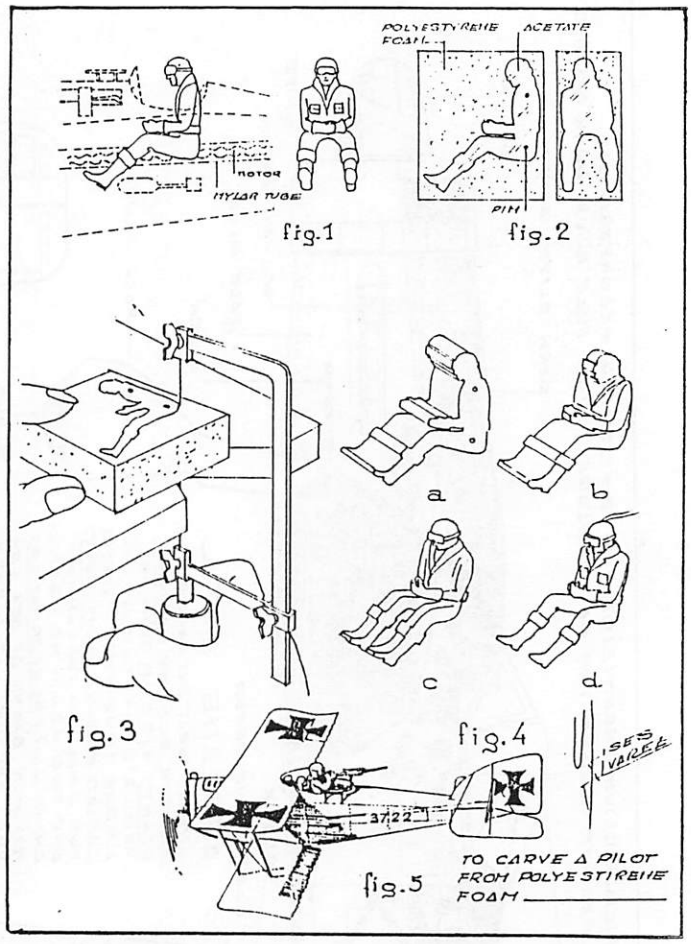
TAIL WHEEL:
- Rounded styrofoam with brass bushing and steel shaft.

- Leg: 0,2 mm aluminium sheet and balsa 150 g/dm^3.

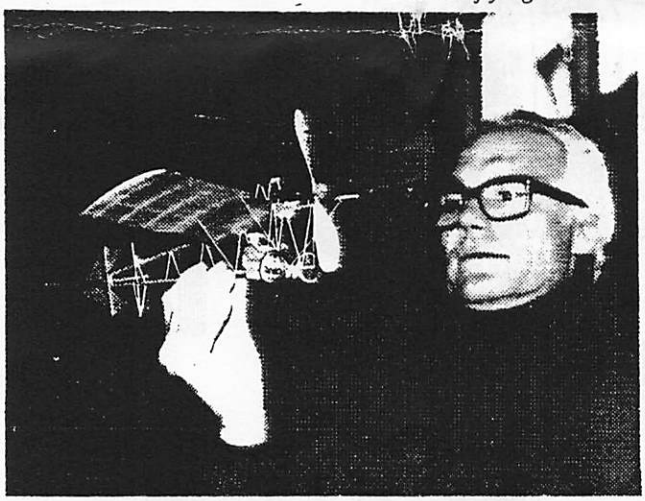
FOCKE WULF 190 D-9
Particular instructions

FLIGHT TRIMMING

- Model as built by author weighs 9,1 g + 1,42 g for rubber motor.
- Propeller inclination: side thrust 0°, down thrust 3°.
- Propeller pitch: 1.4 relative pitch.
- Centre of Gravity: 13% of mean chord (mean chord is 58,6 mm) or 16,6 mm from wing root leading edge.
- Rubber motor: 45 cm long, 1,1 x 1,55 mm FAI TAN rubber.
- Wing warps: 4,5 mm wash-out in right wing, 4,5 mm wash-in in left wing.
- Tail settings: Stab elevator: -3,5°
  Rudder: 13° left.
- Flight pattern: the model is trimmed to fly to the left in circles of 9 m diam. at 4-5 m/sec. speed.



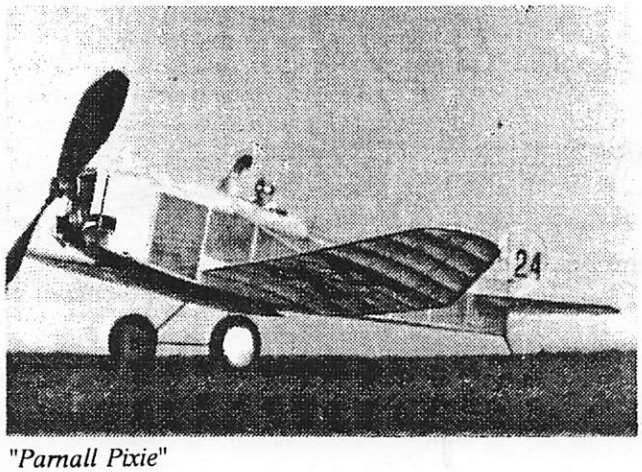
Peanut flying scale models by Arch. Ulises Alvarez (UR)



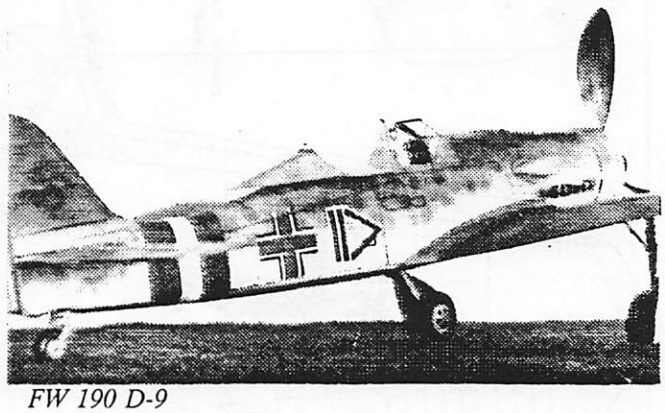
Santos Dumont "Demoiselle"



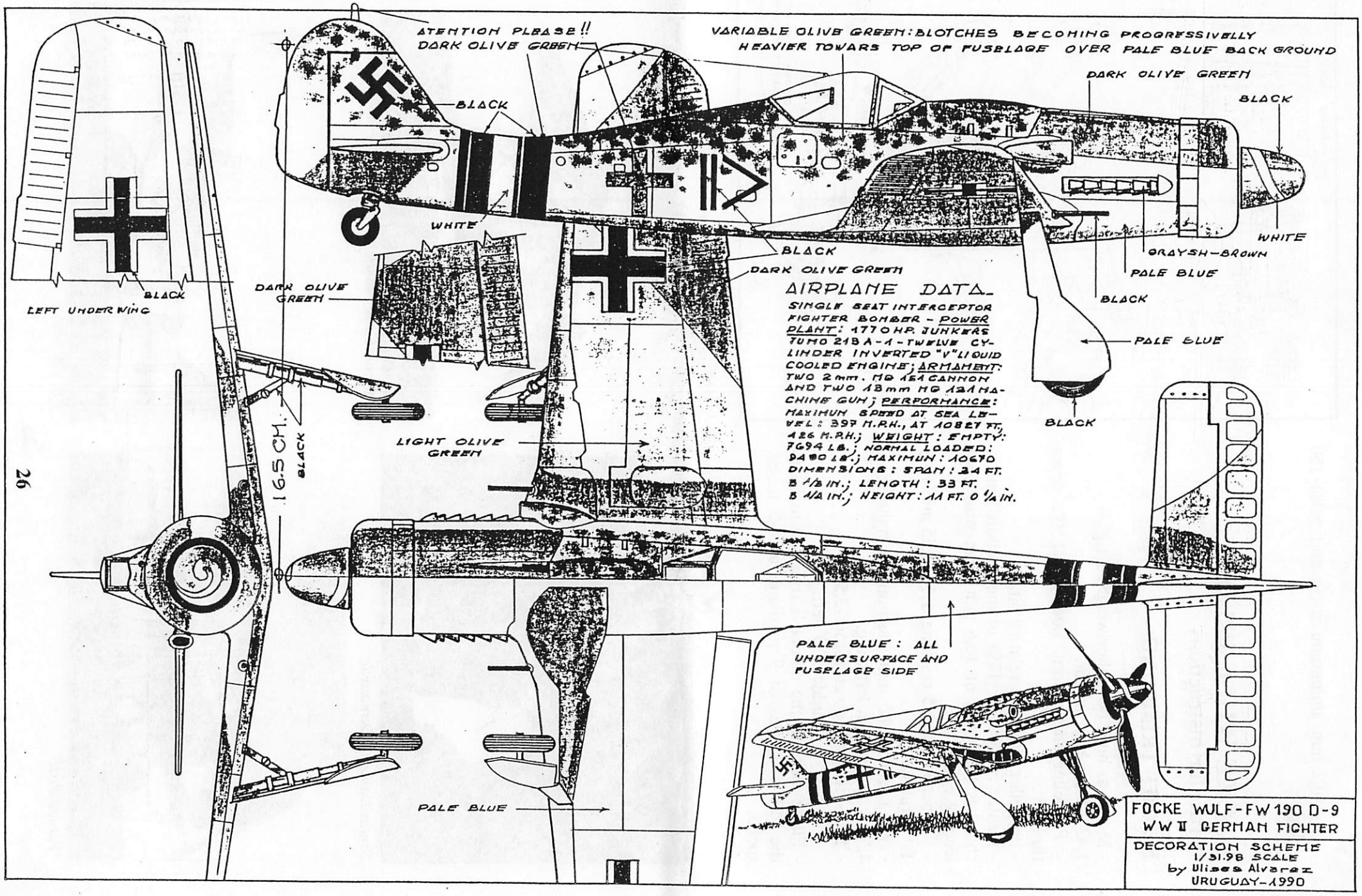
"Farman Carte Postale"

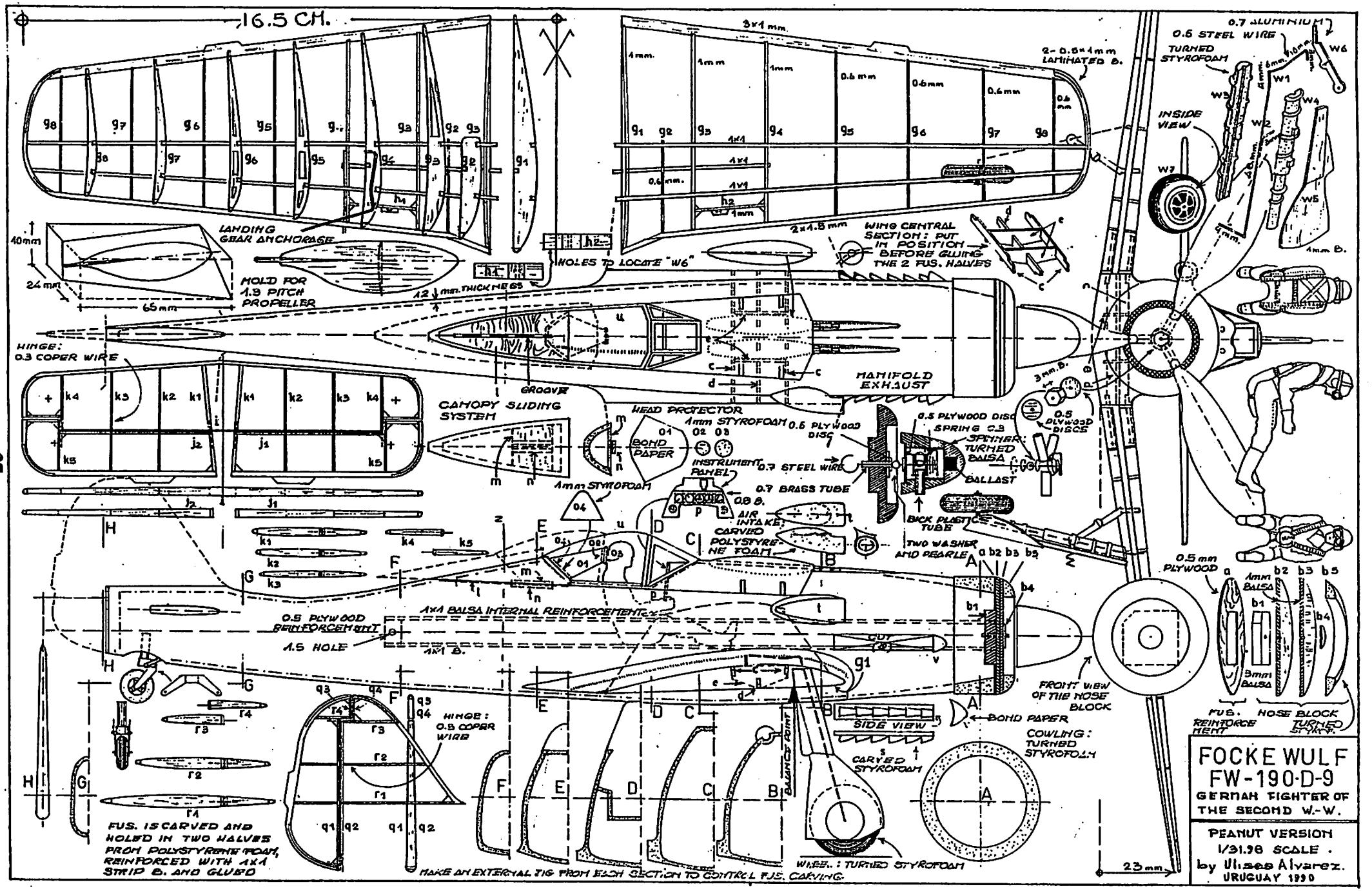


"Parnall Pixie"



FW 190 D-9


ATENTION PLEASE !!
DARK OLIVE GREEN
VARIABLE OLIVE GREEN: BLOTCHES BECOMING PROGRESSIVELLY HEAVIER TOWARS TOP OF FUSELAGE OVER PALE BLUE BACK GROUND
BLACK
WHITE
DARK OLIVE GREEN
BLACK
WHITE
GRAYSH-BROWN
PALE BLUE
BLACK
PALE BLUE
BLACK
LEFT UNDER WING
BLACK
DARK OLIVE GREEN
AIRPLANE DATA
SINGLE SEAT INTERCEPTOR FIGHTER BOMBER - POWER PLANT: 1770 H.P. JUNKERS JUMO 213 A-1 - TWELVE CYLINDER INVERTED "V" LIQUID COOLED ENGINE; ARMAMENT: TWO 2 mm. MG 151 CANNON AND TWO 13 mm MG 131 MACHINE GUN; PERFORMANCE: MAXIMUN SPEED AT SEA LEVEL: 397 M.P.H., AT 20827 FT. 426 M.P.H.; WEIGHT: EMPTY: 7694 LB.; NORMAL LOADED: 9480 LB.; MAXIMUN: 10670
DIMENSIONS: SPAN: 34 FT. 5 1/2 IN.; LENGTH: 33 FT. 5 1/4 IN.; HEIGHT: 11 FT. 0 1/4 IN.
16.5 CM.
BLACK
LIGHT OLIVE GREEN
PALE BLUE
PALE BLUE: ALL UNDERSURFACE AND FUSELAGE SIDE
FOCKE WULF-FW 190 D-9
WW II GERMAN FIGHTER
DECORATION SCHEME
1/31.98 SCALE
by Ulises Alvarez
URUGUAY-1990


16.5 CM.
3x1 mm.
2- 0.5x1mm LAMINATED B.
0.7 ALUMINIUM
0.6 STEEL WIRE
TURNED STYROFOAM
INSIDE VIEW
4mm B.
LANDING GEAR ANCHORAGE
HOLES TO LOCATE "W6"
MOLD FOR 1.3 PITCH PROPELLER
40mm
24 mm
65mm
12 mm. THICKNESS
2x1.5 mm
WING CENTRAL SECTION: PUT IN POSITION BEFORE GLUING THE 2 FUS. HALVES
HINGE: 0.3 COPER WIRE
GROOVE
CANOPY SLIDING SYSTEM
MANIFOLD EXHAUST
HEAD PROTECTOR 1mm STYROFOAM
0.5 PLYWOOD DISC
SPRING 0.3
SPINNER: TURNED BALSA
BALLAST
BOND PAPER
INSTRUMENT PANEL
0.7 STEEL WIRE
0.7 BRASS TUBE
0.8 B.
AIR INTAKE
1mm STYROFOAM
CARVED POLYSTYRENE FOAM
BACK PLASTIC TUBE
TWO WASHER AND PEARLE
1x1 BALSA INTERNAL REINFORCEMENT
0.5 PLYWOOD REINFORCEMENT
1.5 HOLE
1x1 B.
CUT
FRONT VIEW OF THE NOSE BLOCK
0.5 mm PLYWOOD
1mm BALSA
3mm BALSA
FUS. REINFORCEMENT
NOSE BLOCK TURNED STYROF.
SIDE VIEW
BOND PAPER
COWLING: TURNED STYROFOAM
CARVED STYROFOAM
BALANCE POINT
HINGE: 0.5 COPER WIRE
FUS. IS CARVED AND HOLED IN TWO HALVES FROM POLYSTYRENE FOAM, REINFORCED WITH 4x1 STRIP B. AND GLUED
MAKE AN EXTERNAL JIG FROM EACH SECTION TO CONTROL FUS. CARVING.
WHEEL: TURNED STYROFOAM
23mm
FOCKE WULF FW-190-D-9
GERMAN FIGHTER OF THE SECOND W.-W.
PEANUT VERSION
1/31.98 SCALE .
by Ulises Alvarez.
URUGUAY 1990

BETTER ALUMINIUM

by Doug McHard (GB)

The question that I am most frequently asked at model meetings is "How do you get that nice silver finish?". Well, there's nothing magical about it, it's a cellulose finish, but the paint that I use is not sold for model use.

Before applying the colour, of course, you need a good smooth covering. I use Jap Tissue for all my covering. For models over about 20" wingspan I use SAMS "New Jap Tissue'. This is a very easy to use material, as it is wet-strengthened and can therefore be moistened during covering to stretch it round double curvatures without tearing or creasing.

For smaller models, the white Jap from Martin Dilly produces a lighter covering which is unusually strong when doped and exceptionally smooth. It is the nearest thing to pre-war 'Superlite' that you can buy and is actually manufactured for repairing manuscripts! Unfortunately, it is not wet-strenghtened however, and is not therefore as easy to use as 'New Jap', but for a smooth, tough, non-porous, light-weight covering, I find it unbeatable. Another great advantage is that it does not seem to become as brittle as other coverings after doping.

To prepare the airframe for covering, I first give the whole outer surface (everything that will touch the tissue) a coat of thinned-down Sanding Sealer (50% Thinners), then rub it down with No.600 Wet-or-Dry paper (sometimes called Production Paper). Take it right back to the balsa surface which should now be silky smooth to the touch. Now give the outer airframe surface a coat of thin clear dope and when dry, gently smooth out any rough spots with No.1000 Wet-or-Dry paper. The entire surface should now be smooth and slightly glossy. Re-dope any areas that are inadequately covered until the whole surface has an unbroken film of clear dope.

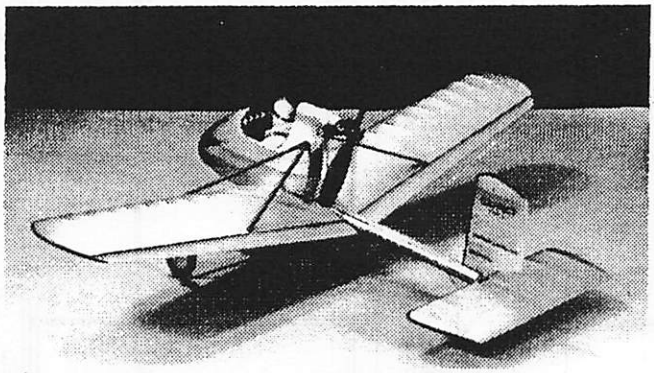
The tissue is secured to the frame with Cellulose Thinners applied through the tissue quite liberally with a soft brush. Pressing the tissue down will soften the dope on the balsa framework and instantly fix the covering in place. If you have made a mistake and need to release the tissue, all you have to do is to apply more thinners to soften the dope, then re-position the tissue. The tissue is not weakened in any way by this method of attachment and once you have mastered the procedure you will never use any other tissue fixing method!

Now shrink the tissue either with steam (or a fine water spray if the airframe is strong e-

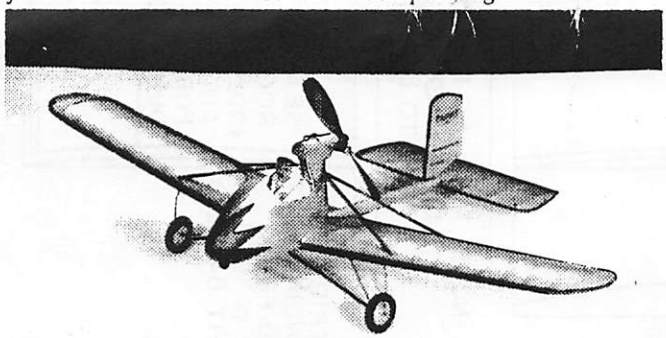


30" Waterman Arrowbile, based on Pre-war Megow rubber powered model, but powered with a 'Z Modell' compressed air engine with a 3 litre tank. This provides enough air for a 1 minute flight in still air. The model is very reliable and super stable. The finish is as described in the accompanying article.

nough). Next you need to give a coat of low-shrink Clear Dope. I actually do not use a model dope. I use a product made by Ault & Wiborg (AW) for the motor trade. It is called Cellulose Clear Laquer (Code No. GL 5235) and it is intended as an additive to give extra gloss when spraying metallic finishes. It is slightly amber coloured, very like Banana Oil. For our purposes it should be thinned down 25% Laquer/75% Cellulose Thinner. To this add 5% of AW Matting agent (Code No. Z 4049) just to "kill" the shine and provide a good base for the colour. Only one coat of this clear laquer mixture should be applied. Note that the Matting Agent 'settles' in storage, and must be well stirred into solution each time before use.



GOURDOU Daspect 3 (1936)
Model powered by Brown A-23 Campus, 18" span. Aviatrix pilot vacuformed, covered with Dilly White Jap & finished silver as described in accompanying article.



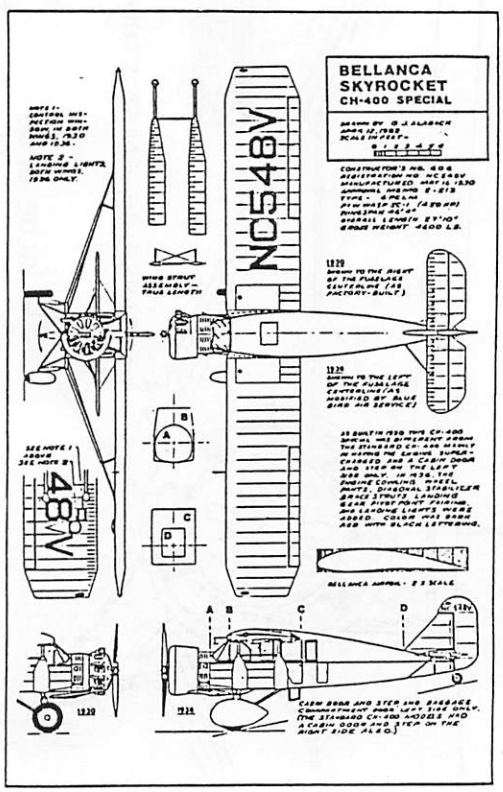
The silver finish is also an Ault & Wiborg (AW) product. It is Code No. 313R "Fine Aluminium" and is what is known as a 'Tinter', used in formulating metallic car colours. There are three other grades of aluminium tinter- Standard, Coarse and Extra Coarse. These could be useful for representing texture variations in metal panelling, but the Fine grade is the only one that I use on my models.

After purchase the tinter should be allowed to settle, undisturbed in its tin for several days then about half of the tin contents should be carefully poured off. This will be mostly laquer and it should be replaced with cellulose thinner. It is not generally appreciated that some thinners are unsuitable for use with metallic finishes. The one recommended by AW is Local Repair Thinner (Code No. Z1523). STIR WELL! This is now further thinned to suit your spray equipment. Remember to stir really well before each application to ensure complete and uniform dispersal of the aluminium pigment. Only the thinnest possible spray coat is now needed to give a super-smooth light-weight aluminium finish.

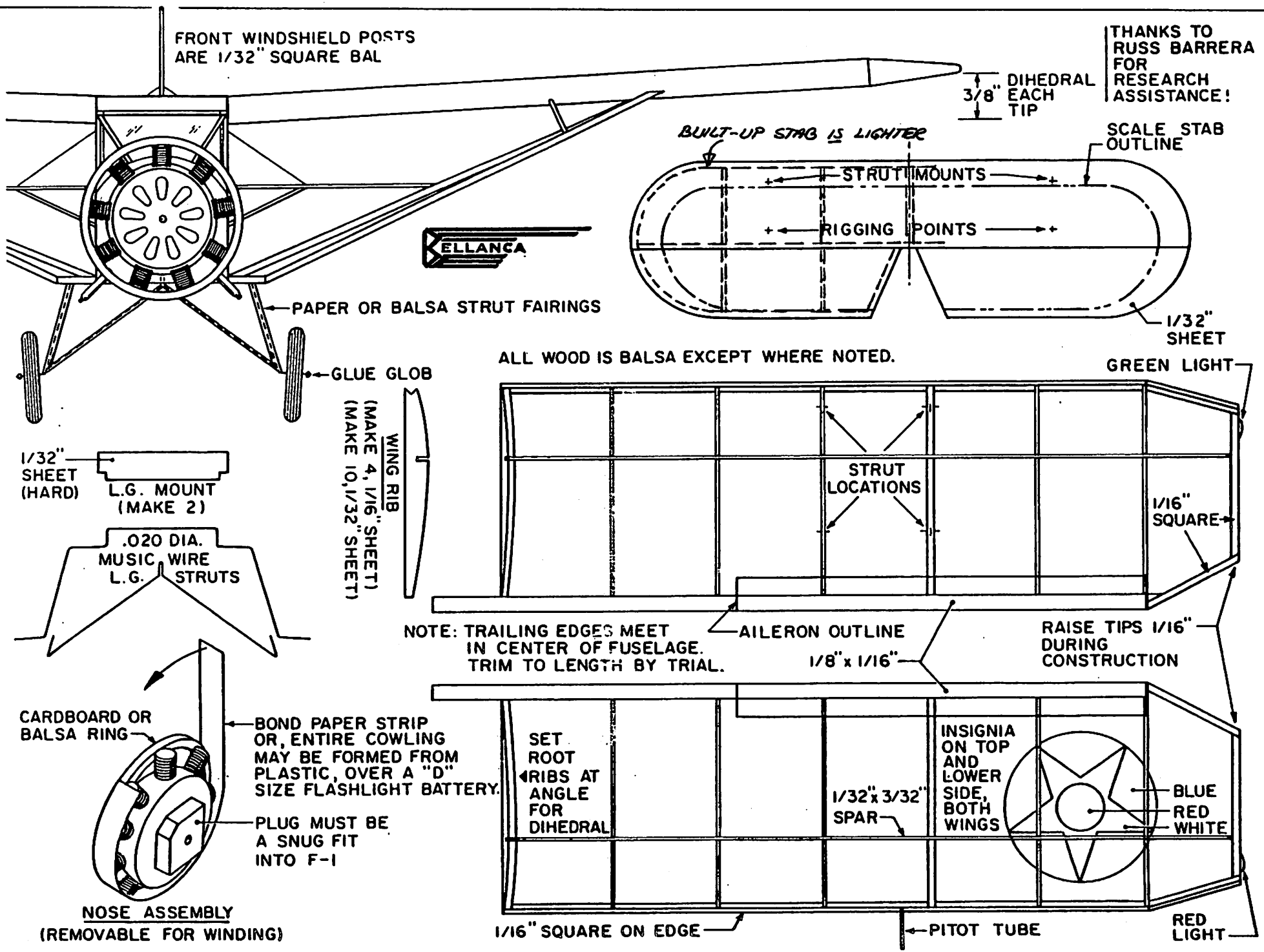
Where polished metal panels are to be represented, you should add up to 20% of the Clear Cellulose Laquer to the aluminium mixture. This gives a real gloss to the surface but it should never be used to represent a doped fabric surface.

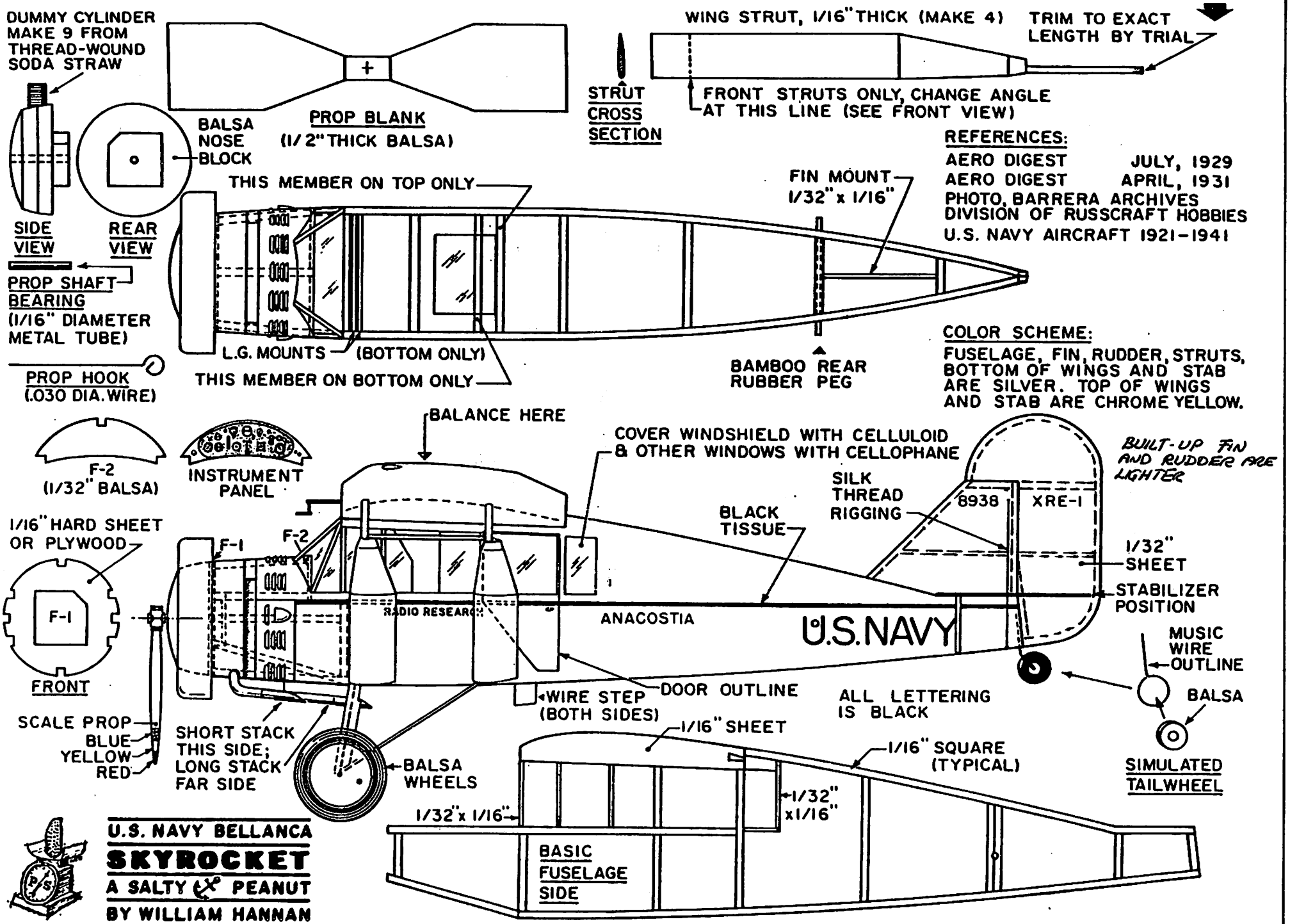
Ault & Wiborg make another product that may be of interest to those seeking a good aluminium finish, it is Wheel Aluminium (Code F 361) which produces a rather 'whiter' aluminium finish which some find quite attractive. It should be used in the same way as the aluminium tinters described above.

Enquiries concerning Ault & Wiborg paints should be directed to: H.P.G. Industrial Coatings, P.O.Box 18, Dagenham, Essex RM8 1AW, England. Please note that I have no connection with AW Paints. They have not been consulted in connection with the preparation of this article, and the way in which I use their products is not necessarily one that would be recommended by the manufacturers.



A CONTRIBUTION BY BILL HANNAN


FRONT WINDSHIELD POSTS ARE 1/32" SQUARE BAL
THANKS TO RUSS BARRERA FOR RESEARCH ASSISTANCE!
3/8" DIHEDRAL EACH TIP
BUILT-UP STAB IS LIGHTER
SCALE STAB OUTLINE
STRUT MOUNTS
RIGGING POINTS
1/32" SHEET
ELLANCA
PAPER OR BALSA STRUT FAIRINGS
GLUE GLOB
ALL WOOD IS BALSA EXCEPT WHERE NOTED.
GREEN LIGHT
1/32" SHEET (HARD)
L.G. MOUNT (MAKE 2)
WING RIB (MAKE 4, 1/16" SHEET) (MAKE 10, 1/32" SHEET)
STRUT LOCATIONS
1/16" SQUARE
.020 DIA. MUSIC WIRE L.G. STRUTS
NOTE: TRAILING EDGES MEET IN CENTER OF FUSELAGE. TRIM TO LENGTH BY TRIAL.
AILERON OUTLINE
1/8" x 1/16"
RAISE TIPS 1/16" DURING CONSTRUCTION
CARDBOARD OR BALSA RING
BOND PAPER STRIP OR, ENTIRE COWLING MAY BE FORMED FROM PLASTIC, OVER A "D" SIZE FLASHLIGHT BATTERY.
PLUG MUST BE A SNUG FIT INTO F-1
SET ROOT RIBS AT ANGLE FOR DIHEDRAL
1/32" x 3/32" SPAR
INSIGNIA ON TOP AND LOWER SIDE, BOTH WINGS
BLUE
RED
WHITE
NOSE ASSEMBLY (REMOVABLE FOR WINDING)
1/16" SQUARE ON EDGE
PITOT TUBE
RED LIGHT



U.S. NAVY BELLANCA SKYROCKET

A SALTY PEANUT

BY WILLIAM HANNAN

SOURCES OF INFORMATION

Cottage Wings
Bill Warner has compiled a list of more than 100 useful adresses for scale interested flyers. This guide is available for $1.00 and a large SASE. Non-US: please send some more money. Write to: Bill Warner, 1370 Monacle Av., Porterville, CA 93257, USA.

Flying Aces Club
When both outdoor and indoor scale is your interest, then the Flying Aces Club is the one to join. The club is led by an enthousiastic bunch of people and they have just listed their 1000th member. Their 24 page newsletter appears six times a year. Cost is $9.00 per year in the US and Canada. Overseas cost is $12.00. Make checks payable to Flying Aces, send to FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506, USA.

Flying Model Warplanes
An International Guide To Plans and Kits
Compiled by John C. Fredriksen

This comprehensive reference book:
*Lists 8656 plans, kits and semi-kits
*Represents 623 types of historical aircraft
*Denotes products from 424 manufacturers from 15 countries
*Shows wingspan, length, motor, flight mode, company, price, designer and availability of cowls, canopies and retracts
*Includes appendixes on documentation, model magazines worldwide and international organizations
*Contains everything from peanuts to giant quarter-scale.

The book lists most of the designs by Alfery, Koutny and Fillon. But there must be more plans out there, which are not yet in the book. Please send your additions to John Fredriksen, 69 Flamingo Dr., Warwick, RI 02886, USA. The next edition will come out in 1994. As John says: "Any scale plan, no matter how obscure, will be included if I can locate it somewhere on this planet!".
The book can be obtained from Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897, USA. Price $14.95 + $2.95 P&P.

Lidberg plans
Al Lidberg supplies plans, documentation sets and some semi-kits of scale models for outdoor and indoor. Particularly his Peanut and No-Cal plans are of interest to us. Readers of Model Aviation will know the quality of his plans. The No-Cal plans include such rarities as a Hansa Airliner and even a Blohm & Voss BV- 141!
Send $1.00 + SASE for catalogue to: A.A.Lidberg/model plan service, 614 E. Fordham, Tempe, AZ 85283, USA.

Czech plans
Mike Woodhouse stocks plans of Lubomir Koutny and his friends. There are about 60 plans of Peanut and mostly 1/20 scale rubber powered models. Send SASE to M. Woodhouse, 12 Marston Lane, Eaton, Norwich, Norfolk NR4 6LZ, Great Britain.

Indoor Scale Model Flying
This 36 page booklet does not get much publicity, but is highly recommended as an excellent and practical first introduction to indoor scale model flying. It is available for $6.95 from Hannan's Runway, Box 860, Magalia CA 95954, USA.

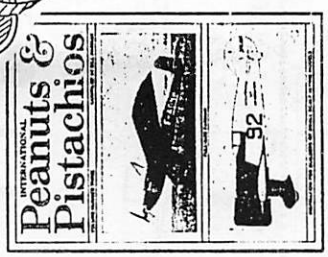
Alvarez plans
Also available from Hannan's are the expert peanut plans of Ulises Alvarez. Order one of his plans and marvel at the intricate techniques he applies to his models. Send SASE for Hannan's catalogue.

The Hangar Pilot
Nothing new for insiders, as The Hangar Pilot is around for more than 20 years. It is the newsletter of the worlds most active indoor group, the Miami Indoor Aircraft Model Association. Hangar Pilot is edited by Dr. John Martin, Peanut guru of fame, and appears 8 times a year. A year's subscription costs $12.50. Write to John for subscription rates outside the U.S.. Address: 2180 Tigertail Ave., Miami FL 33133, USA.

HANNAN'S RUNWAY PUBLICATIONS
Compiled by Bill Hannan

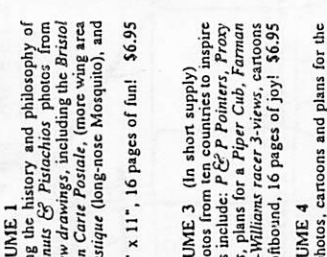
Peanuts & Pistachios!
INSPIRATION FOR BUILDERS OF SMALL SCALE FLYING MODELS

PEANUTS & PISTACHIOS are tiny flying scale models which have gained world-wide acceptance. Our concise booklets follow the progress of these fascinating flyers and their builders. Truly international in coverage, these publications should help inspire you to greater achievements in your own modeling projects, regardless of size.

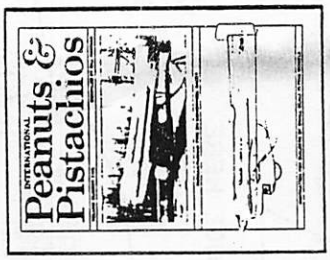


PEANUTS & PISTACHIOS, VOLUME 1
Featured are concise articles covering the history and philosophy of these tiny flying models, plus *Peanuts & Pistachios* photos from worldwide places, five full-page *3-view drawings*, including the *Bristol Brownie*, (short span version), *Farman Carte Postale*, (more wing area than a Fike or Lacey!), *Farman Moustique* (long-nose Mosquito), and the *Corben Super-Ace* homebuilt.
Softbound, 8½" x 11", 16 pages of fun! $6.95

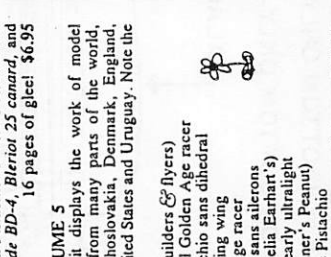
Sorry, VOLUME 2 is out-of-print



PEANUTS & PISTACHIOS, VOLUME 3 (In short supply)
This edition features drawings and photos from ten countries to inspire you to higher modeling goals! articles include: *P & P Pointers*, *Proxy Postal Ideas*, *Pistachio Perigrinations*, plans for a *Piper Cub*, *Farman Mosquito*, *1911 Caudron* plus *Wedell-Williams racer 3-views*, cartoons and more.
Softbound, 16 pages of joy! $6.95



PEANUTS & PISTACHIOS, VOLUME 4
Worldwide coverage includes many photos, cartoons and plans for the late Walt Mooney's *VP-1 Peanut*, Ken Johnson's 1918 *Hergt Pistachio*, and Tonda Alfery's *Drzewiecki canard Pistachio*. 3-Views offered are: *Evans VP-1*, *Miles sparrowhawk*, *Bede BD-4*, *Bleriot 25 canard*, and Amelia Earhardt's *Kinner Canary*.
16 pages of glee! $6.95



PEANUTS & PISTACHIOS, VOLUME 5
Truly an international production, it displays the work of model builders, artists and photographers from many parts of the world, including Australia, Belgium, Czechoslovakia, Denmark, England, France, Germany, Greece, Japan, United States and Uruguay. Note the following highlights:
- Peanuts & Pistachios People (the builders & flyers)
- Farman/Farman French monowheel Golden Age racer
- Lacey M-10 cabin high-wing Pistachio sans dihedral
- Lippisch Storch IXb fascinating flying wing
- Caudron C.450 beautiful Golden Age racer
- Lachassagne A.L.7 unique biplane sans ailerons
- Kinner Canary biplane Peanut (Amelia Earhart's)
- Botali PAMA cabin high-winged early ultralight
- Harold Lloyd Polish parasol (beginner's Peanut)
- Microplano Veloz Mexican biplane Pistachio
- Cartoons, sketches, whimsy & more! 24 pages of pleasure! $7.95

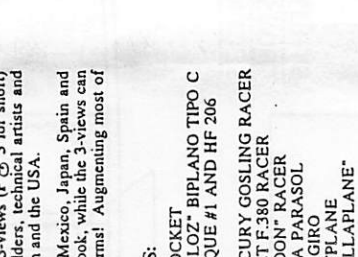
Model PLANS & 3-VIEWS International
An entirely new publication featuring eight model construction plans and eleven unique aircraft. 3-view drawings for modelers and aero history enthusiasts. Plans & 3-views (P & 3 for short) is truly a world-wide production, showcasing the work of model builders, technical artists and photographers from Czechoslovakia, France, Germany, Japan, Sweden and the USA.

Subject aircraft are also international in origin, representing France, Mexico, Japan, Spain and the United States. The model plans are ready-to-use, right from the book, while the 3-views can serve as documentation for any size model from Pistachios to Pachyderms! Augmenting most of the drawings are rare photos of the full-size prototypes.

HIGHLIGHTS OF P & 3:

MODEL CONSTRUCTION PLANS:
- BELLANCA SKYROCKET
- FARMAN MOUSTIQUE PISTACHIO
- KAWANISHI K-12 "CHERRY" PEANUT
- REARWIN SPEEDSTER PISTACHIO
- PIPER VAGABOND PISTACHIO
- WITTMAN TAILWIND PRE-PISTACHIO
- FIKE MODEL E PISTACHIO

3-VIEW DRAWINGS:
- BELLANCA SKYROCKET
- MICROPLANO "VELOZ" BIPLANO TIPO C
- FARMAN MOUSTIQUE #1 AND HF 206
- FORD FLIVVER
- WATERMAN MERCURY GOSLING RACER
- FARMAN/RENAULT F.380 RACER
- ART CHESTER "GOON" RACER
- FAIRCHILD 22 C-7A PARASOL
- CIERVA C.4 AUTOGIRO
- MUMMERT SPORTPLANE
- NEMETH "UMBRELLAPLANE"



Added features include reader feedback (extracts from letters), cartoons and sketches. Softbound, 8 1/2" x 11", 26 delightful pages! $9.95

HANNAN'S RUNWAY BOX 210 MAGALIA CA 95954 USA
March 1993