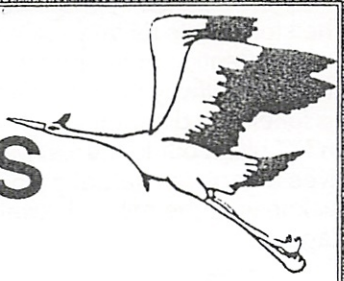
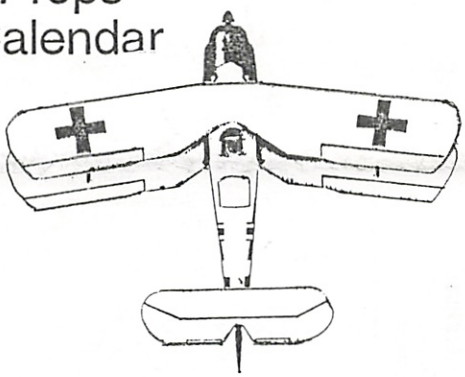
CROSSWINDS

#102

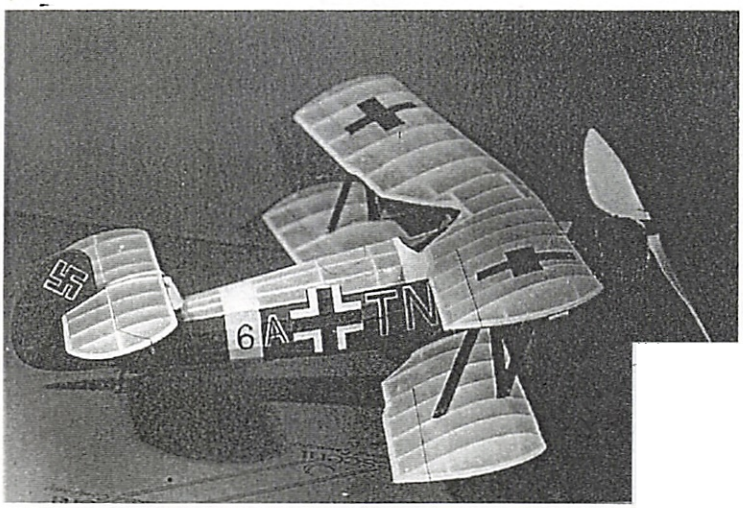


Arado Ar-66
Helical Pitch Props
2002 Contest Calendar





CROSSWINDS
RUSS BROWN
4909 N. SEDGEWICK
LYNDHURST, OHIO 44124



Remember the song from the fiftys " Has anyone here seen Shorty? Shorty's got to go"? Well Shorty's back and in a basement in Marion, Ohio with model plane kits.

HELICAL PITCH PROPS - A CASE OF "DIP" AND "DOUBLE DIP"

Steve Griebling's article in issue 100 gave a wonderful run-down on plastic propellers and also of the process of carving wooden ones from scratch. Now, propeller carving is a dying art because of plastic props, but we can design and carve our own propellers which will have true helical pitch from tip almost to the hub. I think I have now done the final bit of design work which should enable this to be done.
Firstly, I shall give a short history lesson on the important advances in this topic, so you will be able to follow along and see where we have come from and why.

The story starts as far back as May 1951, in the issue of "Model Aircraft" in which J.H. Maxwell draws attention to the fact that the so-called "traditional block" (which has a straight taper in depth from the halfway point to the tip) does **not** give a constant pitch in this part of the prop. A copy of his letter and diagram are shown below. As drawn, his prop is absolutely correct as he is showing an "X" block out to the halfway point, followed by a constant width out to the tip. The "X" block gives a constant helical pitch but is very wasteful of wood out towards the tip and also has zero thickness at the hub. Maxwell's solution is to put a "dip" in the side elevation as shown in the diagram.

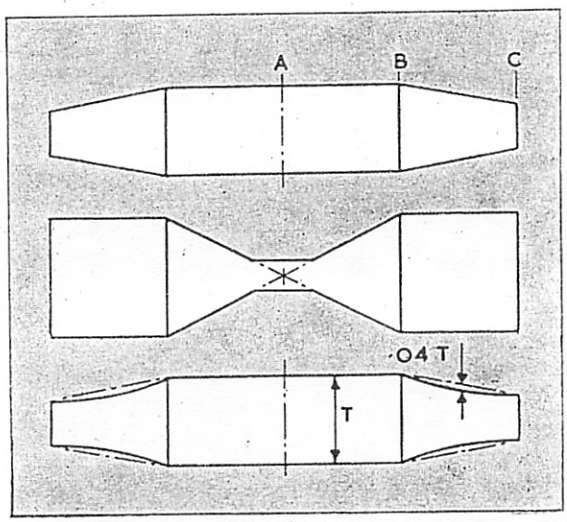
Correspondence

● *The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters*

PROPELLER PITCH

DEAR SIR,—R. H. Warring's recent article " Propeller Pitch " (March MODEL AIRCRAFT) prompts me to point out a popular misconception, which, as far as I am aware, has never been mentioned in print.

The well-known method of laying out a propeller block, which Mr. Warring advocates, does *not* produce a constant pitch from root to tip. It does produce a constant pitch from A to B (see accompanying sketch)



and again at C, but between B and C it gives an error of about 3 degrees, or 12 per cent. This may seem small, but few modellers would tolerate an unwanted twist of 3 degrees in a wing, so why tolerate it in a propeller ?

The method which I use to overcome this discrepancy is to make the taper from B to C slightly concave, instead of straight. The maximum camber of the concave curves is equal to the thickness of the block × 0.04. This is correct when B is midway between A and C, as it generally is, but if B is nearer the tip the camber will be less.

I do not suggest that this modification will greatly improve the performance of a propeller, but I feel that it should be made known for the benefit of those who like to be reasonably accurate in their propeller carving.

Yours faithfully,
J. H. MAXWELL.

Bristol.

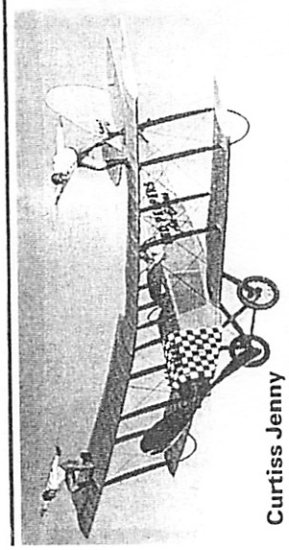
AEROGRAPHICS

Rubber power, printwood kits from England suitable for CO_2 or electric conversion.

AG-324M	Curtiss Jenny	26"
AG-320M	DH Chipmunk	21"
AG-323M	Eastbourne Monoplane	19"
AG-325M	BAC Lightning (JetX)	12"

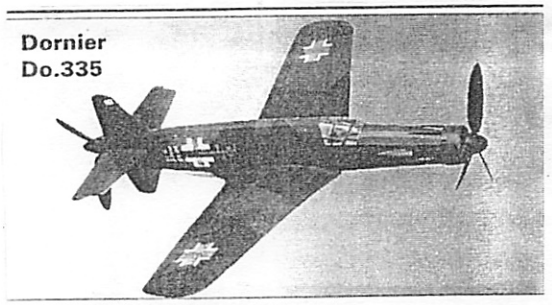
NEW RELEASE!

AG-326M Fairey Swordfish 26"
Superb on a Gasparin GM-300 CO_2 motor!



Curtiss Jenny

Dornier Do.335



'SHORTY"S BASEMENT'
is a source for "AEROGRAPHICS" and "WEST WINGS" kits. Catalog for West Wings and price list for Aerographics is free. Write Carol Kane at 1036 Bexly Ave. Marion, OH 43302
Phone: (740) 223-7471.
Kits are mostly Free Flight models.

WEST WINGS

WW-01	Do.335 Arrow	26"
WW-03	Hawker Sea Fury	22"
WW-08	DH Puss Moth	24"
WW-09	Hawker Hart	25"
WW-10	Westland Widgeon	24"

R/C

CNC cut practical size kits for Speed 400 power.

WW-26	Fournier RF-4	59"
WW-28	**NEW!** Toucan	34"

This letter and its solution were totally ignored for upwards of 50 years until it was re-discovered in the November 1997 issue of "SAM 35 SPEAKS" by John Barker (designer of the "Lulu" glider and the "Hep Cat"). I'm showing you his diagrams 1-4 from this article. I'm not showing you his mathematical work, because I will get into this a little later. You will see that he is only concerned with the outer half of the blade, but again he is using a modified "X" blank as in Fig. 1, so the inner half is still of constant helical pitch. His results confirm those of Maxwell published in 1951.

Yours sincerely,

John Barker

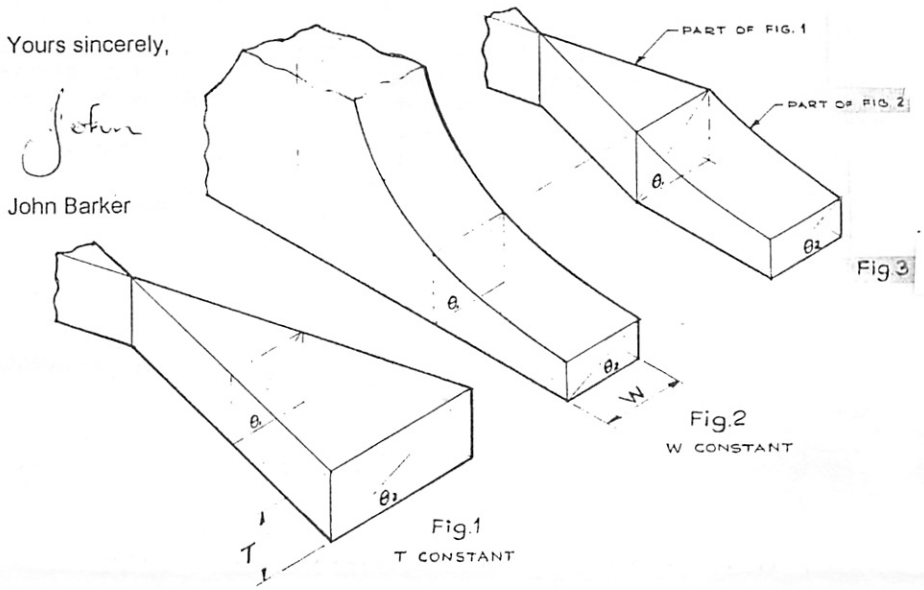


Fig 3

Fig.2
W CONSTANT

Fig.1
T CONSTANT

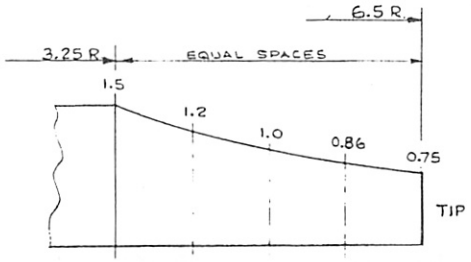
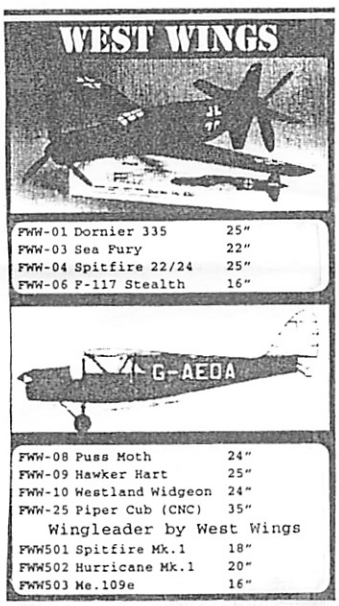


Fig 4



John Barker's note led to a letter from Jim Fullerton in Australia in the May 1998 issue of "SPEAKS" regarding his approach to propeller design. He started working on prop design in 1937 using a geometric approach rather than trigonometric. He was aware that the straight taper on the outer half of the block did not give true helical pitch (thus pre-dating even Maxwell) but went a different way around the problem. He kept a straight taper, but widened the block to compensate.

His letter and diagram makes it all clear. Let us not forget that the Aussies were a formidable force in post WW II Wakefield competitions and that he and his friends Limjoon and King were justly famous - so their propellers were surely doing their job! You will notice in the plan view that there is a concave shape in the inner half as well as a thinning of the inboard section of the prop in side elevation.



WW-09 25"

FREE FLIGHT

WW-24	Sapphire	33"
WW-01	Do.335 Arrow	26"
WW-06	F-117 Stealth	16"
WW-25	Piper J-3 Cub (CNC)	35"
WW-27	**NEW!** 1936 Wakefield	22"



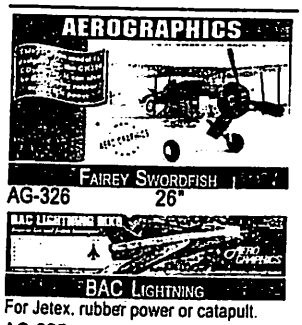
AG-327 22"



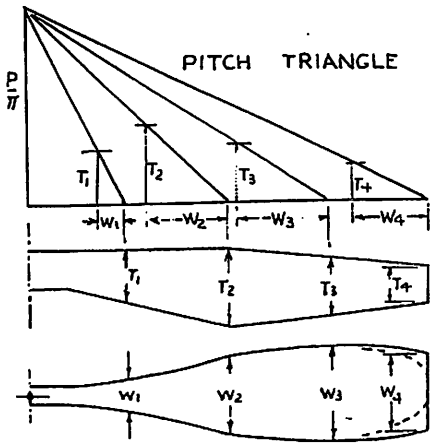
MESSERSCHMITT 163 KOMET
The tailless German rocket plane is now a unique kit for Jetex, rubber or catapult.
AG-328 16"

Letter from Jim Fullarton in OZ *17 Ian's Grove ,*
Lower Templestowe, Victoria 3107,
Australia.

In response to John Barker's article in your November issue, I would like to take the opportunity to join in this discussion. I started to investigate this subject back in 1937, though not being of a mathematical turn of mind, I used a geometrical approach, using the well known pitch triangle, which will be found in any worth while model aeroplane manual dating back to 1910 or earlier.
Like John, I soon found that there was a non linear relation between the side elevation and plan view of the block for a true helical form, only in my case, I started with straight lines in my side view, and developed the plan view by taking widths at various stations along the blade from the pitch triangle, giving curved outlines as shown in the diagram. I used this type of block on my 1938 "Hereward", 1939 Hereward II", and my 1948 Wakefield, and it was also taken up by fellow club members, Allan Limjoon and the late Allan King. The propeller has always been one of the least understood aspects of model design, especially in the early days of single blade folders, when there were some particularly horrible examples. Some of these had the block so reduced in depth at the hub, that the blade angle was just about the same from the centre out to the half radius, which would have meant that the inner portions of the blade would have been going through the air at a negative angle, producing reverse thrust!
More recently, the work of such theoreticians as Schwartzbach, Larrabee etc. has made the true helical pitch distribution seem a bit out of date, but, as I said; not being a mathematical type, I won't go into that. *Jim Fullarton*

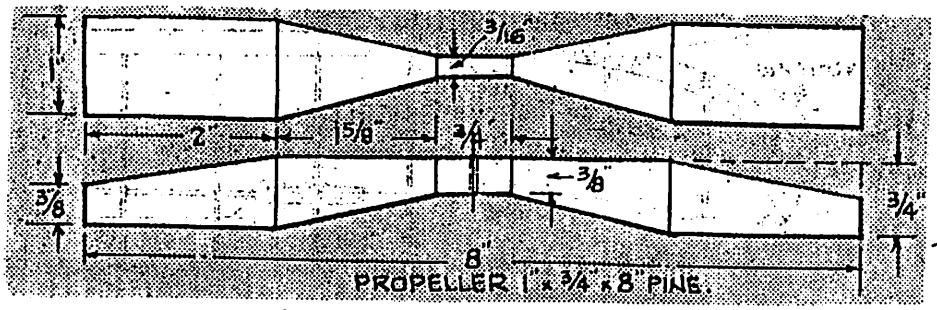


AG-326 26"
For Jetex, rubber power or catapult.
AG-325 12"

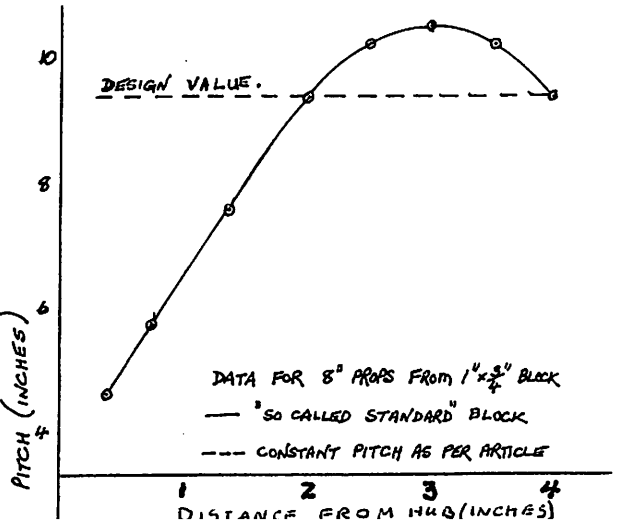


HELICAL PITCH PROP. BLOCK

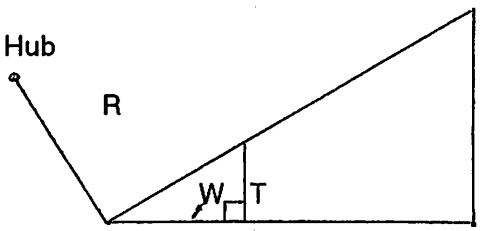
My own contribution to this story is to allow the inner portion with the now almost universal cut-out to half the depth at the hub to be laid out with a constant pitch. What is now called a "standard block" can be seen on many plans as in the example below from a plan in Jan. 1944 "Aeromodeller", using an initial block size 8" x 1" x 3/4". I will be modifying this propeller to have a true helical pitch as an example later, so bear this in mind and compare them when we get to it. This type of standard prop block has been used for many years by the majority of prop-carving modellers, myself included, but it does not give helical pitch - far from it.



STANDARD BLOCK



Calculations: I am keeping these as simple as possible and I promise to not even mention trigonometric ratios (which are a great "put-off" to many people). A rough sketch of the pitch triangle is shown below. The block has dimensions T (thickness) and W (width) at a distance R (radius) from the hub.



$\pi = 3.14$ as near as we need here.

By similar triangles $P/2\pi R = T/W$. This can be re-written in several forms depending on what we want to calculate. First of all we need to know what the pitch is, using the block sizes at the half way point. $P = 2\pi RT/W$ We know T and W from the block size and R is half way out to the tip. This value of P we will keep constant throughout, so if we know either T or W at any other value of R we can calculate the other dimension.

(a) The outer half: Here W is constant and P is constant. We can re-write the equation $T=PW/2\pi R$. Note that T is a function of 1/R, and this is what leads to the "dip" in the outer profile. What we have to do is to take various values of R and calculate the various values of T and then plot them on the side elevation, just as Barker does in his Fig. 4. Note that he is using a 13" x 1-3/4" x 1-1/2" block.

(b) The inner half: The method I have adopted is to draw out the side elevation with the usual cut-out at the back. You can even indulge in curves if you want, as I do. Now measure the thickness from this side view at various values of R. The formula can be written as $W=2\pi RT/P$

We know P and we have measured the values of T at several R values, so we can easily calculate the matching values of W. These widths should be split half and half about the center line of the plan view and the points joined by a smooth curve, remembering that the width is zero at the hub and is the block width at the half-way point on the blade, You will find that the shape developed now becomes a symmetrical "double dip" towards the hub. All that remains is to give the hub section a sensible thickness to withstand flying and landing (crashing?) stresses and to blend this into the shape we have developed.
This all sounds long-winded, but I can assure you that the whole process using the simplest, cheapest hand calculator can be completed in a few minutes. Simple multiplication and division only. As an example, here are the calculations necessary to lay out the 8" x 1" x 3/4" propeller I mentioned earlier so as to have a true helical pitch.

$$P = \frac{2\pi \times 2 \times 3/4}{1} = 9.42"$$

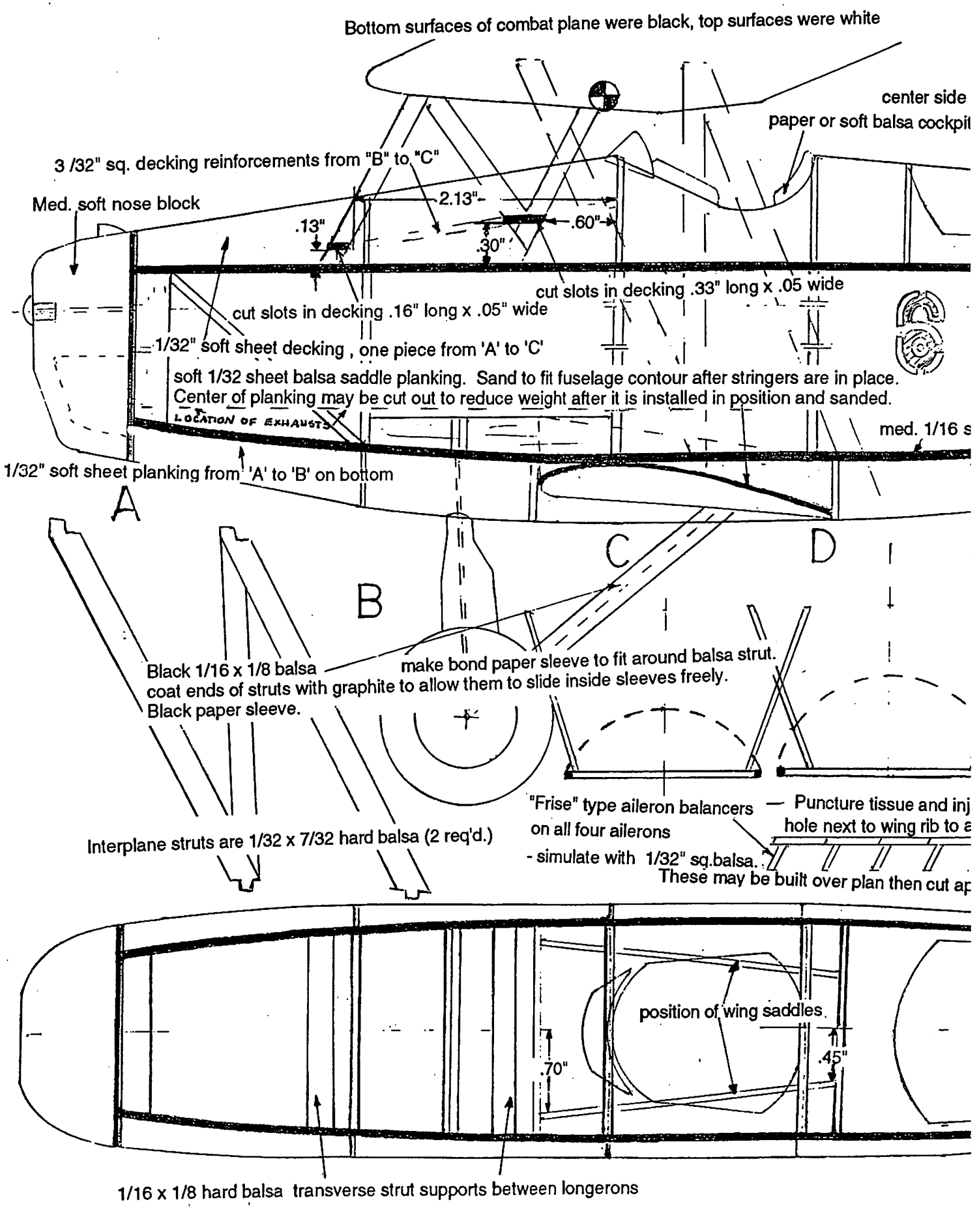
(a) Outboard section (W = 1")

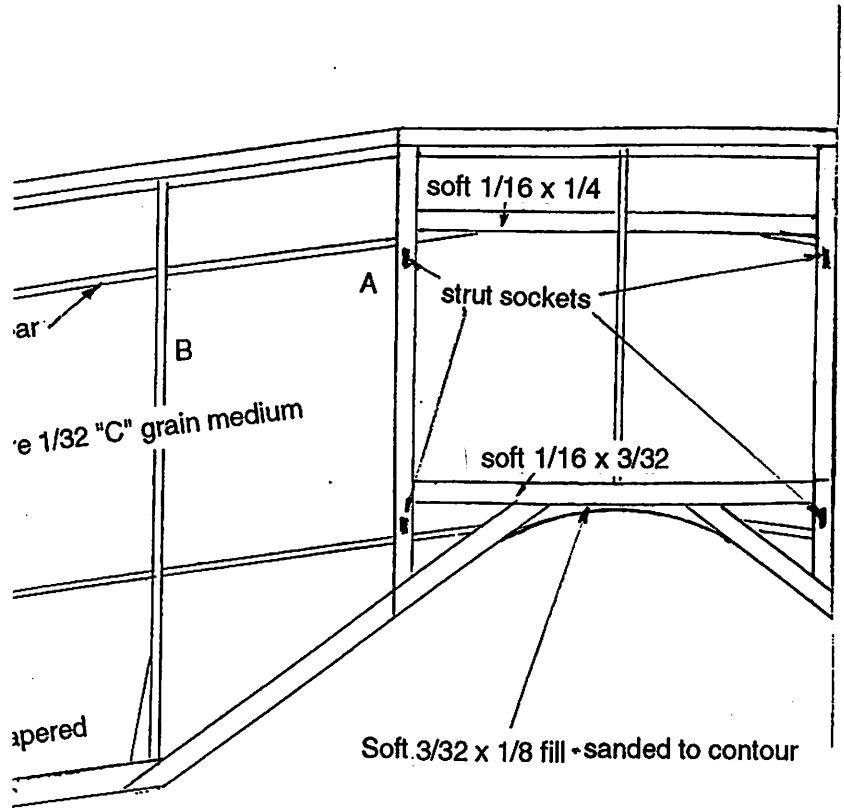
R = 2"	T = 0.75"
R = 2.5"	T = 0 .600"
R = 3.0"	T = 0.500"
R = 3.5"	T = 0.428"
R = 4" (tip)	T =0.375" (3/8")

(b) Inboard section

R = 0.5"	T = 0.413"	W = 0.138"
R = 1"	T = 0.551"	W = 0.368"
R = 1.5"	T = 0.669"	W = 0.669"
R = 2" (as before)	T = 0.750"	W = 1.00"

Continued on page 12


Bottom surfaces of combat plane were black, top surfaces were white
center side
paper or soft balsa cockpit
3 /32" sq. decking reinforcements from "B" to "C"
Med. soft nose block
2.13"
.13"
.60"
.30"
cut slots in decking .33" long x .05 wide
cut slots in decking .16" long x .05" wide
1/32" soft sheet decking , one piece from 'A' to 'C'
soft 1/32 sheet balsa saddle planking. Sand to fit fuselage contour after stringers are in place.
Center of planking may be cut out to reduce weight after it is installed in position and sanded.
LOCATION OF EXHAUST
med. 1/16 s
1/32" soft sheet planking from 'A' to 'B' on bottom
A
B
C
D
Black 1/16 x 1/8 balsa
coat ends of struts with graphite to allow them to slide inside sleeves freely.
Black paper sleeve.
make bond paper sleeve to fit around balsa strut.
"Frise" type aileron balancers
on all four ailerons
- simulate with 1/32" sq.balsa.
Puncture tissue and inj
hole next to wing rib to a
These may be built over plan then cut ap
Interplane struts are 1/32 x 7/32 hard balsa (2 req'd.)
position of wing saddles
.70"
.45"
1/16 x 1/8 hard balsa transverse strut supports between longerons

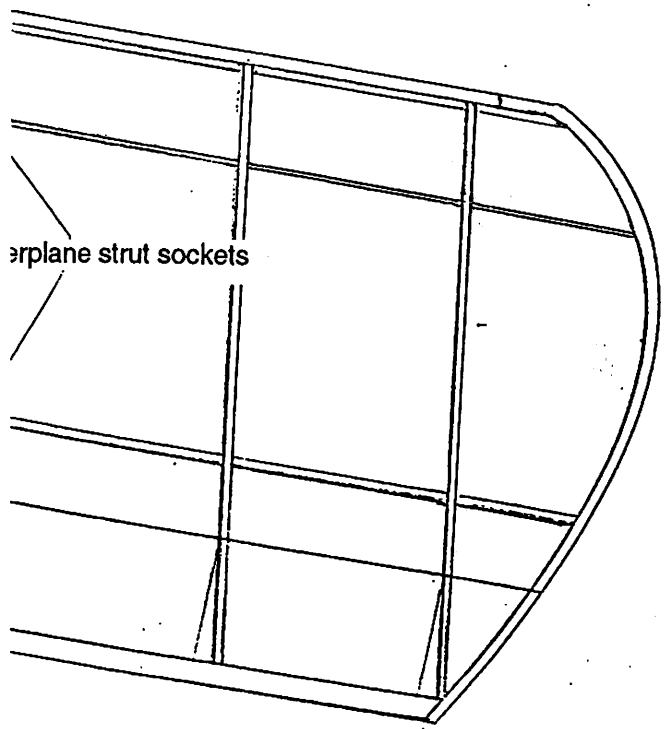


/n on tissue, before covering, with solvent based felt tip marker.
ter water shrinking. After Krylon is dry, the marker may be re-
lesired. ("Design", "Chartpak" or "Berol" markers recommended.)

/16 sq. soft - (black)

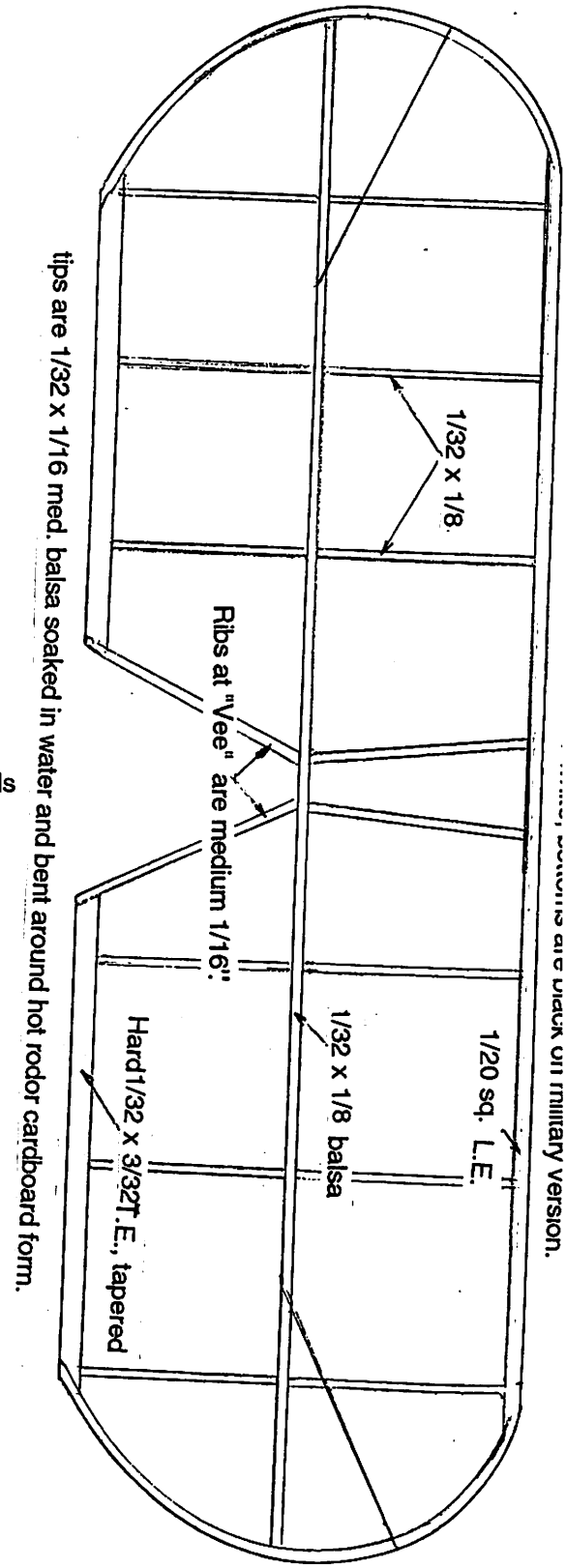


8 or 9" prop. and power with .070"x 60" rubber, braided and folded into four strands



sa, water soaked and bent around hot rod or cardboard form.

ARADO Ar 66C



tips are 1/32 x 1/16 med. balsa soaked in water and bent around hot rodor cardboard form.

...; bottoms are black on military version.

ARADO Ar 66C

The Arado Ar 66 equipped flying schools in Germany from 1933 until into WW II. Over 6000 were built, perhaps as many as 10,000. Some were used as night harassment bombers on the eastern front. They were fitted with the Argus 240 h.p. inverted Vee As10C engine. The Ar 66 was a two seat, single bay biplane with staggered, 8 degree swept back wings with "N" type interplane struts. Lift wires ran from the upper - front and rear struts to lower spar positions at the wing roots. All four ailerons were fitted with "Frise" type balancers.
The fuselage was built of steel tubing and was fabric covered.
The tail unit was mounted on a pylon and was braced to the fuselage with two struts on each side. The rudder was horn-balanced, and had no conventional fin other than the fuselage pylon.

The night military versions were fitted with bomb or other harassment dropping facilities and were finished with dark brown undersides and white topsides. On the bomber version the rear cockpit was apparently covered. The two views shown are for a military version, probably in 1940 since the fuselage cross insignia had wide borders introduced in 1940. (From 1935 through 1938 tail markings featured a wide red band around the swastika, running the full chord of the vertical stabilizer.) (reference - Scale Aircraft Drawings by Peter Bowers - Volume II - World War II. Air Age Publishing Inc. Wilton, Ct.)
I was able to find a color rendition of the Ar 66 in "Combat Aircraft of World War II" by Elke C. Weal, John A Weal and Richard F. Barker, showing the plane with dark brown undersides and white top sides. This combat version had the rear cockpit covered. **I will run off a copy of this drawing for the asking for anyone wishing to build the Ar-66 . Call me at (330) 864-7533 or drop me a card at: 753 Cliffside Drive. Akron, OH 44313-5609. (Steve Griebling).**

Training versions were probably colored aluminum or white and had open rear cockpits and a red stripe around the swastika on the rudder. A friend of Russ Brown, Richard Reimer, flew the Ar 66 prior to the war and remembers his plane as being dark green on top and light blue on the undersides. (This would be similar to the later Ar 68 color scheme.) Unfortunately the entire registration of his plane is not known, but the photo shows it to have an open rear cockpit indicative of the trainer version..

Dimensions: Span - 10.00 m. (32 ft. 9in.), Length (landplane) 8.10 m. (26 ft. 7 in.), Length (seaplane) 8.85 m. (29 ft. 1 in.), Height (landplane) 2.70 m. (8 ft. 10 in.), Height (seaplane) 3.15 m. (10 ft. 4 in.), Wing area 29.63 sq. m. (319 sq. ft.).

Performance: maximum speed at sea level =130 mph. , cruising speed =109 mph.
Normal range = 444 miles. Time to 3280 ft. = 4 min 6 sec.. Service ceiling = 14, 765 ft.
Weights: empty = 1,995 lb., max. = 2,932 lb.

Armament: 4.4 lb (2kg.) or 8.8 lb (4kg) anti personnel bombs. Employed as night ground attack aircraft against Soviet forces along the Eastern Front and in Finland. Equipped sixteen Staffeln, including one manned by Estonian volunteers, one by Latvian and one by a Russian ex POW.

The Ar 66 was first flown in 1932 but the first delivery occurred in late 1933. They were built by the Arado Handelsgesellscaft Warnemunde. Nacht Staffel Gruppen 2,3 and 5 were employed in the Soviet Union, NSG 8 in Finland and NSG 12 in Latvia. They usually flew at tree top height on dark nights dropping booby traps, and anti-personnel bombs.

Thanks are due to Russ Brown for providing the vital side and top view drawings from "Die Luftwaffe" pages 122-123 by Bill Gunston - published by Salamander Books, and to the Akron Public Library for allowing me to make copies of pages from Janes"All the World's Aircraft - 1935" and "German Aircraft Industry and Production 1933 - 45"by Ferenc A. Vajda and Peter Dancey, published by Airlife Pub. Ltd in 1998 and from "The Warplanes of the Third Reich" by Swanborough .

Steve Griebling - CFFS

ARADO Ar-66

My first trial with an Arado biplane was the Ar 68 because I had some good three view drawings and color photographs of the plane. Unfortunately the nose moment of the Ar 68 was quite short and the rubber powered model required a great deal of ballast, resulting in a totally unacceptable flying weight. Russ Brown, our expert historian, suggested the swept wing Ar 66 to overcome this objection, but it was difficult to find reference material for it because of its rather limited use in World War II. Russ supplied me with top and side views and later a photo of a portion of the actual plane flown by his friend Richard Reimer. I found additional photos in a couple of books at the Akron Public Library and have reproduced these as well as I could. I believe the model plan here is reasonably representative of the Ar 66 shapes, but the instrument panel is a wild guess!

FUSELAGE

This model uses a conventional box structure of 1/16" square balsa for the fuselage. The longerons also serve as stringers. All fuselage formers are 1/32 sheet except for "A" which is 1/32" plywood. The center side stringers are 1/8" wide and the others are 3/32" wide, very soft balsa. These are set on edge to give an oval cross section. The center top and bottom stringers are 1/32x 3/32 to afford a bit more strength. The nose is planked only on top and bottom with soft 1/32" sheet. Soft 1/32 sheet is also used for the lower wing saddle sheeting. It is stiffened by the use of saddle support formers with a shape complimentary to the wing ribs. Since the saddle sheeting is curved it resists the shrinkage force of the covering very effectively. I recommend very careful installation of the saddles to make sure they are parallel with the stabilizer pylon surface before gluing them in place. Any slight correction can be made by sanding the saddle formers before the sheeting is installed.

STRUTS

Cabane and interplane struts are built over the plan. Holes for the cabane struts must be carefully laid out and cut through the upper fuselage planking. The bottom ends are glued to the transverse strut supports. To be sure the struts are symmetrical and correctly spaced, make a dummy upper wing center section of sheet balsa or cardboard and slip the strut ends into holes in this dummy piece. Sight and measure carefully till you are satisfied that the cabane struts are aligned.

RUDDER

The rudder drawn on the plan is the scale outline, but early test flights of my model showed a tendency for a little "Dutch Roll", so an alternate outline is shown as a broken line. This larger rudder should correct the "Dutch Roll". Note that the stabilizer pylon is the only fin on this plane.

WINGS

The upper and lower wings are identical except that the lower wing is planked with soft1/32 sheet from rib "A" to "A". The fuselage and lower wing should be covered and assembled before adding stringers under the lower wing. (An alternative is to cover all but the bottom of the fuselage before the lower wing is fitted, then add the bottom stringers and cover).

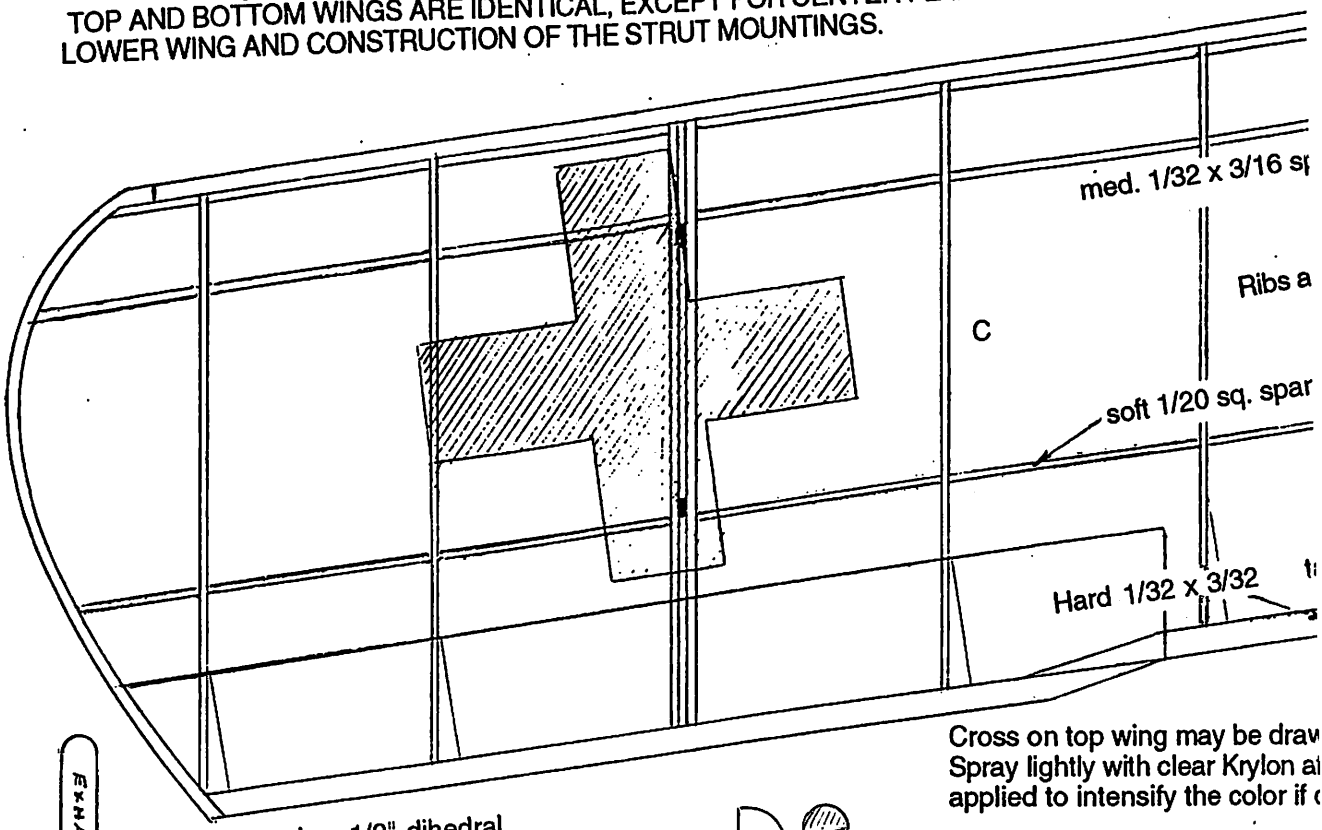
Strut sockets are made by sandwiching three ribs together, but note that the center ribs of these sandwiches are notched either on the top (for the lower wing) or on the bottom (for the upper wing).

I have had trouble with rib warpage on some of my models, from tissue shrinkage force, so I used rib stiffeners made of tapered 1/32 x 3/32 soft balsa on this one. They appear to do the job so far, but the final test will be when it has been in the hot sun for a couple of hours! Since this plane was built I have found that rib distortion will not occur if the tissue is applied to the bottom of the wings first and cemented to each rib!

INTERPLANE STRUTS

Interplane struts must be carefully fitted to ensure the correct incidence angle and spacing. I recommend this be done before covering just to be sure everything fits and to make any necessary adjustments. Fit the lower wing in its saddle and set the upper on the cabane struts then strap it in position with a thin rubber strip passed under the fuselage and joined to itself with an alligator clip.

TOP AND BOTTOM WINGS ARE IDENTICAL, EXCEPT FOR CENTER PLANKING ON THE LOWER WING AND CONSTRUCTION OF THE STRUT MOUNTINGS.



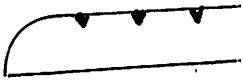
Cross on top wing may be draw
Spray lightly with clear Krylon a
applied to intensify the color if

1/2" dihedral



air scoop = foam or balsa

cylinder heads = 3



use

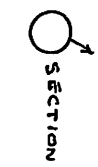
med. 3/32" square L.E.

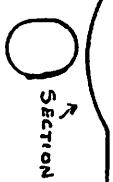
int

1/32 x 3/32 rib tail stiffners to resist rib warping

JOIN LINE

EXHAUSTS -- 2 REQ'D -- MAKE FROM FOAM -- PAINT BLACK WITH ACRYLIC

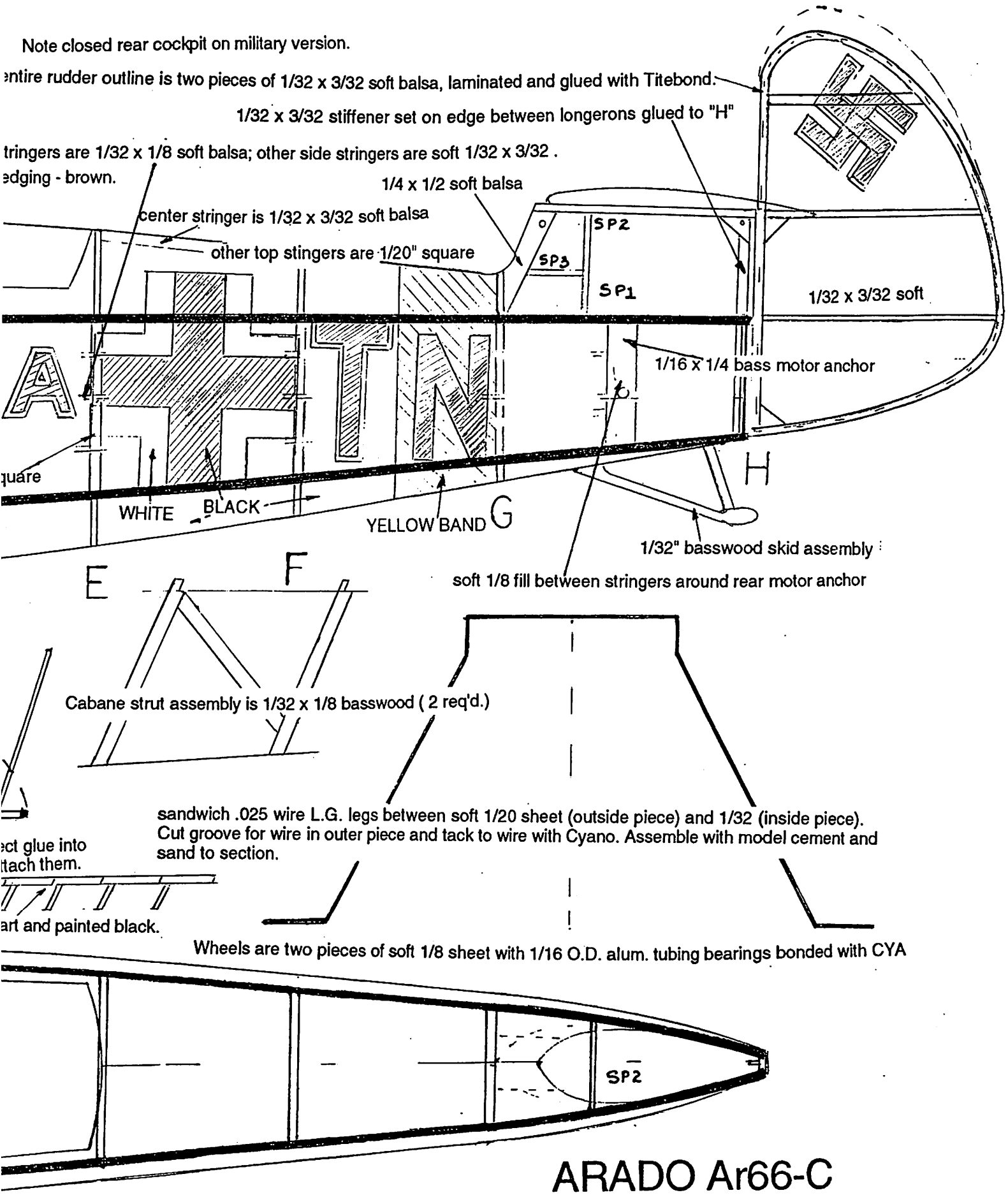




Location of Frise balancers
Long end points forward on bottom of wings

Location of Frise balancers.

tips are 1/32 x 1/16 med. hard ba



ARADO Ar66-C

18-5/8" span.

Drawn by Steve Griebling CFFS, Flying Aces "Stork Squadron"

Finally, I have done calculations for several sizes of propellers to cover most options for FAC events. These comprise a 12", a 10", an 8", and two 6" sizes.

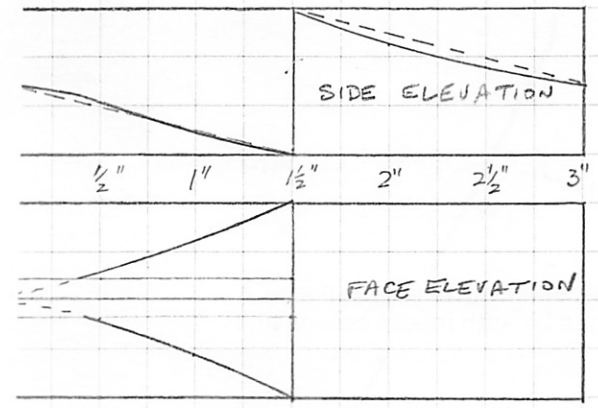
If the block sizes and diameters do not suit what you want, calculations for any different size follows along the lines suggested above.

I am not saying that the props will be MAGICALLY better that their "standard block" contemporaries, but they should be **somewhat** better. We need to get a lot of flying data before we can be sure about increased efficiency. I would be pleased to get some practical data from our readers as they compare plastic nondescripts, standard blocks and the new helical pitch props derived from the same initial block sizes. You may find that you may have to alter the motor size a little to get the best results.

Finally, just a few points in cutting out the block shape. The best order is as follows: -
(1) Drill the hole for the prop shaft (drill press to get it vertical).
(2) Cut the outer dips (band saw).
(3) Cut the center cut-out (side view).
(4) Cut the two dips on the face elevation.

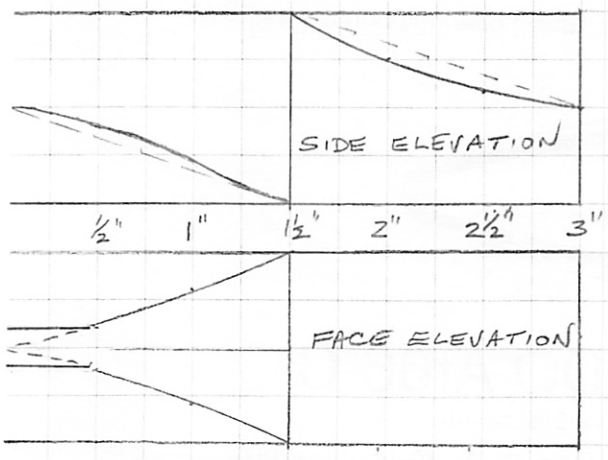
Carving was well covered by Steve in the previous propeller article and I'm not going to touch this.

Gordon Roberts: Cleveland Free Flight Society, FAC "Stork Squadron".



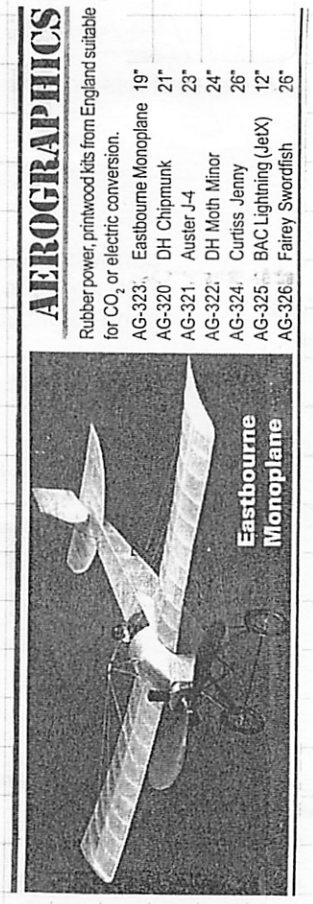
6" PROPELLER
PITCH 7.07"
P/D = 1.018
BLOCK 6" x 1" x ¾"

HUB THICKNESS $\frac{3}{16}$"

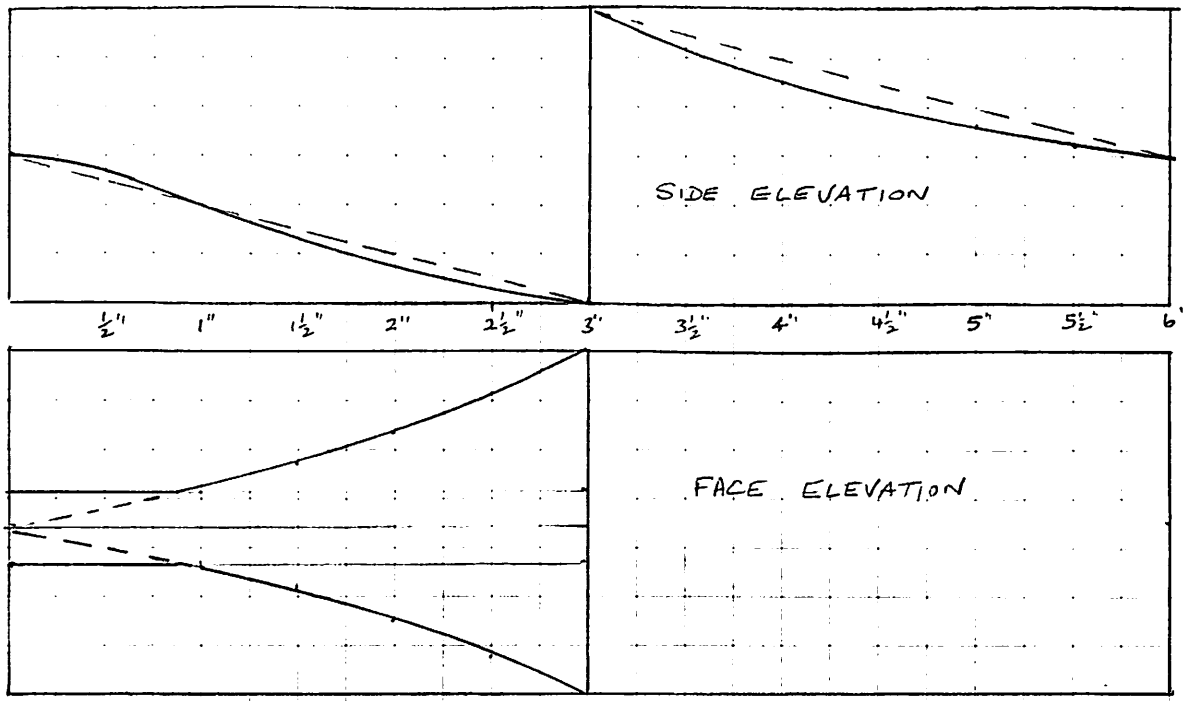


6" PROPELLER
PITCH = 9.42"
P/D = 1.57
BLOCK 6" x 1" x 1"

HUB THICKNESS $\frac{3}{16}$"



HUB ↓

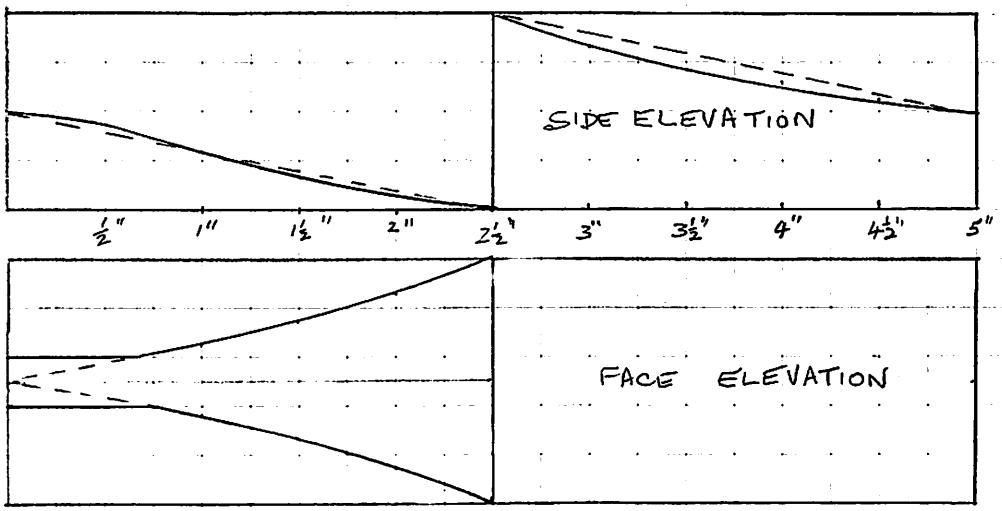


12" PROPELLER
16.2" PITCH
BLOCK 12" x 1¾" x 1½"
P/D = 1.35

RADIUS VALUES

HUB THICKNESS 3/8"

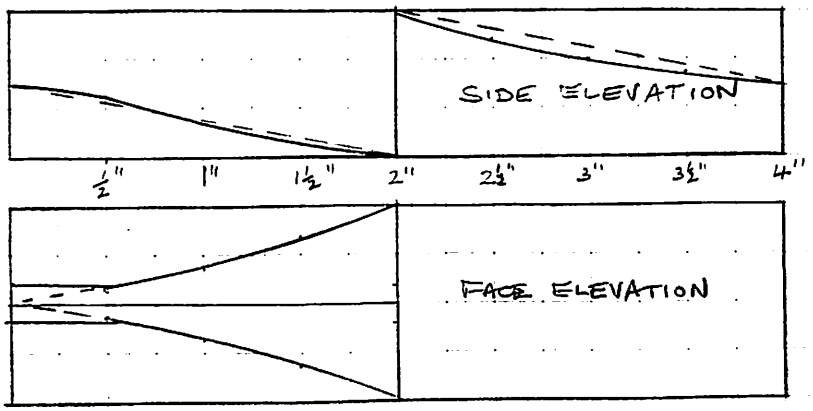
HUB ↓



10" PROPELLER
12.6" PITCH
BLOCK 10" x 1¼" x 1"
P/D = 1.26

HUB THICKNESS 1/4"

HUB ↓



8" PROPELLER
9.42" PITCH
BLOCK 8" x 1" x ¾"
P/D = 1.18

HUB THICKNESS 3/16"

STABILIZER

I recommend that a couple of .025 wire "dowels" be passed through the stabilizer pylon, as shown on the plan, so the stabilizer can be strapped down with a rubber band. This will make it easy to adjust stabilizer incidence for test flights. After this incidence is set you may want to glue the stab. in place and add the 1/20" sq. bass struts as shown with broken lines and small "X's" on the plan and photographs.

LANDING GEAR

The landing gear struts are two pieces of 1/16" sheet for each leg, laminated with Titebond. Make a groove in one of the struts for the wire and attach it to the wire with cyanoacrylate. Lamination is facilitated by strapping the assembly with a thin rubber strip till the Titebond sets.
The rear struts are made of paper sleeve wrapped around 1/16 x 1/8 balsa sanded to a streamlined shape and painted black. Coat the strut with graphite so it slides freely inside the paper sleeve.

PROPELLER

I carved a hard wood prop for my model, because nose weight was needed, but a plastic prop will do well too. I strongly recommend a Henry Struck type free wheeler mechanism because it can be entirely enclosed within the spinner. Make the spinner of very hard balsa and hollow it with your Dreml tool, so it is very thin, in order to accommodate the free wheeler. To wind the rubber you may use either a "Crocket " hook or a stirrup to hold the rubber and simply hook the prop assembly on after winding is complete. I f you omit the spinner, a Garami free wheeler may be used instead.

ARMAMENT

The bomber version of the Ar 66 carried four small bombs or other harassment devices. I assume these were under the lower wings, close to the fuselage, but I have not been able to find either description or photos of the fitment. I simulated bombs by shaping pieces of foam about 3/16" dia. and 1" long and mounting them with Titebond to short pieces of 1/16 x 1/8 balsa . I mounted the bomb racks under the wings, and I also used the rack ends for mounting the rear L.G. struts. Paint bombs and racks black with water based paint (Acrylic is good). A dab of red paint on the nose of each bomb is a nice touch. Bomb fins are made of paper slit and formed into a cross. You will need to cut an "X" into the rear of the foam bomb to insert these fins. Open the slit with a piece of thin wood as you insert the fin assembly. Glue with Titebond.

MARKINGS

Paint the yellow band on the fuselage with dope and cut the crosses and swastikas from paper after you have drawn them. (I had poor results with "Micro Mark" decals printed with a laser printer.) The color scheme of this plane makes it impractical to draw on the tissue, except for the top wing crosses.
The crosses on the upper wings can be drawn directly on the tissue, before covering, using a solvent based felt tip marker such as "Design", "Chartpak" or "Berol" brands . After the tissue has been applied and water shrunk, apply a light coating of "Krylon" clear spray to fix the ink and seal the tissue. If you want to intensify the felt tip colors, they may be reapplied over the Krylon. Solvent type inks, as above, dissolve the Krylon and make it into a good waterproof ink when dry.

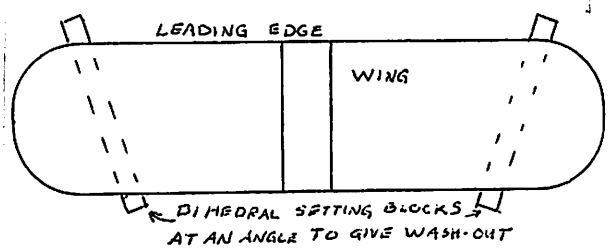
"FRISE" AILERON BALANCERS AND RIGGING

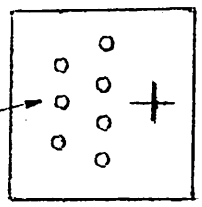
Build the Frise aileron balancers of 1/32" square balsa over the plan and cut them apart on the lines shown, paint them black and poke 1/32" holes through the tissue next to wing ribs so you can inject a bit of glue into the holes. Insert the ends of the balancers into these holes while the glue is wet so they will be firmly attached to the ribs. The long ends of the balancers point forward. There are two balancers for each aileron.
Use silk thread for rigging. Sew it thru the interplane strut ends and cabane strut ends and lower wing roots. Apply tension with alligator clips and glue in place.

TIP OF THE MONTH

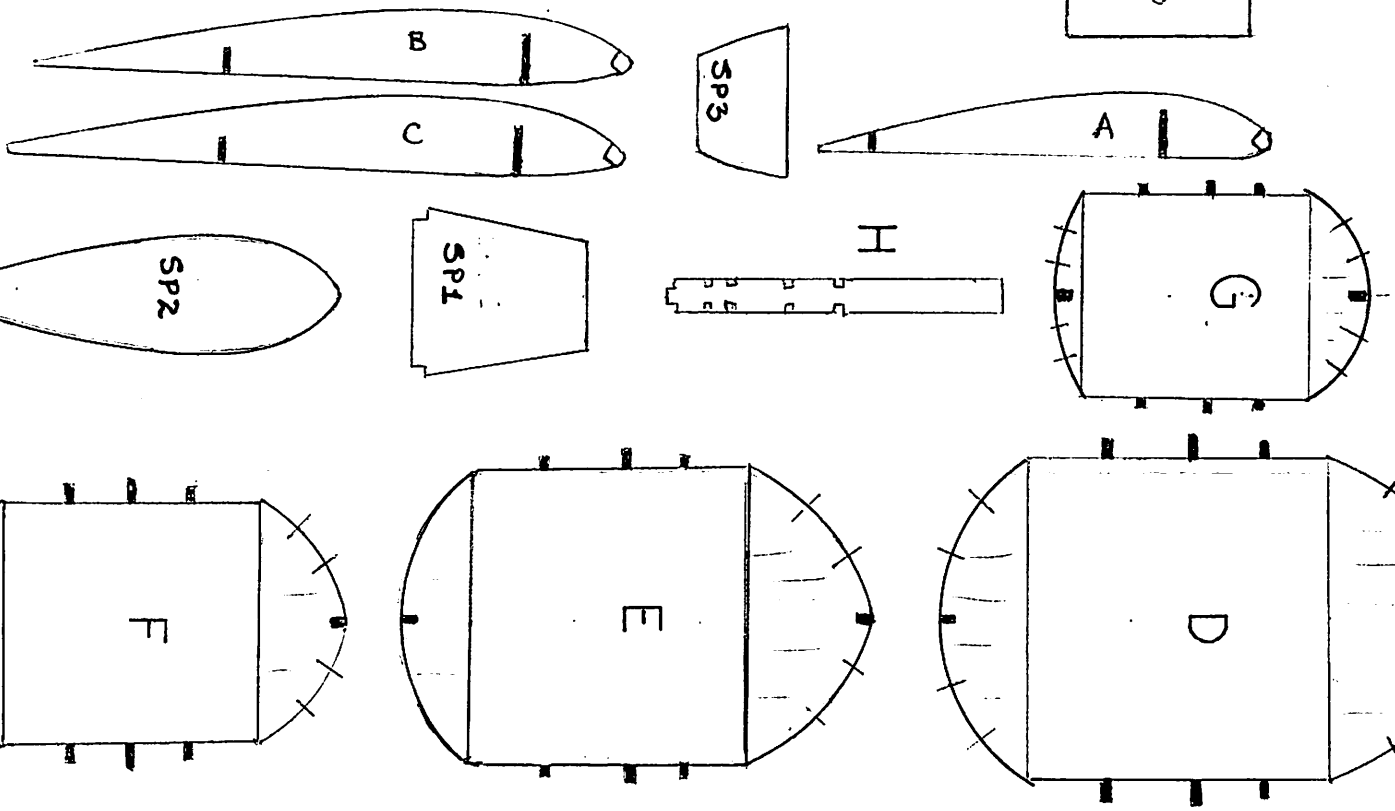
When setting dihedral it's best to include a little washout in both wings. The easiest way to do it is to block up the wings when the tissue is wet by using two wood blocks with parallel edges. Tip the blocks inward at the trailing edges so there is more dihedral at the trailing edges!

If the wings are pre-attached to the fuselage, pin one wing at a time to your work table and let the Fuselage hang out in space while the water evaporates and the tissue shrinks. You can still block up the trailing edges to get the necessary washout. I like to put waxed paper under the wet wing (or stablilzer) so there is no danger of any Titebond sticking to the work table!



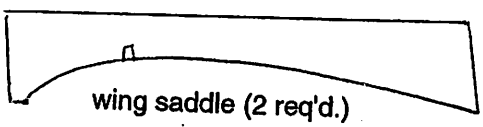


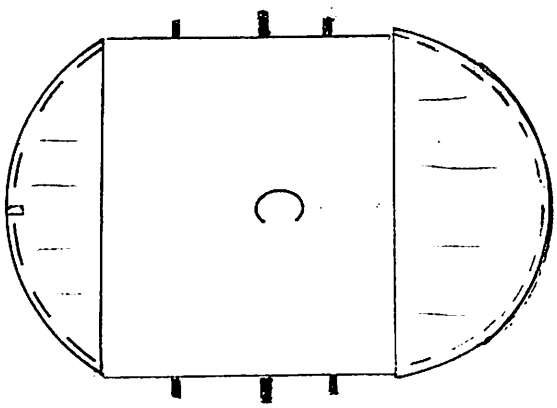
1/4" thick pine key to fit snugly in "A"; drill to accept wood screws to obtain correct balance

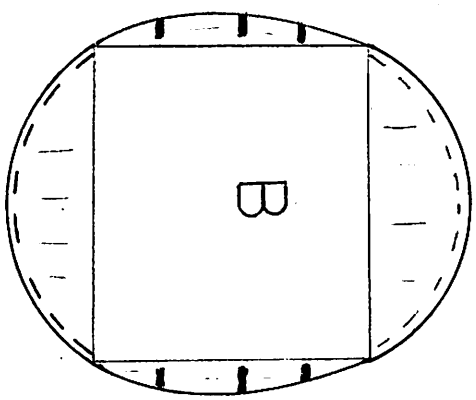


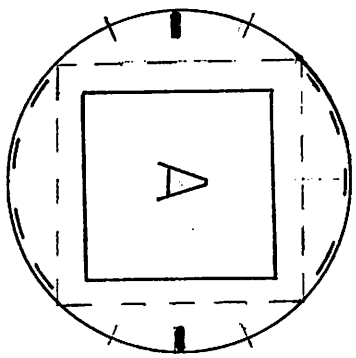
Arado Parts

All formers except "A" are 1/32 medium balsa.









1/32" plywood

CFFS CONTEST EVENTS AT LORAIN COMMUNITY COLLEGE ATHLETIC FIELD

1. FAC Peanut Scale, full points.
2. Hi-Wing Cabin Peanut Experimental
3. Hi-Wing Cabin Peanut Production
4. FAC Dime Scale
5. FAC Rubber Scale
6. FAC OH Funk & Waco Ltd. M.L.
7. FACC Jumbo Scale
8. FAC Pinoneer Scale
9. FAC Golden Age Civil Aircraft
10. Golden Age Military Aircraft
11. FAC No Cal Profile Scale
12. No Cal WW II 3 flight. total
13. FAC Power Scale Elect. or CO2
14. O.T. Gas Replica Elect or CO2
15. Embryo Endurance (J) (S) (O)
16. Jr. Rubber 3 flight. No Max.

+ P-20

17. H.L. Glider (J) (S) (O) * $1 Pot.
18. 6" Stick catapult glider, $1 Pot.
19. FAC O.T. Rubber 36" or 150 Sq. " Pot
20. FAC O.T. Stick 36" or 150 Sq. " Pot.
21. FAC O.T. Two Bit. 25" Max. $1 Pot.
22. O.T. Jimmie Allen R.O.T. $1 Pot.
23. Shell Speed Dash - 2 flt. by 3:00 P.M.
24. Modern Military M.L. @12:00
25. WW I Multiwing Peanut M.L. @12:30
26. WW I Multiwing FAC M.L. @1:00
27. WW II Peanut Combat M.L @ 1:30
28. WW II Combat FAC M.L. @ 2:00
29. Bendix Trophy Race M.L. @ 2:30
30. Goodyear F.1 race M.L. @3:00
31. Greve In-lines Race M.L. @3:30
32. Thompson Radials M.L. @4:00

+ P-30

FAC rules apply with inspection of No Cal & Dime detail. Mass Launch 45 point Min. detail and O.T. Per Plan. Pre select event for multiple option models. No size changes in O.T. 25" Max. Mass Launch and O.T. Gas replica out of bounds to be set at field. All may pick a plan prize.

I-90 Exit 148 to Rte. 301 (S. Abbe Rd.) Check Hoag Rd or upwind..

Sun July 28 at LCCC 9 AM to 5PM CD Gordon Roberts

11 Sunday Aug 11 at LCCC 10AM to 5PM, C.D. Peter Zbasnik 216-476-4824

15 Sunday Sept. 8 at LCCC 10 AM to 5 PM, C.D. Russ Brown & Lundy Goesling 216-382-4821

6 Sunday Oct. 6 at LCCC 10AM to 5PM, C.D. Gordon Roberts 216-749-4817

Other Events of Interest:

August 5-9 AMA Outdoor Champs at Muncie, IN. Chuck Markos 655 Carlisle Ave. Deerfield, IL 60015 (847) 945-9225 <cmarkfl@aol.com>

Aug 9-11 Aeronca Fly-in at Alliance Barber Field (216)932-3475 www.oaafly-in.com Brian Matz - bwmatz@yahoo.com

Aug 16-18 Empire State F.F. Champs at Geneseo, N.Y. for FF Gas, Rubber , Nostalgia Gas &FAC FAC Club News May/June . John Carls, Route 2, Box 88 Bradford, PA 16701 (814) 362-7789

Aug 26-30 Muncie SAM Champs (SAM) (N) Ron Sharpton, 1290 Country Rd., Daytona Beach, FL 32119. (386) 767-6138. <dixiefreeflight@aol.com>

Aug 31-Sept1 Muncie, IN. Annual Free Flight Meet (Central Ohio FFC). (N). Larry Willis 336 Sugar St. Saint Louisville, OH 43071. (614) 745-6314.

Aug 31-Sept 2 Cleveland Air Show at Burke Airport with CFFS FF Model Display

Sept. 21-22 Empire State Indoor Champs at Bills Field House Orchard Park, N.Y. 10 FAC and 9 AMA Events including F1D plus Science Olympiad . Radio Control session 9/21 evening. Access to site is noon on 9/21. Vet Thomas 970 Clarkson-Parma Town Line Rd. Hilton, N.Y. 14468 (585) 392-5164 vthomas@rochester.rr.com Site is 200x400 feet with an arched ceiling height of 128 feet. Entry fee for Free flight only = $25; Open R.C. only = $20. Open FF & R.C. =$35 Juniors FF ocontest $5; R.C. $5. Valid AMA or MAAC licenses required. Butterfly model packages including model and winder will be sold at the site. Age groups for Butterfly event are under 11 and 12-17.

Sept 7-8 FAC at Muncie, IN.

CROSSWINDS readers with the dreaded red X at issue renewal code No. 102 or lower can send $16 per year (4 issues) to Russ Brown at 4909 N. Sedgewick, Lyndhurst, OH 44124.