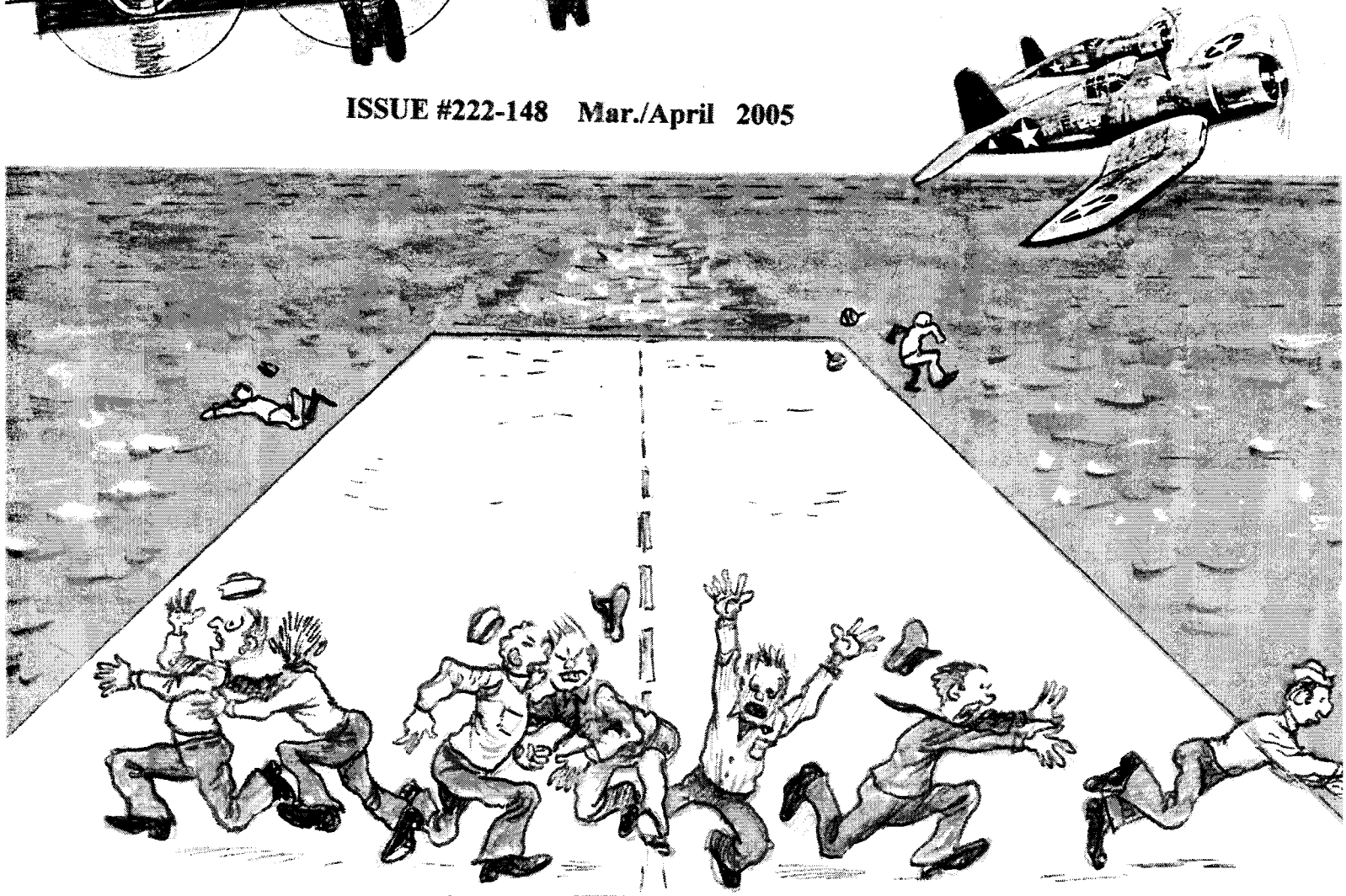
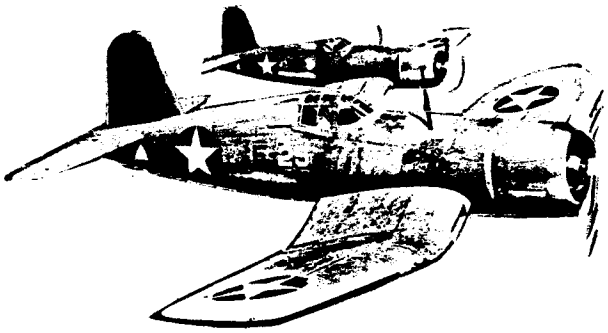
FLYING ACES

Club News

ISSUE #222-148 Mar./April 2005



UNEXPECTED GUESTS



STORY BEHIND THE COVER

Shortly after VJ day, when the pressure was off and everyone felt a little giddy, a passing B-29 joined an echelon of F4-U's waiting their chance at the hook. It was fun and games until the -29 dropped flaps and wheels and lined up on the LSO. Then--pandemonium!

The 20th Air Force had a good laugh. The carrier captain's comments were not recorded.

Once again our cover is adorned by the artwork of Bob Rogers. Great "stuff", Bob. We wish to thank Bob and all of the others who have contributed to this issue. The plans came from Fran Ptaszkiewicz (North American Observation, you can change the airfoil), John Blair sent the Pseudo Dimer (Snyder Baby Bomber), Dave Stott (AITI PT-1 Trainer), Tom Nallen II (Leighnor Special) and the Northrop "Gamma" redrawn by Dave Stott from an old "Sky Flyer" plan which we have had in our files for a long time.

Three of our members have gone "West" since the last issue. They are James Ries of Akron, Ohio and Peter Wank. Peter Wank was the owner of Scientext, the company that gave of those nice plans and short kits of electric powered scale models. Our condolences to their families and friends. We also lost Dick Howard, Dick designed many scale model plans over the years. A notice on Dick's passing further on in this issue.

The FLYING ACES CLUB

is a society of unique individuals with a common interest that at times borders on a passion. It is our intent to preserve and promote the traditional building and flying of free flight stick and tissue model aircraft. Although competitive at times, the sharing of innovations, assistance and camaraderie is second nature to all that believe in the unique spirit of the FLYING ACES CLUB

More on the FAC Non-Nats; Event sponsors are always welcome, they can be manufacturers, FAC Squadrons or individuals. If you are interested please contact GHQ as soon as possible. The fee is just $50.00 per event. Also, if anyone wants a vendor's table during the scale judging event, the fee is $15.00 per table and can be reserved right now. Space is limited and first come, first served. No tables will be available after June 1, 2005. Please get your entry forms in to GHQ A.S.A.P. to save us work at the contest.

Several FACers have asked about a video from the 2004 FAC Nats. If there are any out there for sale please let GHQ know so we can advertise it for you.

We have been asked several times in past years about an FAC calendar which would feature models from some of our fellow FACers. Well, we are going to attempt to do it. What we need are 8X10 glossy photos of your models. The photos would become the property of FAC-GHQ and there would be no reward to the individual except for the honor of having his model included in the calendar. There would be no guarantee that all photos would be used as we would only use 12 of them. You can send as many views and as many different models as you wish. We would also have to have a brief discription of the model such as, size, what kind of power, did you build it from a kit (whose), did you build it from a plan (whose) and any other information you may wish to add. All profits from this venture would go into the FAC general fund.

BUILD---FLY---WIN.....EFF---AAA---CEEE!!!!! Col. Lin Reichel, CinC, FAC

Lin

FLYING ACES

Club

Flying Aces Club decals are back! We have had many requests for them over the last few years but the decal manufacturers wanted way to much money for them. Now, one of our members has been kind enough to make them for us at cost. They are priced at $1.00 each with a minimum of 3 decals per order. Send your order to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

S.O.S.----S.O.S.

Needed, a copy of the construction article for the "THERMAL HUNTER TWO" designed by Frank Zaic and published in the July 1939 issue of "Popular Science". Please note the "Thermal Hunter Two" is not this year's SAM one design rubber model. I do not need any info on that model. Paul Grabski, 312 Forest Hills Dr., Cantonment, Fl. 32533.

POSTAL CONTEST

The FAC Squadron #69 is sponsoring a postal contest called the "DEATHTRAP POSTAL EVENT". This event is for Gee Bee aircraft with a wingspan limit of 25 inches. Rules are standard for a postal contest. We will accept times starting on Memorial Day and closeout entries on Labor Day of this year. Send your entries to; David Boals, 816 Genoa St., Monrovia, Ca. 91016.

If the box on the right has the dreaded RED "X" in it, it is time to renew your membership which includes the newsletter. Cost is $15.00 per year in the United States per year. Cost in Canada is $20.00 per year. Overseas the cost is $25.00 per year. All in U.S. dollars. Six issues per year, published approximitly every other month. Please make checks payable to; Flying Aces. Send to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

HIGHLIGHTS OF THE 2005 RULE CHANGES

GENERAL FAC RULES

Rules #16 and 17: use of gears.

Rule # 18: use of binoculars.

BASIC SCALE RULES

Rule # 21: construction material for windows.

DETERMINING SCALE BONUS POINTS

Note the change in bonus points for seaplanes with multiple floats, tri-motors and off center line twins.

FAC OLD TIME GAS REPLICA

Wing span max now 36 inches.

FAC DIME SCALE

Rule # 7: event now limited to two models per contestant.

CONSTRUCTION: no foam allowed.

NEW FAC EVENT!

FAC OLD TIME PLAN SCALE

THE 2005 SPRING INDOOR FLING

An AMA Sanctioned Class AAA Contest

Presented by:

When: Sunday, May 1st, from 8:00AM - 8:00PM

Where: "INSIDE SWING" Golf Dome, Flint, MI, A CATEGORY III SITE

Event Schedule:

8:00 AM - 9:45 AM.....Standard and Unlimited Class Catapult Glider
Jr plus (Sr, Op comb.)

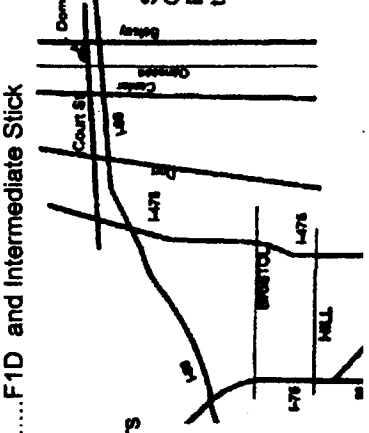
9:00 AM.....Bostonian Judging

9:45 AM - 5:00 PM.....7 Gram Bostonian (J,S,O), Limited Penny Plane (J,S,0)
EZB (J,S,O), Mini-Stick & Mini-Stick Mass Launch (J,S,O)
No-Cal Scale 6.2gm without motor (J.S.O.)
Blatter 40 / Jetco ROG/Phantom Flash ROG (fly any one)
Jr. plus (Sr, Op comb.) Sci. Olympiad Airplanes, Jr. Hi, Sr Hi
And Open. There are no rubber motor restrictions.

11:00AM.....Scale Judging

11:30 AM - 5:00 PM.....FAC Scale, FAC Peanut, Dime Scale, Golden
Age Scale, Pioneer Scale, WW1 and WW2 Mass
Launches (All events J.S.O.)

5:00 PM - 8:00 PM.....F1D and Intermediate Stick
competition.



Entry Fee $20.00

**$1.00 for Jr & Sci Olympiad fliers

CONTEST DIRECTORS:

George Lewis (810) 329-6833
Fred Gregg Jr. (586) 264-1018
Don Lang (586) 751-3281

Ten-Step Trimming Process for Rubber Models - Part I

by John Koptonak

Trimming

This is a topic that gets beaten to death and I'm sure that the method presented here will open a flood of comments. I will say this method has worked for me quite well for some time and allowed me to save many a model from trimming disaster. It can be used for any type of model from No-Cal to Jumbo Scale. The important thing to remember is not to skip any steps and to follow them carefully and patiently. Do not go on to the next step until you have met the requirements of that step. THERE ARE NO SHORT-CUTS BUT THIS METHOD DOES WORK!

There are two concerns with trimming that must be satisfied; CG and thrust line. The CG of the model must be located at the right location to provide stable flight and provide maximum aerodynamic efficiency. A CG that's too far forward spells loss of aerodynamic efficiency. A CG that's too far aft spells stability problems. The thrust line determines how the model will be pulled (or pushed) through the air. Many modelers try to juggle each of these two problems at the same time causing unnecessary trimming confusion. The trimming procedure presented separates the two variables and treats them individually. You first get the most efficient "glider" you can with compromises allowed for free flight stability, then power the "glider" and adjust the thrust line. It's actually nothing new. I hear it's basically the same method utilized by rubber scale modeler Mike Midkiff. This does have a few differences from other methods I've seen and allows a logical progression towards a trimmed, stable flying model.

We will assume that your model has been built straight and true. Take the time to check this. I won't go into details on how to do this, but make sure you have no warps. This method of trimming also assumes the model has the right amount of dihedral and that all flying surfaces are of adequate size but does have some leeway to compensate for this since it checks stability. Your model will also need a way to adjust the stabilizer incidence. Here's the steps for trimming. Each will be discussed in the text that follows.

No-Nonsense Trimming

1. Locate CG.
2. Balance model without prop and motor to locate CG.
3. Glide model.
4. Adjust stabilizer for a smooth glide
5. Check stability by launching into slight dive and climb.
6. Re-adjust CG for stability if necessary.
7. Mark location of the new CG (if changed in step 6).
8. Install prop/motor and re-balance to established CG.
9. Test fly under power.
10. Adjust flight pattern with thrust line.

There you have it. Ten easy steps to successful free flight. Perform each step and your model will fly. Let's look at each step in detail.

1. Locate CG

If the plan you are using shows a CG location, then start there. If the CG location is not known, then guesstimate the CG. Thirty percent of wing chord for a constant chord wing is a good place to start. Step 6 may adjust this later.

2. Balance model w/o prop and motor to located CG

What?! Without the prop. You gotta be kidding! Nope. Leave the prop off! Have you ever seen people trying to test glide a ship with the prop on? One toss goes into a stall, one toss goes into a dive, next toss looks OK. The problem is that it's difficult to get a free wheeler up to a consistent speed that would be similar to when the model is flying at a consistent glide speed. One toss might have too much RPMs which means the ship is being launched at too great a speed to give realistic, usable results. The model will be much easier to glide without the prop. Oh, I hear you theorists out there, the spinning freewheeling prop contributes to drag so will affect the glide. Waa, waa, waa. DON'T WORRY ABOUT IT! Glide the ship at best L/D and when the prop is added it will bring the ship into the best sink rate portion of the polar curve (that was for all you theorists, the rest of you who just want to get your models to fly just ignore that). So leave the prop off for now so we can establish CG/decalage. Remember? One thing at a time!

3. Glide Model

Of course this is the easy part. Now you have a glider so glide it! Launch the model smoothly towards an imaginary spot somewhere out in front of you on the floor. If you're working on a small, light model such as a No-Cal or Peanut, this can be done right in your living room (if the wife will allow it...and don't hit the dog). The trick is to launch the model at it's glide speed. Do it a number of times to get the hang of it and to get some usable information on the gliding flight characteristics. If the model is turning then you have a warp! Slight amounts of turn are OK but hard turns must be tracked back to a warp and eliminated.

4. Adjust stab for smooth glide

At this point the glide is adjusted using only the stab. DO NOT CHANGE THE CG BY ADDING OR REMOVING CLAY! The most efficient method for stab adjustment is to re-glue the stab with positive or negative incidence. Cement-type glues work great for this since the joint can be unglued with solvent and re-glued. Adjustable elevators can be used, but produce more drag. Take your time to obtain a smooth but not too floaty glide (best L/D not best sink rate theorists).

5. Check stability by launching into slight dive and slight climb

This is the tricky step that requires some patience. If you are using a CG from a plan location then you might be able to skip this step, *(continued*

(Ten Step Trimming Process, continued
but it's worth checking. This idea came from flying R/C sailplanes. A neutrally stable sailplane can be put in a slight dive and will remain in that dive at constant speed. An unstable sailplane when put in a dive will remain in the dive and speed up. A stable sailplane when put in a dive will not stay in the dive, but will return to it's original attitude. This is all based on center of lift and CG location. I'm not about to attempt a lesson in aerodynamics (theorists) but I hope the idea comes across for these trimming purposes. Ideally, for maximum performance, neutral stability is desired. Of course, for a free flight model, neutral stability may not be the best way to go. Some amount of stability is desired because of the possibility of being upset during free flight (i.e.: air, ceiling, wall, other models, etc.). The closer you

WANTED; Any FAC members in my area. Doug Logg, 176 Little York Mt. Pleasant Rd., Milford, N.J. 08848. Phone (908) 996-6694

GLUE TIP

Dear Lin,

I recently discovered something very useful I ought to share with other FACers, although some of them are crafty enough to have discovered it and are keeping it to themselves! It is called "Liquid Stitch", available from WalMart craft departments and probably several other places as well. Comes in a tube like most glues, in a bubble pack. This stuff works really well for attaching canopies and suchlike. Goes on white but dries clear. It also seems good on structural stuff too, although I have not yet tried it on anything structual. The nozzle on the tube is very fine--perfect for applying around the edges of canopies, etc., and the end cap screws on to form a non-clogging seal. Highly Recommended!

Eric Clutton, AKA Dr. Diesel

Dick Howard 1920 -- 2005

It is with great sadness for me to announce that Dick passed away Sunday Jan. 16th peacefully in the hospital at Lake Havasu , Az., most probably of organ failure. Dick had been battling a series of strokes since the summer of 1998 along with several other health problems. He is survived in his most immediate family by three sons, the youngest, Robert Howard, has been his caretaker for the past six years.
Dick was one of the charter members of the Cactus Squadron since it's inception in 1985, and a constant competitor at all their contests. He also was a member of the Flightmasters F/F scale club in LA., the San Diego Scale Staffel, and of course the Flying Aces club before the Cactus Squadron was founded. He was a newsletter member of many more and had friends all over the states and abroad in modeling and was well respected among his modeling peers.
He won his last Kanone on his last flight ever, a beautiful flight with his P-38 model in a Mass Launch event in our 1998 Annual contest when I knew he wasn't really sure he knew what he was doing . The minor strokes of that summer were affecting him. He lived to make the Air Marshall list of the "Flying Aces Club" and that was his 52nd win!
Affectionately known as the "King of Twins" he was one of the first, if not the first, to popularize and prove to modelers that multiple engine rubber power models could fly with duration. Many of his designs were printed in model magazines. He was also fond of embryo designs and many of them have been well circulated over the years.
Dick was a quiet man who generally said little in public but was always approachable and helpful to anyone who wanted to talk about airplanes, models, or needed advice for a modeling problem. His passion was airplanes.
A WW II veteran of the USAAF he flew many A/C . The P-39 in training, and the P-38 in the ETO war zone as a photo recon pilot. He flew many missions over water and I was amazed once when he told me he could not swim one stroke. His P-38 "Green Eyes" had no armament, so his only defense was run like hell when he encountered German fighters. That he lasted until 2005 is testament to how fast he could pour the coals to "Green Eyes".
I will miss him greatly, along with many other friends. May he fly forever now, waiting on many of us to eventually join him,and others already there.

Bob Schlosberg.

Part 4: Choosing and Making a Hypotwisted Prop

So, how do you choose and construct a "hypotwisted prop" that's best for a given model? As it has always been for helical props, on the objective side there is an empirical set of good options associated with plane-types, prop-size per wing-area, and aggressivity of powering, and on the subjective side there is one's intuitive ability and willingness to experiment. Here are some attested guidelines and two ways to actualize them at your flying model's busy end(s).

Unless you have counter-(not contra-)rotation to neutralize the torque-over otherwise entailed by an on-average-70-degree climb: for a rubber-powered outdoor-flying Scale or Embryo model, use some twist and 1.3 to 1.7 P/D at 75%-radius -- 1.5, nominally. Where to my mind the set for outdoor helical props of nominal size is 1.2 to 1.6 P/D, the hypotwist-set is a bit steeper because ratio of plane-speed to blade-speed, "basic alpha-washout", is greater when Efficiency is. The blades spin slower (and the prop runs longer while delivering same average thrust) while the plane flies at the same speeds, so optimal "sweet-spot-P/D" is greater.

Easiest Construction: Make a jig of a wooden plank or a metal sheet with shaft-wire vertical to it at one end and a right-triangle out from the shaft at 75% of prop's radius at the other, which sets the blade at the 32.5º angle and .64 tangent (triangle-height is .64 x its width) of 1.5 P/D at 75%-radius. Hair-dryer-heat (I am indebted to "Grayhawk" Lawton for this technology) a Peck plastic prop at its roots and twist just-above the roots until 75%-rads fit the jig.

Maybe you've already done that or something quite like it. If so, you already know how well it works, but perhaps not that you did not "increase the prop's P/D" -- any more than a full-scale "variable-pitch" propeller has a single P/D, is helical in static angles-of-attack, at other than one setting. Rather, you created from a helical prop a more-efficient hypotwisted one by introducing a range of P/Ds which increased toward the tips, whose average was about 50%-higher than the prop's previously single one. Of course, such a prop is to be compared not to its commercial ancestor of too-low P/D for usual FAC-purpose, but to helical ones (same planform and airfoil) of 1.5 and 1.4 P/D with the same motor and model.

More work, greater advantage: Carve a prop with a cylindrical hub to 25%-radius, of .55 x the P/D of a helical one that has proven to work well or best for a certain model or for another model of its type, then re-set the blade at 75%-radius, per 1.1 x 75%-tangent of that P/D. For example, if 1.3 P/D looks good, carve a (.55 x 1.3, =) .715-P/D prop. -- "X-block" prop-blank is (.715/*pi*, =) (only) .23 times as high as wide at its tips. (Saves good wood!) Cut the blades off the hub at 25%-radius, slot them along their centerlines from 37.5% radius to roots for music-wire or carbon-rod joining-spars and epoxy-in the spars cut to nearly reach 0%-radius. Drill spar-diameter holes in the hub down-to its bearing, drip slightly acetone-thinned epoxy into the holes, plug-in the spars, and set the blades at 75%-radius using a jig-angle whose tangent is [1.1 x 1.3/[*pi* x .75, =) .607 -- The right-triangle is .607 times as high as wide.

To clarify the intended result : If 1.3 P/D was your basis, at 50%-radius P/D will be 1.19, at the tip, 1.67, and on-average in the sweet-sector 1.43. If, rather, 1.7 P/D was the basis, P/Ds will range from 1.56 P/D at 50%-rad via 1.87 at 75%-rad to 2.18 at the tip. -- Fear not. If the prop is of normal

proportions relative to wing-area and wing-span and thin-of-airfoil, it will work especially well for (lightly-built) planes which are more streamlined than average and which, barring thermals, spend most of their air-time in "the cruise".

I do not know how close such hypotwisted props come to being optimal, but I am very happy with them and maintain that they will "give you an edge" that is lacking with "airscrews". So if your joy is (in Ernst Udet's noble sense) "to con*test*", select a hard C-grain balsa block, ... launch, and watch your model climb higher and fly longer.

NEW MASS LAUNCH EVENT FOR THE NON-NATS by Mike Nassise

The Bay State Squadron will be sponsoring a new mass launch event this July at the Non-Nats in Geneseo. The event was flown at quite a few FAC contests along the East Coast last year and proved to be very popular among those clubsters taking part. It's for models of low-wing military trainers of which there is a large number to choose from. As is the custom in national FAC competetion, the event will be flown on an unlimited rubber basis. Here are the provisional rules that will be used. Hopefully, if the event is a hit with everyone, they will be eventually included in the official FAC Rule Book.

FAC Low-Wing Military Trainer Mass Launch

This is an event restricted to rubber-powered scale models of propeller-driven low-wing military training aircraft. Airplanes of any nation or era are eligible, including "one off" experimental ships and dual-control fighter conversion types. All models must be finished in correct color schemes and bear appropiate markings. Armament, if any, must be displayed in scale-like fashion. Any model of an airplane that had retractable landing gear may be built and flown with the gear represented in the "up" position. All other basic FAC mass launch rules apply. Proof of a model's eligibility is the responsibility of the contestant. Judges decisions are final.

There are many airplanes that would make ideal, high performance models for this new event such as the Arado 96, Embraer Tucano, Pilatus PC-9, or Yak 11 Moose. Even a lightly built and well trimmed AT-6/SNJ would fit the bill beautifully. Start planning and building your entry now because July will be upon us before you know it. Below you will find a partial listing of eligible low-wing military trainers to help you make a selection. It is by no means complete, but it gives you a good idea of what's available to choose from.

Some Eligible Low-Wing Military Trainers

Aero 2
Aerospatiale Epsilon
Ambrosini S.7
Arado Ar 96
Beech T-34B Mentor
Beech T-34C Turbo Mentor
Bucher Bu-180 Student
Bucher Bu-181 Bestmann
CA-2 Wachett
CA-6 Wachett
Commwealth Ca-25 Winjeel
CT-4 Airtrainer
Curtiss SNC-1 Falcon
DHC-1 Chipmunk
De Havilland Moth Minor
Embraer Tucano
Fairchild PT-19
Fairchild PT-26
Fiat G.46
Fiat G.59
Fokker S.11 Student
Hunting Percival Provost
Hal HT-2
Hispano HA-100El Triana
Miles Hawk
Miles M-18
Miles Magister
NA AT-6/SNJ
NA T-28 Trojan
NA T-28 Turbo Trojan
Nardi FN.305
NDN 1T Firecracker
Nord 3202
Piaggio P.148
Pilatus P-3
Pilatus PC-7
Pilatus PC-9
PZL M-4 Tarpan
Ryan PT-20
S.I.P.A. S.121
Temco T-35 Buckeroo
Timm N2T Tutor
Yak-11 Moose
Yak-18
Zlin Z-226 Trener
Zlin Z-326 Trener
Valmet Vihuri
Vultee BT-13 Valiant

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NEW LISTINGS:

- TBD DEVISTATOR WW2 TORPEDO BOMBER 33.5" SPAN RUBBER
- PORT VICTORIA PV-2 WW1 SESQUIPLANE FLOATPLANE 27.5" SPAN RUBBER
- PBY CATALINA - 3/5 "DUMBO" SEA PLANE, 42" SPAN. TWIN EL FF/RC (2 sh)
- B-24 LIBERATOR WW2 WORKHORSE 51" SPAN EL FF AND/OR RC. (2 sh)
- RAF FE-8 - WW1 PUSHER BIPLANE 31" SPAN ELECTRIC
- MACCHI - M5 - WW1 BOAT HULL BIPLANE, 34.5" SPAN FF ELECTRIC/RC
- P-51D MUSTANG- CADILLAC OF THE SKY- 33" SPAN - RUBBER/ELECT.
- GRUMMAN AVENGER-WW-2 TORPEDO BOMBER 41" SPAN - RUBBER/ELECT. (2 sh)
- DE HAVILLAND SEA HORNET- LATE WAR TWIN, 31" SPAN -RUBBER
- DE HAVILLAND MOSQUITO - PLYWOOD BOMBER - 41" SPAN- RUB/ELECT. (2 sh)
- FOKKER Dr. 1 TRIPLANE THE RED BARON 24" SPAN FF RUB / ELECT
- RAF BE2e WW1 BRITISH FOKKER FODDER 35.5 SPAN FF RUBBER/ELECTRIC

"Hypotwisted Props" Made Clear

By (an apologetic) Bruce Holbrook (March, 2005)

Web-posted reactions to my recent **FAC NEWS** article on "hypotwisted props" have made me realize that literary play has no place in, and humor does not ease, the presentation of what for most is a new and difficult topic. My apologies for having confused. Here is a succinct and forthright representation.

What does "hypotwisted" mean? By reference to a helical blade, a hypotwisted one of same P/D at the nominal, 75%-, station is insufficiently twisted: angular difference between chords at 50%- and 100%-stations is less. Accordingly whereas a helical blade has a single pitch and P/D, those of a hypotwisted one graduate from some lowest value near its hub to some highest value at its tip.

What is the purpose of hypotwisting? By way of improving efficiency-in-flight (by about 10% per my experiments): where "dynamic angle of attack" refers to airflow to the airfoil's undersurface when the prop is moving the plane through the air; to provide **steeper dynamic angles of attack above the nominal blade-station and shallower ones below it, than obtain with a helical prop.**

Why does hypotwisting improve efficiency? The pros think it provides for a single dynamic angle of attack which is optimal at any airspeed. I think it more likely that it better fits dynamic angle(s) of attack to airspeed as determined by blade-station, than can helical pitch-distribution.

How is a hypotwisted prop specifically designed and manufactured (for a rubber-powered scale model with a climb of normal steepness)? Best bet if but one version is to be tried: 1) A normal nominal P/D is selected for a given type of model, and *halved.* If it's 1.5, the blades then are those of a .75-P/D helical prop. 2) A music-wire or carbon-rod joint and a jig are used to set the blade at its 75%-station at stipulated (here, 1.5) P/D.

Nominal P/D may be experimentally varied just as with a helical prop. A 10%-percent increase is a smart first move.

For more on selection and manufacture, see Part 4 of my **FAC NEWS** article and, re. design as well, my **"Hypotwisted Props – What, How and Why"** on Dave Dodge's Website at http://home.att.net/~dannysoar/home.htm.

NEW PLANS FROM FAC-GHQ

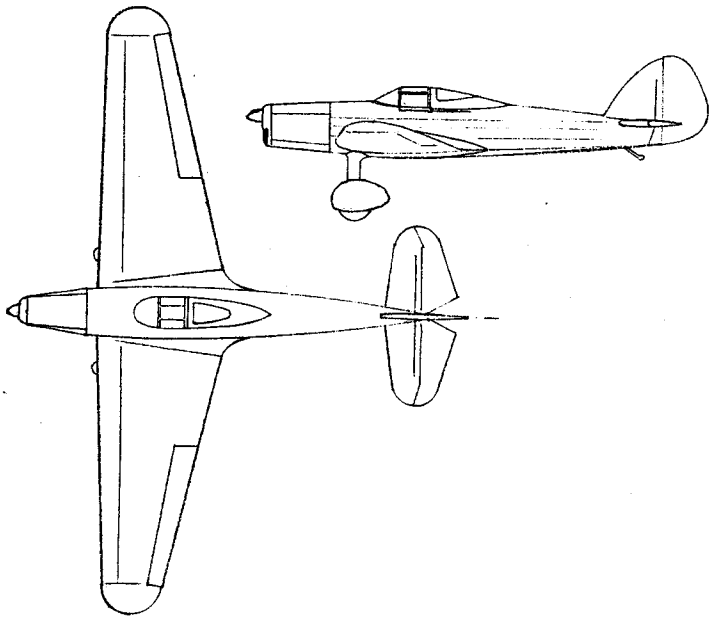
Three new plans for sale. The Messerschmitt BF-109E by Michael Heinrich and Rocky Russo for the FAC-Nats, 22 inch span. Bill Henn has given us his plan of the Swiss EKW C-3603,25 inch span and we have the Spartan Executive of 29 inch span. Original drawing by Alan Booton and redrawn by Ralph Kuenz. The BF-109E includes a color profile and a short history of the aircraft. All plans should make good flying models. All 3 plans sell for $6.00 each postpaid. Send to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

SIDE LIGHTS OF THE
FIRST POST-WORLD WAR II QUEEN'S CUP RACE

By Dave Stott

Recovery of Britain's civil aircraft industry was boosted by the resumption of the coveted Queen's Cup Race in 1948. Though money for such endeavors was hard to come by, three all new designs were to be found on the entry list. The Westland Whynotte, the Miles Majestic (See the excellent rendition on the cover of the Flying Aces Club News for Jan./Feb. 2005), and the Hawker Hoaksley presented here in two-view. Not much gen remains on the Westland built entry, but some research has provided details on the Hoaksley. Perhaps more so on the financial backer of this Hawkers built machine.

Colonel (Ret.) Sterling Worth-Havingsom, DSO, MC, while attending a gathering of the League of Flyers of the Great War, was introduced to a budding designer of aircraft, one Ron Martinet, SMAE, by his old C.O., Major Hardliegh Bryghte. The three conversed spiritedly into the wee hours on the coming Queen's Cup Race. Mr. Martinet had given details of his race plane design and sketched the layout on numerous linen napkins and the tablecloth, much to the consternation of the management of the host, London's Port of Portly Potentates.



With unbounded enthusiasm, and rather slurred speech, Colonel Sterling Worth-Havingsom, being a man of means, vowed to back the cost of the new machine. There had been some whispers that he had made his fortune in White Slavery in North Africa after the war. But, his generosity has proven him to be of such high caliber as to make this rumor seem ridiculous.. Of course, there is the rather disturbing fact that his housekeeping staff at Castle Crumbley, are all extremely young and attractive.

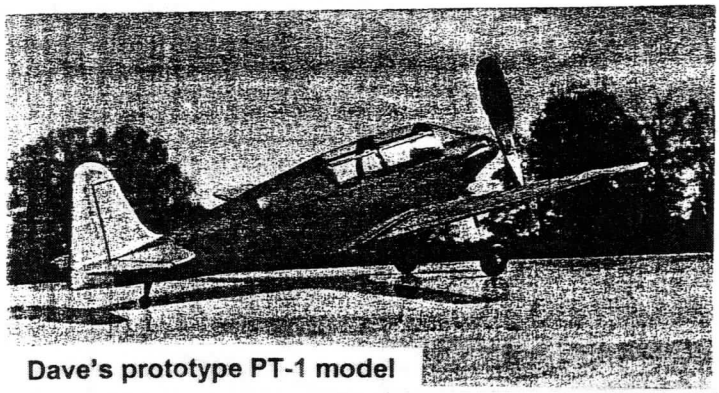
Hawkers was contracted to build the machine for cost provided it carry the Hawker name. Mr. Martinet was taken aback by this, but agreed when Major Hardleigh Bryghte mentioned that his backer, Colonel Sterling Worth-Havingsom had been forced to mortgage Castle Crumbley on Fawling Downes in order to meet the demands of building the machine. It seems Scotland Yard investigators had been active in England and the colonies, giving rise to yet another terrible rumor that the most maligned Colonel was experiencing a limited income due to said investigation. How could such accusations even be considered of a man who would jeopardize his all to keep his given word? Unfounded, unkind, and slanderous rubbish!

The machine itself, christened "Hoaksley" and carrying the registration G-AHAW was, as can be seen by the drawing, the epitome of British engineering. Powered by a De Haviland Gypsy Queen engine, as was the Miles Majestic and many other entries, the first flights were conducted at Hungleigh Aerodrome near Bustinge, in Uhnworthy. In the able hands of Flt. Lft. Rolls O'Dough, the ship showed good speed.

Most of us recall how the Miles Majestic swept the field in the 1948 Queen's Cup race, but few know of the untimely end of the Hawker/ Martinet/ Worth-Havingsom entry. Fate, in in the form of a hangar fire at Hungleigh Aerodrome, leveled the structure destroying all within. A broken man, Colonel Sterling Worth-Havingsom was last seen boarding a tramp steamer bound for ports of call in North Africa to renew his fortune, no doubt. It is said that Mr. Martinet continued his design work, but for a concern called Frog. Major Hardleigh Bryghte took over Castle Crumbley, complete with staff, after coming into an undetermined sum paid him by Lloyds of London.

AITI PT-1 TRAINER

"Early in 1939, Europe was darkened by war clouds thanks to Hitler and his Nazi mafia. Top brass in the U.S. Army Air Corps knew it was time to build up a force of pilots to man the ships they felt would soon be pouring out of aircraft factories. Thus, the Civilian Pilot Training Program was begun. Now, you cannot train pilots without training planes, so many small aircraft companies, some of them formed just for this purpose, started to design and build prototype trainers. Aviation schools also joined in with designs by their instructors that were being built by students in the school shops. It was patriotic and inspiring work that was highly instructive and perhaps might even become lucrative.

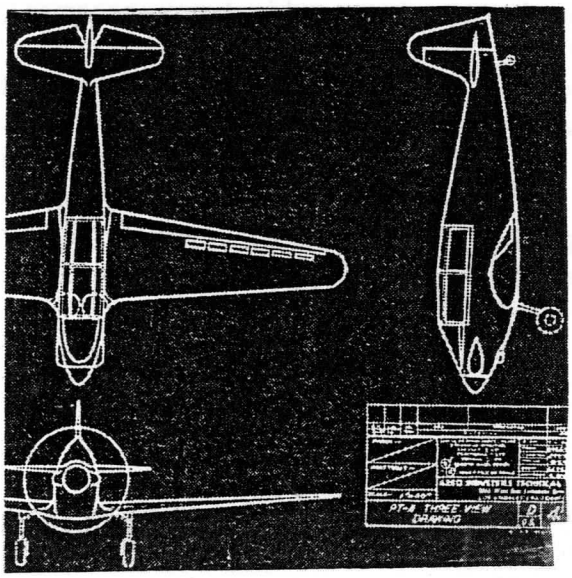


Dave's prototype PT-1 model

Aero Industries Technical Institute of Los Angeles, California was a government approved aviation school and this was right down their runway. The outside back cover of *Air Trails* magazine for January, 1941 has an Aero I.T.I. advertisement with a 3-view of their training plane, the PT-1, and photo of the open cockpit prototype. A unique low winger with very pleasing lines. What more could a modeler ask for? The result is the Airdevil Model Company plan presented here.

The model built from this plan was powered by a 12 inch loop of 3/32" Tan II rubber turning a balsa prop carved from a 1/2" x 3/4" x 4 1/2" block. A 3/32" diam. ball of clay ballast was needed at the tail for balance. The all up flying weight, including the ballast, was 11.4 grams. The model performs very well with 7 degrees of down thrust and 4 degrees of right thrust. Trim your model for a left power turn and right glide path. Be sure to washout the wing tips as shown on the plan. You may also want to use a wire landing gear strut in place of the typical 10-Cent style indicated on the plan.

Oddly enough, the photo of the PT-1 shows an "NX" registration on the wing but "NC" on the tail! Hopes of gaining an ATC, no doubt. No trace of one being issued for this ship has been found."



A GREAT BOOK!

We're sure that any modeler will find this book to be most helpful, informative and interesting, and should be included in any modeler's library. It is described in the following ad appearing in the Jan.-March issues of the NFFS Digest, 04. It also contains a practical discussion of trim and stability. (For detailed description send SASE)

"Making Scale Model Airplanes Fly", also non-scale types. The whole story under one cover for all types and aspects. Selecting-Improving-Constructing-Flying-Troubleshooting. Rubber-Gas-CO/2-Electric-Jet. Monoplane-Multiplane. Indoor-Outdoor. Tractor-Pusher-Canard-Tailless-Helicopter. No other book has all this reliable info. $18.95 + $3.00 S&H. Also, 24 Great Flying Peanut Scale plans $20.95 + $3.00 S&H (or SASE for individual plan listing/prices) William McCombs, 2106 Siesta, Dallas, Tx. 75224.

Widely recommended in the model magazines and FF club newsletters. This is the revised and expanded edition.

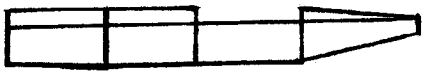
* * Triangulation * *

Mumbo Jumbo # 119 from the Glue Guru

Our structures, especially fuselages, differ greatly from those of the performance crowd. We tend to go with boxy, rectangular construction, rounded with a few formers and stringers. Performance people tend to introduce diagonal members wherever possible, converting the structure into an assembly of triangles. Why?

Cutting those diagonal stick ends at the proper angle for gluing isn't easy. Certainly our standard construction is simpler, and the resulting model holds up reasonably well. What are the performance people trying to achieve?

Performance Model

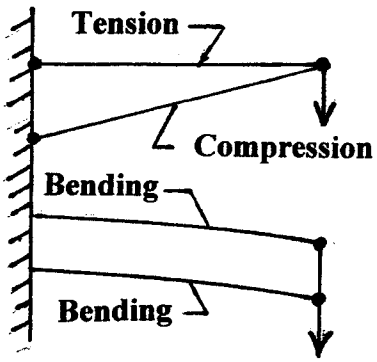


FAC Model

Structures must fight off applied loads with some combination of internal stress. These are tension, compression, bending and torsion. Of these, we're stuck with tension and compression; they can't be avoided or transformed into something else. Fortunately, even balsa wood is fairly strong in resisting both direct tension and compression.

Bending stress is not one of the good ones. As we each quickly learn, even a small bending load applied to the middle of a stringer will first greatly deflect and then break the member.

What can be done is to transform much bending stress into direct tension and compression. Such is the purpose of triangulation. An up or down load at any of the triangular intersections results in direct tension or compression in every member. In the case of the typical FAC model, a large loading at the intersections leads to a great deal of bending–and to trouble. See sketch.



Yet, we are usually able to get away with it. How come?

Two factors act to help. Our wing loading is usually much lower than that experienced by comparable performance models. In turn, we fly at a lower speed–and crash at a slower speed. In short, the loads placed on our models are smaller.

Secondly, any covering material--when suitably shrunk--becomes yet another mechanism for absorbing and transferring load. With the primary balsa structure pre-loaded in compression via the covering, the model is able to withstand a much higher tension load before breaking.

Nuts to diagonals. With low weight and tight covering, we squeak by.

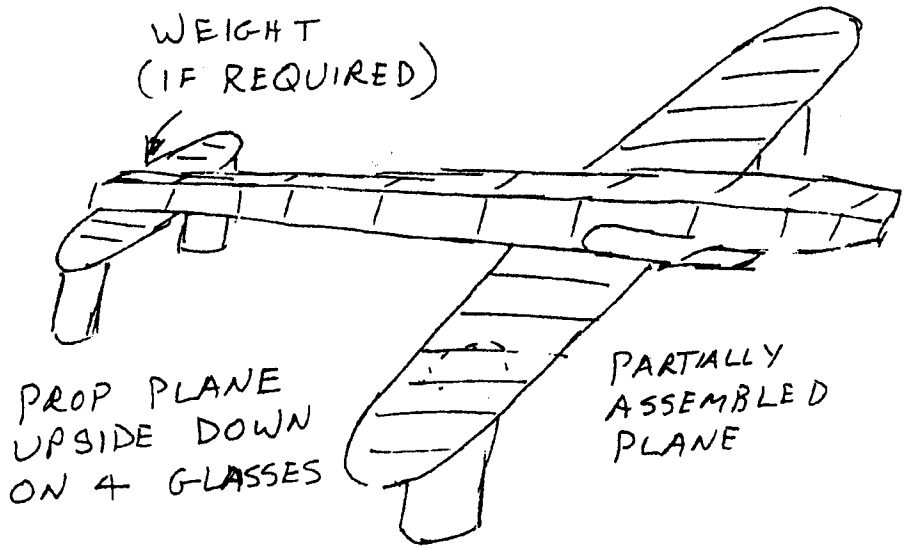
Tips and Techniques **by** **Jerry Sullivan**

Funny where and when you get these ideas. While on Federal Jury duty (not as a defendant) there was the January 2005 issue of Quiet Flyer magazine. Thumbing through, two small tips came to mind:

You can add color to epoxy that you might need to glue together parts. The author of the tip, adds Testor's paint for plastic to the A part and thoroughly mixes it. Part B is then added and the whole mess is mixed and used. According to the write-up, it doesn't affect the strength.

The second tip concerns gluing the stabilizer level with the wing. Even though it applied to electric R/C ARF planes, it could apply to our lighter scale efforts. To easily glue the stab level with the wing, the wing is first completed and temporarily (or permanently) attached to the fuselage. The wing / fuselage is then placed upside down on two identical drinking glasses. With the stab on another pair of drinking glasses, the end of the fuselage is glued onto the stab. If the wing has dihedral, make sure each (wing) glass is the same distance from the fuselage.

I have tried this, and it works!



The above and the Flightline article by Tom Arnold first appeared in the "Scale Staffel" newsletter.

CAROLINA MODEL FLYERS& KUDZU FLYING CORPS present

Spring 2005 Contest

AMA - FAC - ROW

R.O.W. **Friday, May 13, 4PM till dark**
Walnut Creek, Goldsboro, NC

Events:

- **Rubber stick**
- **Rubber non-scale cabin**
- **Rubber scale**
- **Power (CO2/electric) scale**
- **R/C race around the course points for time + landing**

AMA/FAC **Saturday, May 14, 9AM-5PM**
Carolina Sod Farm, Raeford, NC

Mass Launch Events:

- **10AM WWI Biplanes**
- **11AM Combined Racers**
- **12PM WW2 Fighters**
- **1PM Low-wing Military Trainers**
- **2PM Modern Production**

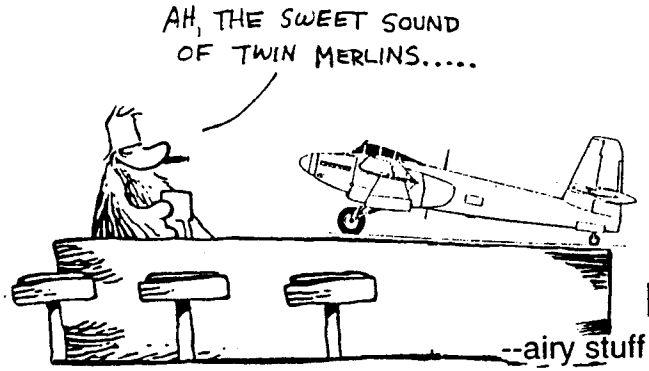
Timed Events:

AMA - Hand Launched Gliders
AMA - Catapult Gliders
FAC - Jet Catapult Gliders
FAC - Embryo
FAC - Golden Age
FAC - Dime Scale

Fly both days - $5.00 - no food provided

CD: John Diebolt (919) 467 1025 jdiebolt@mindspring.com
526 Heater Dr., Cary, NC, 27511

Awards to Third Place



Flightline

--airy stuff by Tom Arnold

Building and flying scale models not only is an aerodynamic challenge, but a real exercise in aviation history. The timeline of aircraft is so studded with brilliance, luck, tragedy, and heroism, that every scale model that puts air under it's wings is a small celebration of some moment in that history. I read Lindbergh's "*We*" and was consumed by a desire to build the NYP. As I covered the nose with sheet balsa, I felt Lindbergh himself was being sealed inside. As a result, the side windows **had** to be clear acetate--how could he see otherwise? Reading Pierre Clostermann's "*The Big Show*," all I could think about was Hawker Tempests thundering over the dikes of Holland and wavering streams of tracers chasing them into Europe. My shop called with such an urgency that at 5:30 a.m. I was framing up a 24" span version of Clostermann's "Le Grande Charles." I convinced myself that Squadron 54 also rose at such a ungodly time to make their way to the briefing hut for the days sweep.

So it went with every model I ever built. I refused to let it be just kinetic art, I had to find out how, who, what, and when it flew. The idiosyncrasies because endearing bits of its' character instead of traps to kill the unwary pilot. (Never land wheels up in a Typhoon. The nose digs in, it flips and burns.) Its' production life became a story of incredible interest, and the demise of the type a minor tragedy. The words of the men who flew them were icing on the cake to be relished. When friend and former P-39 pilot, Dick Howard, related a story of a student crash during advanced training, I visualized the scene of his flying through the black smoke of his fellow cadets sudden death countless times as I stretched tissue over the wing of a P-39.

When I was drawing up the plans for a Hughes XF-11, I had propped up numerous photos around my workspace of the aircraft for reference. One had a shot of Hughes in the cockpit in his shirtsleeves and fedora looking through the canopy straight at the propeller that would in a matter of minutes run wild and put him in physical pain for the rest of his life. As I drew the shape of the cowl and spinner of that fateful engine, it seemed that it required nothing less than my best to recreate that aircraft as it exactly was. Hughes almost put his life into it, the least I could do is get the shape right.

There was a time I was a fanatic about color schemes. I had to get the correct Federal Standard number of the paint, the correct camouflage scheme, the correct insignia, the correct serial number, the looks on the correct **day** of the aircraft's life. That, of course, brought on the whole concept of weathering versus fresh color and I found myself descending into the madness of the plastic model world. Fortunately, my recovery was successful.

After visiting many well-known aircraft, my history wanderings presented me with interesting and strange members of aviation's family tree and the old urge to build would hit. The constant problem became a lack of plans to build from. Many times a 3 view and some photos were all that existed. The path was obvious--draw your own and build from there. Just as paint and finish was a different world, so became plan drawing; only now I was communing with not pilots, but men who many times never flew in their very creations--the engineers. As I drew up plans for the long winged Westland Welkin, the geometry of the tail would not "come together" between all the views and the bulkhead shapes. As I chased elusive shapes from top view to

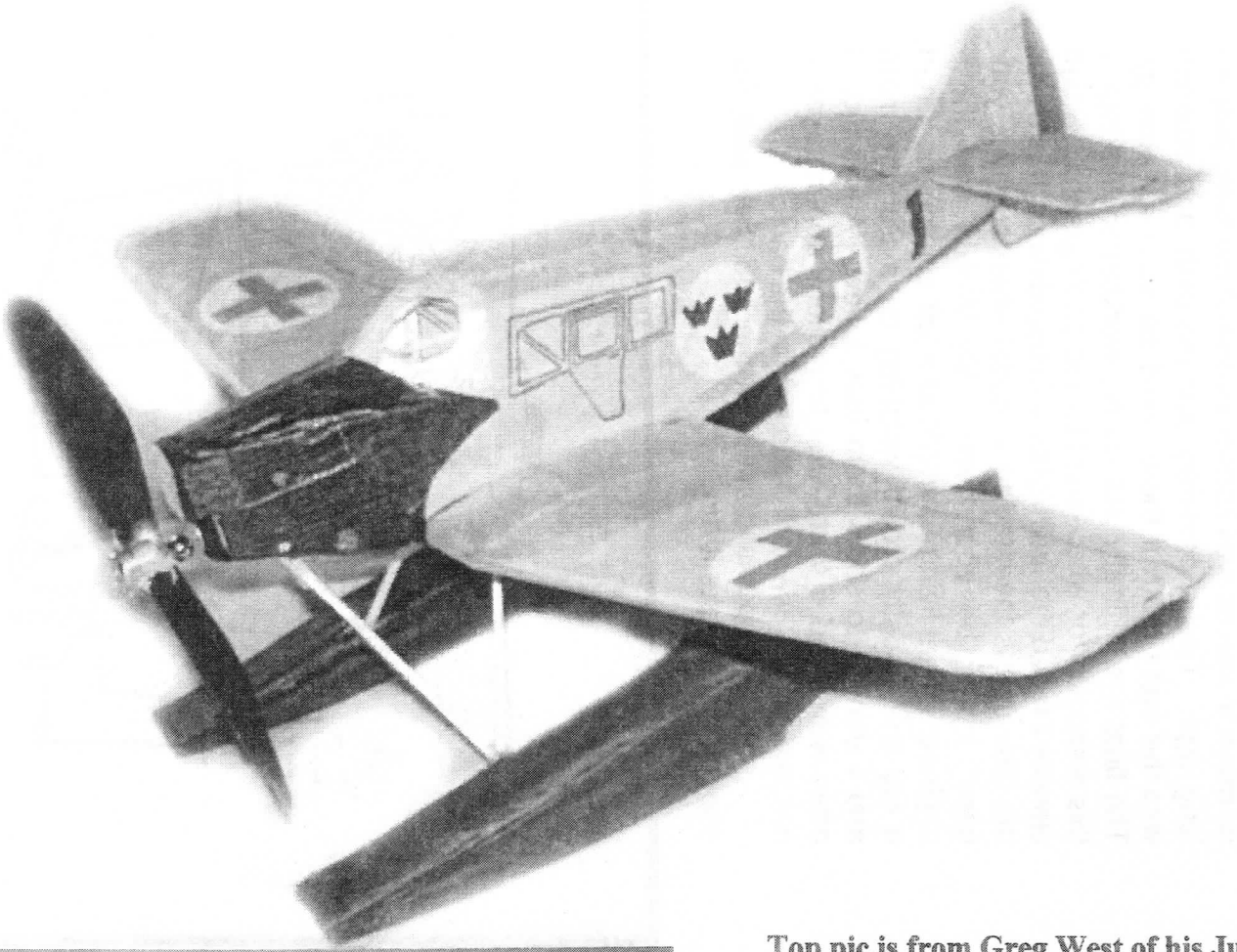
side view to rear view to bulkhead, something was wrong. It would not fit and I poured over photo after photo trying to interpret light and shadow to visualize how it all came together. Some of the photos had men posed in front of the aircraft bundled up against the British damp frozen in smiles and conversation 50 years ago. As I looked into the eyes of one young engineer I silently asked him to just turn around and run his hand up the fuselage side to fin. Did the surface bend in or did it bulge out? It's right there, right behind you...just turn around and touch it and tell me. The aircraft is long gone and only you can tell me. He continued to silently look at me as still as ever. The aircraft was long gone, the rainy day was gone, and that young engineer was gone too. Did he ever imagine that a half century into the future some stranger would ask so intensely to just turn around and touch that wet aluminum? I never did find out about that elusive fuselage curve. If I ever could see a Welkin I know I'd run to the tail and rub my hand over that very spot and marvel over the truth of its shape.

Paper, pencil, dividers, curves and T-squares were my companions as I reconstructed long forgotten shapes and curves last seen by some draftsman bent over a big easel. With my drawing tools some type of communication took place with another set of drawing tools that quietly worked on a long ago day. I could almost hear rain on the window as the top view yielded to probing measurements and line intersections. A radio played quietly with war news in the background as the lofting lines filled out the shape nacelles. It was all coming together at last. Eventually I had the plans I needed. There were still some mysteries that the photos told, but I had to move on and only I would quietly agonize that I did not solve why the cowl had a dark crease on the underside.

The translation of flat shapes on a plan to 3-dimensional forms of wings, fuselage, nacelles all defined by strips of thin balsa was like the gestation of some small mechanical bird. After cutting, fitting, gluing, sanding, I had turned the aircraft form over in my hands so much it was as well known as one of my baby kids so long ago. Tissue covering was the birth and painting was the first breath if there could be such an analogy. The final result finally sat on my workbench looking--is this a shocker or what--just like the photographs. Small wonder I faced the first flights with trepidation. It is never the time that is invested in a model when it leaves your hand, it can be your heart. My Welkin was those engineers' final flying example as it left my fingers. I had a big and ghostly crowd watching on a Sunday morn and I wanted to show them how it flew. And it did. I often wondered if there was any silent applause as it climbed away. I swear I felt a pat on the back.

All my models don't suck me into their past, but enough do to make it fun.

Now what seems to be YOUR problem?



Top pic is from Greg West of his Junkers F-13, plan in the last issue. Below left is Tom McCoy admiring Dave Linstrum's Zippy Sport. Pic from Dave. Below left, Frank Scott sent us this photo of the great, late, Bob Thompson.

THE GOLDEN AGE

by

Fran Ptaszkiewicz, F.A.C. ... D.S.M.

There was the "Alpha", "Beta", "Delta" and then the famous "Gamma". All having come from the drawing boards of John K. Northrop whose Corporation was established in California in 1929.

Here was designed and built the "Alpha, which was believed to be the first all-metal stressed-skin airplane. It carried six passengers in a cabin while pilot flew the ship in an open cockpit.

This was followed by the little known "Beta" which had a 300 hp engine and two open cockpits. It was the first aircraft to have reportedly exceeded 200 miles per hour.

The "Delta" was next, an 8 passenger high-speed transport which put the pilot inside the cabin and out of the elements.

However, the airplane which was to gain a lot of fame was the "Gamma", a low-wing, all-metal design which came about as a result of a request from the Texas Company in 1932, at which time "Jack" Northrop was asked to design and build an airplane to be used by Frank M. Hawks, for the purpose of setting cross-country, speed and distance records to promote the use of Texaco Products. Frank Hawks was at that time the superintendant of the Aviation Products Division and this new design would replace his Travel Air Model R, which now reposes in the museum of Science and Industry in Chicago, Illinois.

The design work began in May of 1932 and the airplane was completed and test flown in December of 1932. It was appropriately named the "Texaco Sky-Chief" and was trimmed as such with the addition of the Texaco logo and Fireman's hat along with red trim adorning the fuselage.

This "Gamma", was to be the first of many variations of the original design which would include, land, ski and float-plane versions.

The Northrop Company had no difficulty in modifiying the basic configuration to suit the needs of people like Lincoln Ellsworth, noted explorer; Bernarr McFadden, the early physical culture fadist; Jack Frye of Trans-World Airlines; Jackie Cochran and others.

The airplane was powered by a 14 cylinder double-row Wright R-1510 "Whirlwind engine, which developed 700 hp at sea level.

The new design set many records in various category's with Frank Hawks at the controls and more than repaid itself in advertising value for the Texaco Company. Purchase price was thought to be around $40,000 dollars.

This all-metal airplane had as one of its most outstanding features an elaborate wing to fuselage fillet, which was perfected as a result of considerable research at the California Institute of Technology. This fillet eliminated the "buffeting" which seemed to exist in almost all low-wing airplanes of that period and thus this troublesome interference problem was resolved with the total drag of the airplane being reduced considerably. As a result the wing could then be placed under the fuselage, creating more space for mail, freight or passengers. Another feature of this design were the wheel pants, which were considered unique at the time and believed to have 1/6th the drag of an open type landing gear. These pants housed a very inticate landing gear shock-absorbing device and were a notable feature of all the early Northrop fixed - gear designs. Large split wing flaps contributed to low and comfortable landing speeds.

In this first model produced for Mr. Hawks. The single-seat cabin design with its monocouqe construction and flush-riveting throughout also had a unique style of wing control surfaces, in effect called "park-bench" ailerons,as it was thought that perhaps lateral control would be much better, especially under fully loaded conditions.

In all the "Texaco Sky-Chief" went thru three phases of modifications during its record smashing career. Most notably an increase in fin and rudder size plus the addition of some windows in the fuselage.

Model 2-B, was a copy of the basic design and went to explorer Lincoln Ellsworth in 1934, it too featured the "park-bench" ailerons as well as a two seat cabin. A later modification of this Model 2-B placed the ailerons back into the wing and subsequent models of the "Gamma" all had the ailerons back as an integral part of the wing surface.

The third version a Model 2-C, was a copy of the basic design intended for use as an attack bomber which never materialized, although the Army Air Corps A-17 was developed from this configuration.

Model 2-D was used by Jack Frye of T.W.A. as a personal transport. It was eventually turned into a flying laboratory and used for the research of possible problems of aircraft involved in continuos high altitude flying conditions.

There were a number of Model 2-E's, which were a modified military version built for the Chinese Air Force during the mid-1930's.

A most interesting modification of the original design was one ordered by Jackie Cochran, to be flown in the Mac Robertson Air Race, from England to Australia.

This one of a kind Model 2-G, was a highly streamlined version in that in place of the Wright "Cyclone" radial engine was a 700 hp Curtiss "Conqueror" liquid-cooled V-12 supercharged engine, which when fully-cowled, gave the airplane a very slim and speedy look, also the single-seat cockpit was located in the rear of the fuselage giving the craft a true racing appearance. Sadly it was badly damaged during its delivery flight. Repaired it established several national distance records.

Later the airplane was re-built and refitted with a Pratt & Whitney "Twin Wasp" radial engine. Jackie then used it in the 1935 Bendix race but bad weather forced her out.

Also in this race was another "Gamma" owned and sponsored by Bernarr McFadden whose name was emblazoned in huge letters on the fuselage. It finished in third place.

In 1936 Howard Hughes, who had taken over Jackie Cochran's airplane had it re-engined with a newer and more powerfull Pratt & Whitney, proceeded to use it and set numerous Transcontinental speed records all over the United States.

There was one more model of the "Gamma", a model 2-G which was a modified military version used by the British Hercules Engine Company as a flying test-bed for their new engine.

Presently one example of this airplane exists. It is the ski mounted version called the "Polar Star" used by Ellsworth in his Antartic research flights. It is in the possesion of the Smithsonian Institution at it's Silver Hill, Maryland facility. There are some dents and dings, the result of some rough landings on the ice.

Specifications of the "Gamma" were; Length 29' 9"; Wingspan 48' 0" with a wing area of 363 sq, ft.. The maximum speed was reported to be over 200 m.p.h. while it's landing speed was believed to be from 42 to 60 m.p.h. depending on configuration and loaded weight which could be up to 7,000 lbs or as low as 3,500 lbs.

Locating a suitable 3-view proved to be a bit of a chore. However, our FAC Commander was able to provide a good example and with a little more diligent searching, another drawing which accompany's the Williams Brothers plastic model kit, proved to be of great help as it depicts the two "Gamma's" used by both Hawks and Ellsworth and shows the so-called "park-bench" ailerons used on the earlier versions.

The Hawks version did go thru three phases of updates and always retained that aileron configuration while the Ellsworth version finally had them recessed on his third and final modification.

A copy of a plan for a solid model is available from plan supplier Charles Schultz and is supposed to be a copy of one originally sold by the Texaco Company, although I have not seen it. The plan is said to be for an accurate display model with a wingspan of 22 1/2".

While on the subject of plans, there are a number of rubber powered designs available from various sources as well as a 36" wingspan version by Pres Brunning, distributed by Yesteryear Plan Service.

I have also included a side view depicting the changes made to Jackie Cochran's Model 2-G in order to incorporate the Curtiss "Conquerer" engine, which airplane sadly had a short lived existence. This from Charles Mendenhall's book of the National Air Racers in 3-views.

Another interesting fact which I have not been able to document is, Jack Northrop's fascination with naming his early aircraft following the letters of the Greek alphabet.

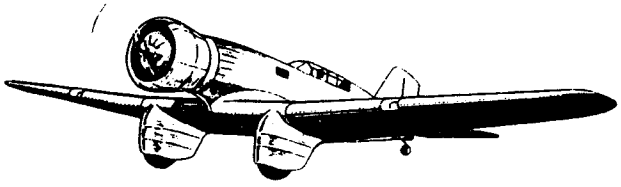
In later years his interest in flying wing aircraft is also legendary. Particullarly his early work with various configurations, which eventually led to an experimental prop-driven pusher fighter, the XP-56 followed by a jet design the XP-79.

His multi-engine pusher propeller bomber the XB-35 culminated in the eight jet engine powered YB-49 which saw limited service with the U.S. Air Force.

All this work with the heavy bomber flying wing designs led to the now famous B-2 Stealth Bomber, thus in essence proving the feasibilty of this type of planform.

Fortunately "Jack" Northrop was able to view the first B-2 under construction before passing away. Sadly he never saw it fly.

Finally, all information indicates Northrop to be the correct spelling of this man's name, yet Northrup appears from time to time in various publications and on some drawings or plans.



EASTERN U.S. FREE FLIGHT CHAMPIONSHIP EVENTS

Saturday — April 30th — 9:00 A.M. to 5:00 P.M.

1/2A FF GAS – Cat. III, 7 sec. eng., 2 min. max (SR/OPEN)..................Awards to 3rd
1/2A FF GAS – Cat. III, 7 sec. eng., 2 min. max (JR)..............................Awards to 3rd
FAI POWER – F1C/F1P FOR ENG. RUN & MAX SEE CD tble.(JR/SR/OP)Awards to 3rd
WAKEFIELD – F1B, 7 flts, 3 min. max (JR/SR/OPEN)...........................Awards to 3rd
ABC NOSTALGIA GAS COMBINED – 9 sec. eng., 2 min. max, hand launch,
Rules as published in NFFS (JR/SR/OPEN)...................................Awards to 3rd
A-1 TOWLINE – F1H, 5 flts, 2 min. max, 220 gms. (JR/SR/OPEN).......Awards to 3rd
PEEWEE 30 – (JR/SR/OPEN)..Awards to 3rd
CAT. GLIDER – hand held, 9" loop, 1/4"rubber, max 1-1/2oz. 6 flts (JR)..Awds to 3rd
CAT. GLIDER – hand held, 9" loop, same as above (SR/OPEN)............Awards to 3rd
B FF GAS –Cat III, 7 sec. eng., 2 min. max (JR/SR/OPEN....................Awards to 3rd
PAYLOAD GAS – (JR/SR/OPEN) ....Awards to 3rd
MULVIHILL – (JR/SR/OPEN)..Awards to 3rd
FAC EVENTS for SAT—Ed Zapolski Memorial Day
Mass Launch: WWI, RACERS (All Types), WW II NoCal Fighters
Timed and Judged: PEANUT, DIME SCALE
Fly off the table: BOGUS BOSTONIAN, SKY BUNNY........21 trophies..Awards to 3rd

F1A,B,C, 1 hr rds starting at 9:00 AM Saturday and 8:00 AM Sunday - 7 rds
3:00-3:30 for flyoffs if needed. If weather dictates we will overlap 1-1/2 hr. rds.
CHECK ROUND TIMES AND REQUIRED MAXES POSTED AT CD'S TABLE!

DAKOTA SPECIAL EVENT - can be flown either Saturday OR Sunday
DAKOTA Target Time - 30 sec min. flight time, 3 flts...................Awards to 3rd

Sunday — May 1st — 8:00 A.M. to 4:00 P.M.

DAWN UNLIMITED – **7 A.M.**/ONE FLIGHT NO TIME LIMIT
Special Joe Farrell Perpetual Trophy for 1st (JR/SR/OPEN)............Awards to 3rd
COUPE d'HIVER – F1G, 5 flts, 2 min. max (JR/SR/OPEN)................... Awards to 3rd
F1J – FOR ENG. RUN AND MAX SEE CD table..................................Awards to 3rd
.020 REPLICA – 9 sec. eng., 2 min. max (JR/SR/OPEN)......................Awards to 3rd
A FF GAS – Cat. III, 7 sec. eng., 2 min. max. (JR/SR/OPEN)................Awards to 3rd
C FF GAS – Cat. III, 7 sec. eng., 2 min. max. (JR/SR/OPEN)................Awards to 3rd
1/2 A Nostalgia - 9 sec. eng., 2 min. max, hand launch.......................Awards to 3rd
MOFFETT – New Rules (JR/SR/OPEN)...Awards to 3rd
A-2 TOWLINE – F1A, 7 flts, 3 min. max (JR/SR/OPEN).........................Awards to 3rd
P-30 – 2 min. max (SR/OPEN)..Awards to 3rd
P-30 – 2 min. max (JR).. Awards to 3rd
HLG – (SR/OPEN)..Awards to 3rd
HLG – (JR)...Awards to 3rd
1/2A CLASSIC FF – 7 sec. eng., 2 min. max (JR/SR/OPEN)................Awards to 3rd
AB CLASSIC FF – 7 sec. eng., 2 min. max (JR/SR/OPEN)...................Awards to 3rd
FAC EVENTS for SUN—Burt Philips Memorial Day
Mass launch: WW II, MODERN CIVILIAN
Timed and Judged: FAC RUBBER SCALE (single engine) & OLDTIME KIT SCALE
Fly off table: EMBREYO, FAC GRAND CHAMP TROPHY..15 trophies...Awards to 3rd

Where it applies combined events will be recorded as individual for National Cup Points

TROPHIES WILL BE AWARDED AT THE END OF EACH DAYS EVENTS

★★

A RAFFLE WILL BE HELD ON THE FIELD – TICKETS WILL BE SOLD BOTH DAYS – DRAWING ON SUNDAY!!!

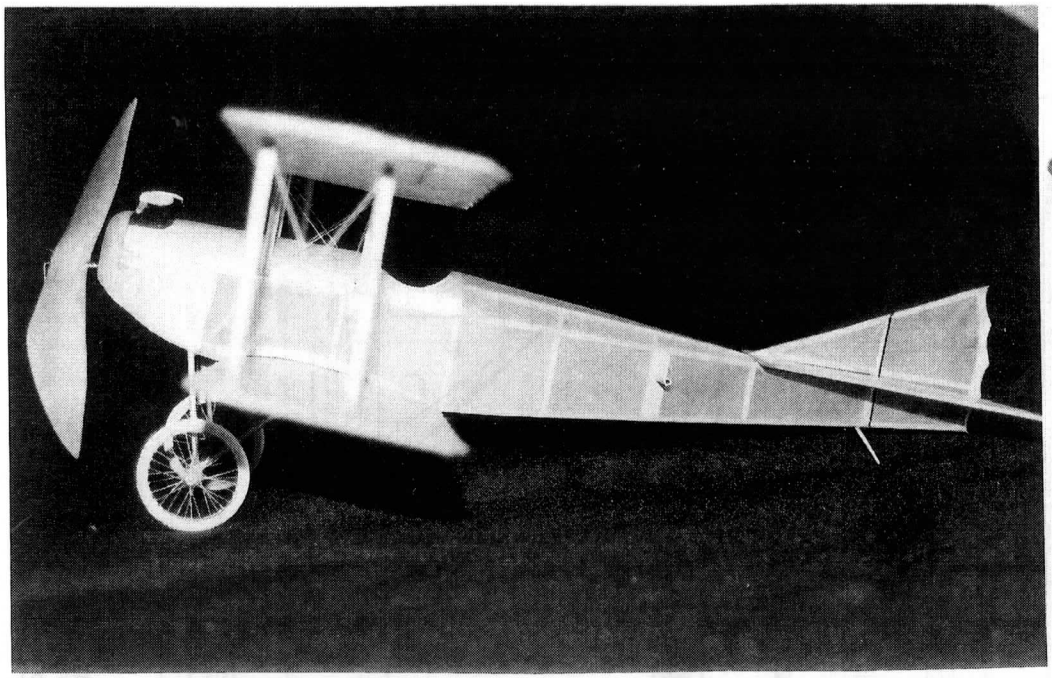
★★

OPEN — $20.00 includes 1st event
$5 for 1 additional event – $25.00 Maximum for 2 or more events
SENIOR — $5.00 for all events JUNIOR — N/C for all events
REGISTRATION WILL CLOSE AT 1:00 P.M. BOTH DAYS!!!!

($1.00 WILL BE DONATED FROM EACH CONTESTANTS FEE TOWARDS FIELD MAINTENANCE.)

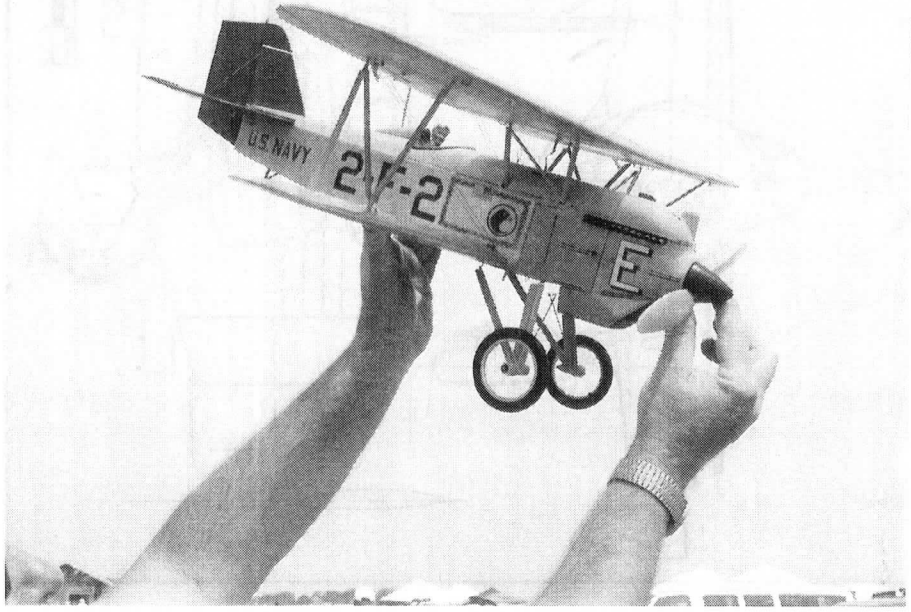
Contest Directors: Joe Wagner, Tom Kerr & Lydia Wagner
SPECIAL CD for FAC Events: Russ Sandusky
JW & LW—25804 John Hansen Rd., Chestertown, MD (410) 778-3933
TK—7733 Airy Hill Rd., Chestertown, MD (410) 778-4939
Joe's new
emails-ekerr@hpiug.org, typeshoppe@dmv.com, sandusky@enter.net

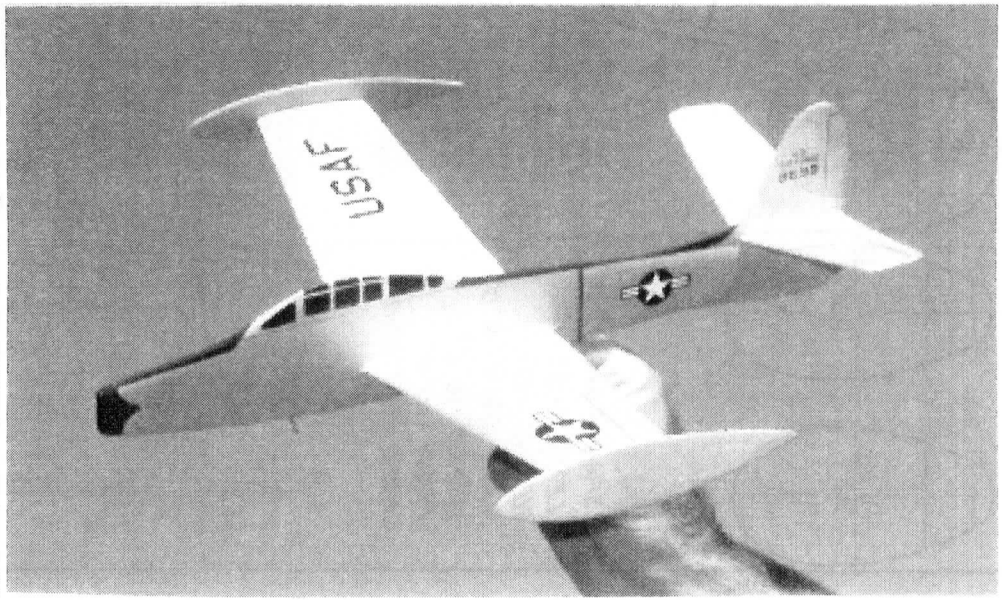
★★

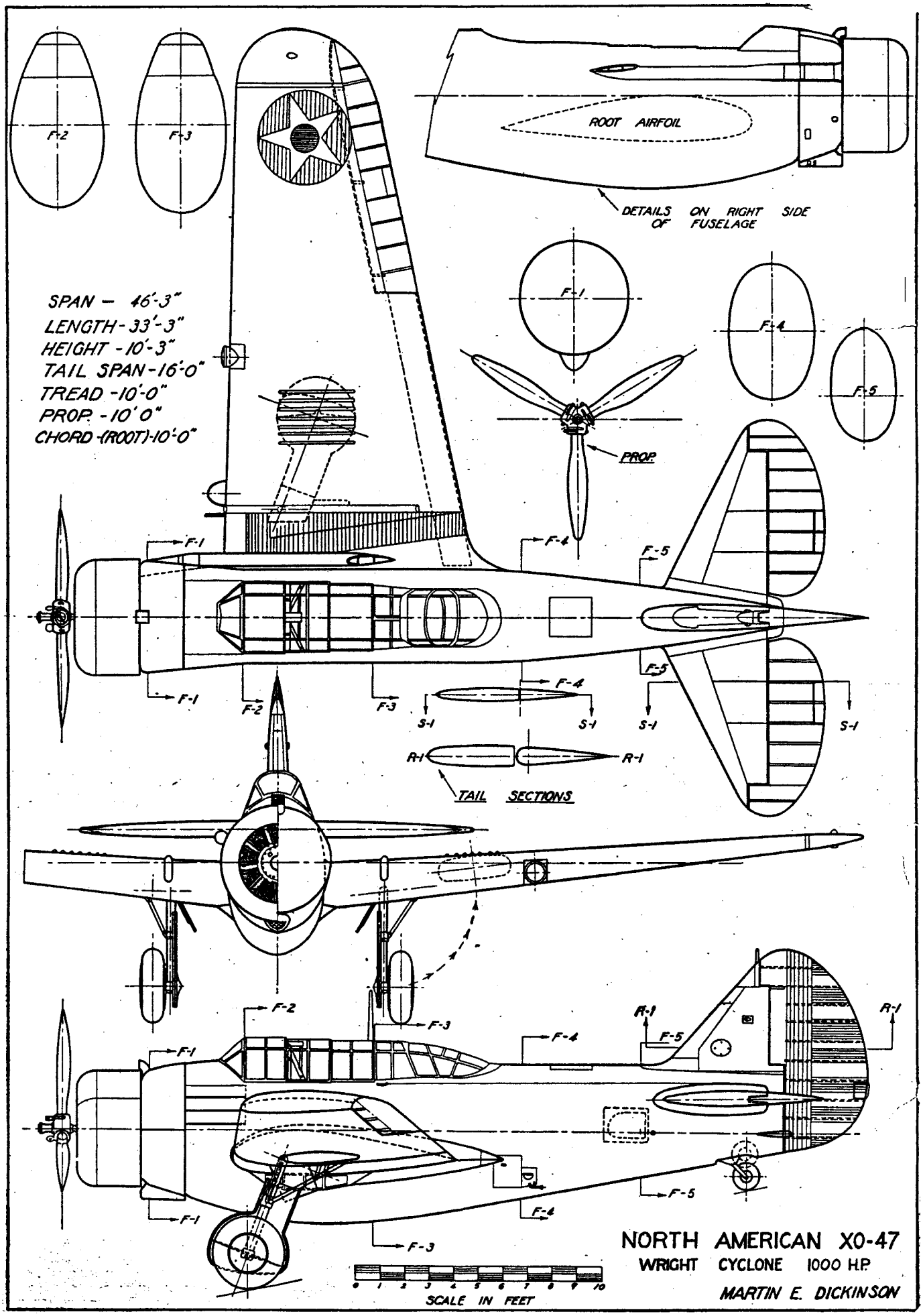


Top left; John Blair's "Snyder Baby Bomber", plan in this issue. Below; Who's model is this? It showed at the FAC Nats in 2004. Great looking model! Photo from Chris Junker.

Right top; Here is Barry Harrison's own pic of his Guillow SE-5A. Nicely done.
Below is Paul Grabski's Republic F-84G for FAC Jet Catapult event from Paul's own plan. Photo by George White.






F-2
F-3
ROOT AIRFOIL
DETAILS ON RIGHT SIDE OF FUSELAGE
SPAN – 46'-3"
LENGTH - 33'-3"
HEIGHT - 10'-3"
TAIL SPAN - 16'-0"
TREAD - 10'-0"
PROP. - 10'-0"
CHORD - (ROOT) - 10'-0"
F-1
F-4
F-5
PROP.
S-1
R-1
TAIL SECTIONS
SCALE IN FEET
0 1 2 3 4 5 6 7 8 9 10
NORTH AMERICAN X0-47
WRIGHT CYCLONE 1000 H.P.
MARTIN E. DICKINSON

NEW FAC T-SHIRTS

We now have the FAC Outdoor Champs T-shirts in stock. This shirt features the Spartan Executive. Another design by Bob Bojanowski. We have all sizes in stock and ready to go! Small med., lge., X-lge., [redacted]. Nice in silver & green.

We still have the Boeing F4B-4 shirts in all sizes. This may be our all-time best seller! Also still in stock is the 2004 FAC-Nats shirt in all sizes. This one is of the Messerschmitt BF-109.

The Boeing shirts also come in youth sizes of small, medium and large.

Prices for all shirts is $15.00 Postpaid, send your order to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

FLYING ACES PLAN SERVICE

These plans are from the FAC contests at Geneseo N.Y. and Muncie, In.

Aircraft	Span	Designer	Price
Erie Times O.T.	24"	Engstrom	3.00
Westland Lysander	25"	Studiette	4.00
Northrop Gamma	36"	Bruning	5.00
Fairchild PT-19	24"	John Low	4.00
Curtiss Gulfhawk	24"	Wilkey	4.00
Boeing P-26	18"	Wilkey	3.00
Waco C-7	22"	Boyanowski	5.00
Laird Solution	14"	Tom Nallen, Sr.	4.00
Waco "D"	24"	Bruning	4.00
Lockheed Orion	24"	Tom Nallen, Sr.	6.00
Monocoupe	24"	Canada M.C.	3.00
Seversky SEV-2	22"	Tom Nallen, Sr.	6.00
Gee Bee QED	24"	Tom Nallen, Sr.	6.00

T-SHIRT CLEARANCE SALE

The following T-Shirts must go at a reduced rate to make room for our new shirts. Shirts and sizes are as follows;
HALL BULLDOG, small, [redacted], large and Extra large.

Seversky SEV-2, small, medium, [redacted].

These shirts are priced at just $10.00 each postpaid. Send your orders to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

POSTAL CONTEST

This postal contest starts now and will continue until May 30, 2005. Entries postmarked after May 31, 2005 will not be accepted.

We will have four events, Indoor Peanut, Outdoor Peanut, Indoor No-Cal and Outdoor No-Cal. Fly and enter as many models as you wish. Every time you better a score with a particular model send it in. Contest times count too.

Send entries to; FAC-GHQ, 3301 Cindy Lane, Erie, Pa. 16506.

OUTDOOR PEANUT

Ed Pelatowski Ole Tiger 55 sec.

OUTDOOR NO-CAL

Ed Pelatowski Cessna Centurian 71 sec.

INDOOR PEANUT

Gordon Roberts Lacey M-10 58 sec.

INDOOR NO-CAL

Chuck Slusarczyk Hosler Fury 216 sec.
Larry Loucka Hosler Fury 210 "
Geof Phillips Gloster Meteor 35 "

REGISTRATION FORM-----FAC NON-NATS GENESEO, N.Y. JULY 16 and JULY 17, 2005

Name _____ Address _____ Jr. _____ Open _____

City _____ State _____ Zip _____ AMA or MAAC No. _____

Entry fees at $25.00 each (flies all events) _____ $ _____

Banquet tickets at $22.00 each with no dormitory reservations _____ $ _____

Reservations for double occupancy with meals and banquet at $175.00 each ____ $ _____

Reservations for single occupancy with meals and banquet at $220.00 each ____ $ _____

Total enclosed $ _____

No entry fee for contestants under 18 years of age. All contestants must be members of the A.M.A. or the M.A.A.C. Please remit entry fee by June 15, 2005 to ease paper work on the field. Mail entrys to; Lin Reichel, 3301 Cindy Lane, Erie, Pa. 16506. We will be unable to refund cancellations after June 20, 2005. If you plan to share a room with someone please indicate their name so we can direct the University to set up the proper arrangements. _____

Awards through 3 places in all events. Contest times are as follows;Saturday July 16, 8:30 till 5:00 and Sunday July 17, 8:00 till 4:00

WAIVER: I/we hereby release the Historical Aircraft Group, Inc., Austin Wadsworth, the State University of New York (Geneseo), The Flying Aces Club, all other persons and other organizations connected with this contest from any liability whatsoever for accident incurred while participating in this contest. I/we also agree to abide by all flying and field rules in force at this contest.

SIGNATURE _____

Your meals at the university will include dinner on Friday July 15th, breakfast and dinner on Saturday July 16th and breakfast on Sunday July 17th and July 18th. The banquet will be at the Days Inn on Sunday July 17th.

Scale judging will take place at the Days Inn, 4242 Lakeville Rd., Rte. 20A, Geneseo, N.Y. on Friday July 15th starting at 2:00 PM. Bring your models there to be judged. Giant and Jumbo models will be judged on the field. No one admitted to the judging room before 2:00 PM. Vendors may set up at 12:30 PM.

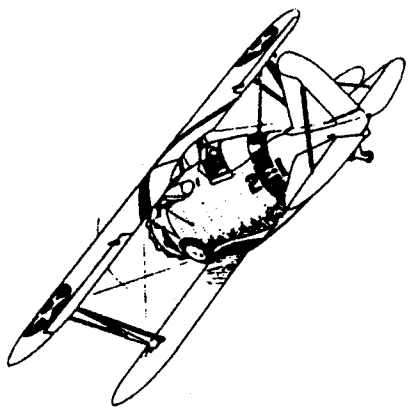
Plans must be presented in the Fairchild "24", Dime Scale, Two Bit O.T. Rubber and the new FAC O.T. Plan/Kit Scale events. All radial engined models in mass launch events must have at least a paper engine inside the cowl. All military models in mass launch events must have armament built into the model, no painted on guns, etc. No slab sided models unless the real aircraft was slab sided. Have proof of scale for all mass launch events.

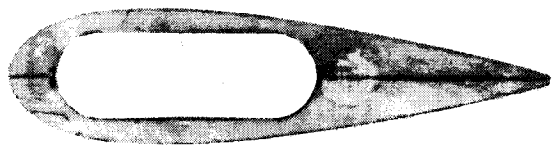
Saturday July 16 8:30 untill 5:00 pm.

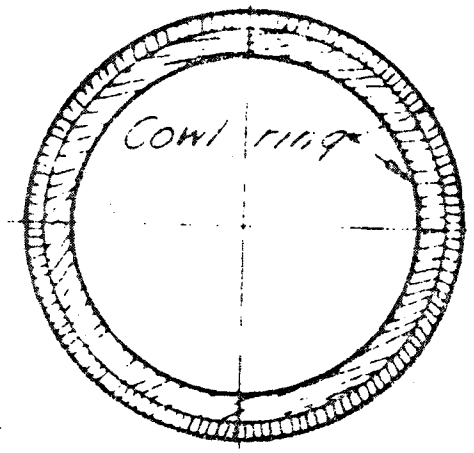
Giant Scale May be flown either day
Jumbo Scale May be flown either day
Power Scale May be flown either day
FAC Scale
Hi-Wing Peanut Scale
Old Time Rubber
Greve Race *
World War One Dogfight *
Golden Age Civil
Modern Military
Embryo Endurance
AT-6 *
Phantom Flash
No-Cal Scale
Contra-Prop Scale *
Fiction Flyers

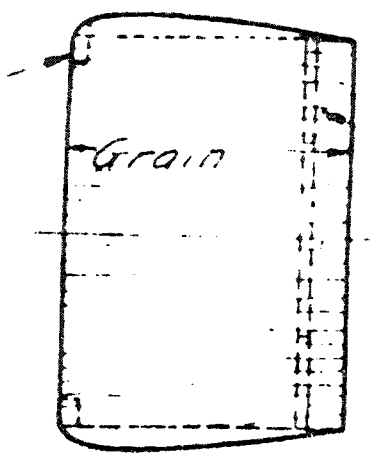
Sunday July 17 8:00 untill 4:00 pm.

Pioneer Scale
Old Time Stick Rubber
Jimmie Allen
Thompson Race *
World War Two Combat *
FAC Peanut Scale
Powder Puff Scale
Modern Civil
Golden Age Military
Two Bit Old Time Rubber
Old Time Gas Replica
Fairchild "24" *
B.L.U.R. Race
Dime Scale
Low Wing Trainer *
FAC Old Time Plan/Kit Sca

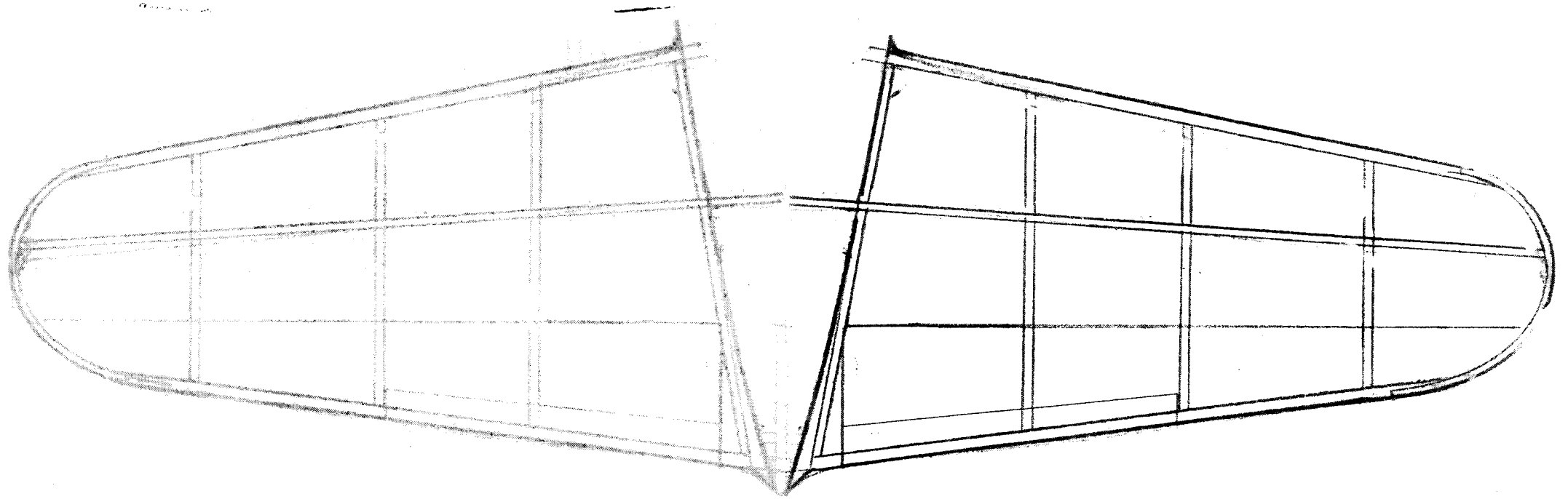


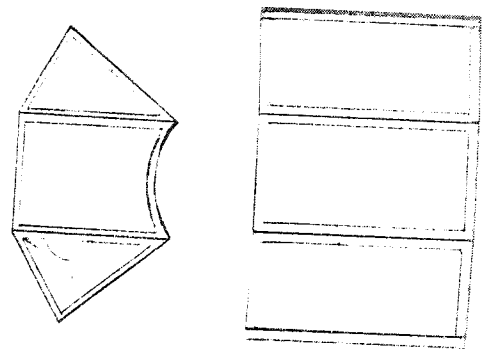


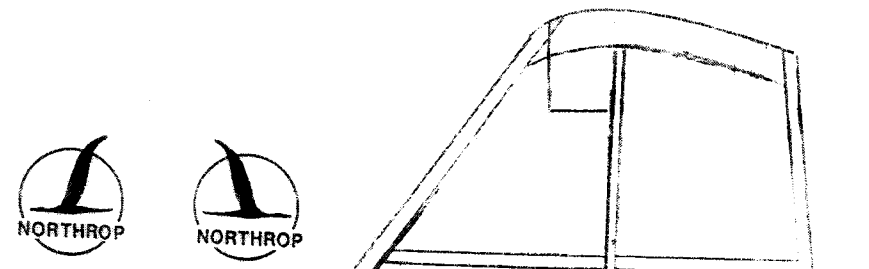


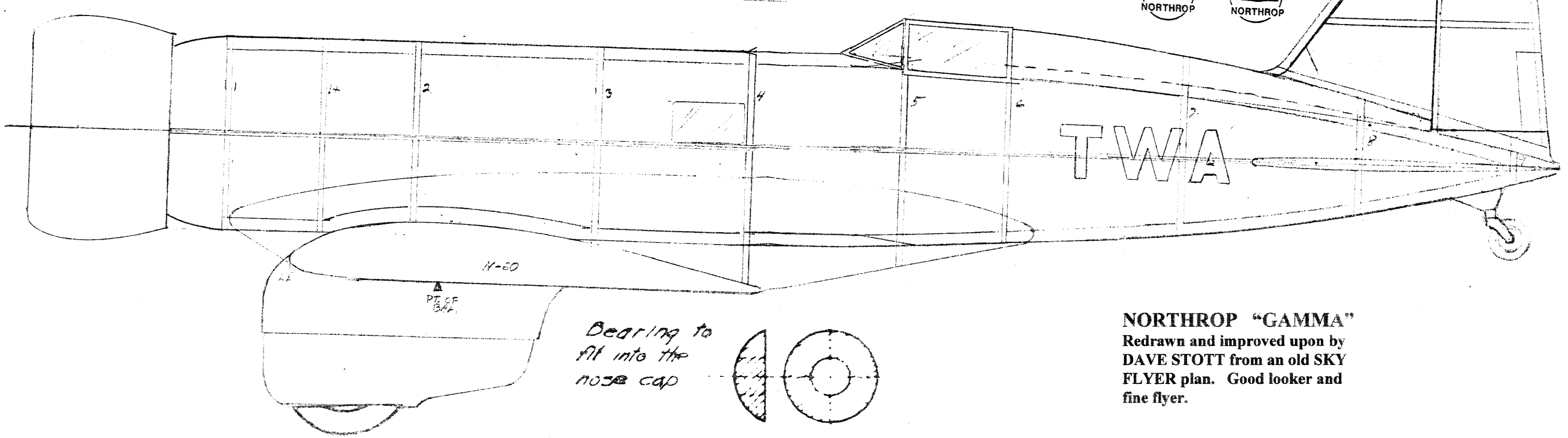


BUILT BALSA RING



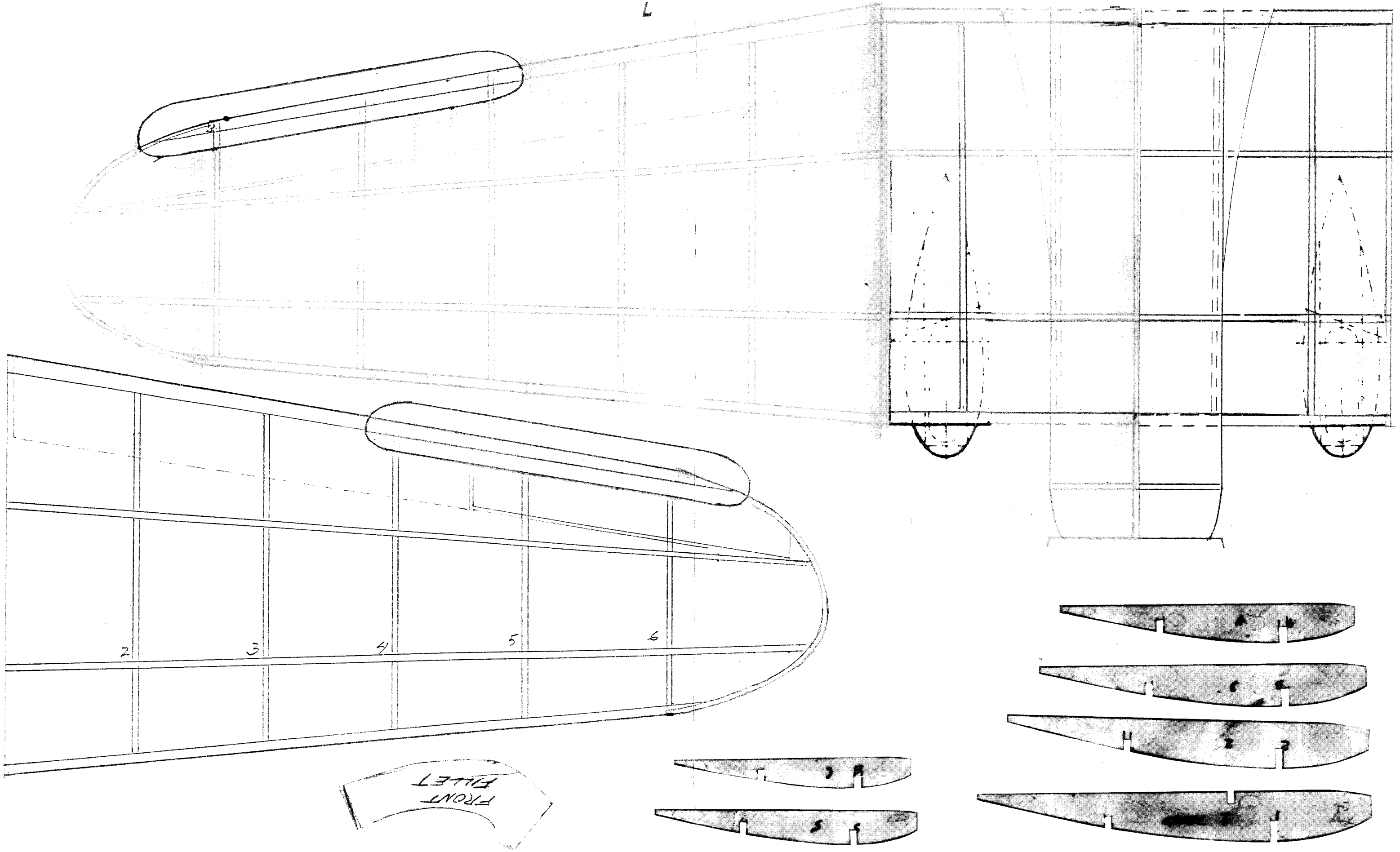


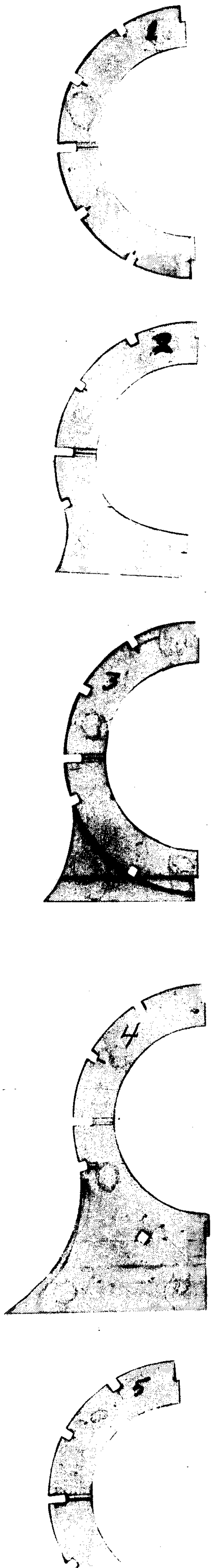


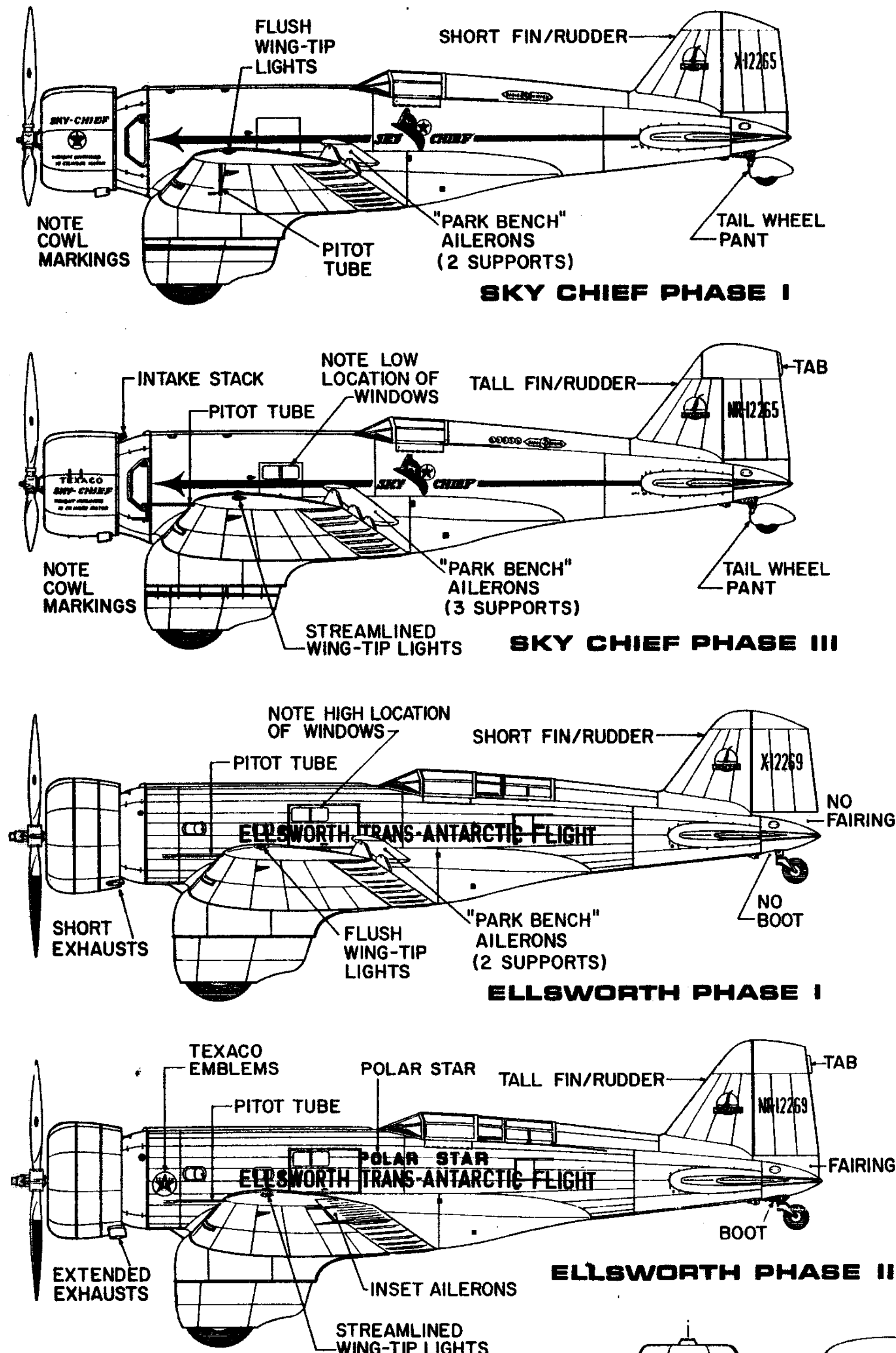


NORTHROP "GAMMA"
Redrawn and improved upon by DAVE STOTT from an old SKY FLYER plan. Good looker and fine flyer.

NOSE CAP


L
2
3
4
5
6
FRONT
FILLET





SKY CHIEF, PHASE III: After additional rework. Tail fin with balanced rudder. "Park Bench" type ailerons with three supports each. Horizontal type pitot tube.

ELLSWORTH GAMMA, PHASE I: New, shortly after manufacture. Two-seat cockpit. Windows in fuselage sides (but note slightly different location than SKY CHIEF). Short fin/rudder, no fairing under rudder. "Park Bench" type ailerons, with two supports each. Horizontal pitot tube (different configuration than SKY CHIEF'S), mounted in leading edge of port wing. X-12269 license markings on both sides of rudder, top of starboard wing, and bottom of port wing.

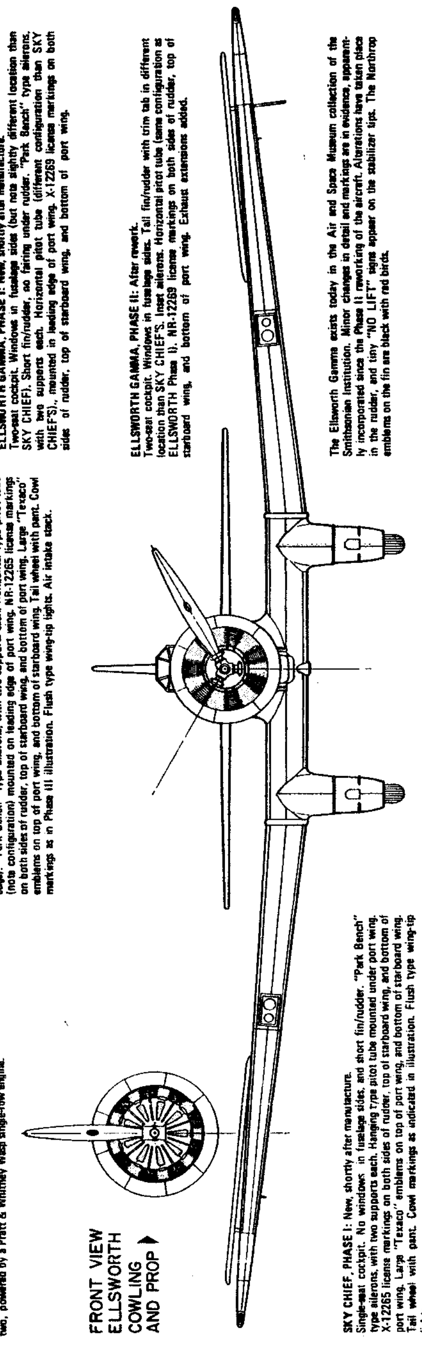
ELLSWORTH GAMMA, PHASE II: After rework. Two-seat cockpit. Windows in fuselage sides. Tail fin/rudder with trim tab in different location than SKY CHIEF'S. Inset ailerons. Horizontal pitot tube (same configuration as ELLSWORTH Phase I). NR-12269 license markings on both sides of rudder, top of starboard wing, and bottom of port wing. Exhaust extensions added.

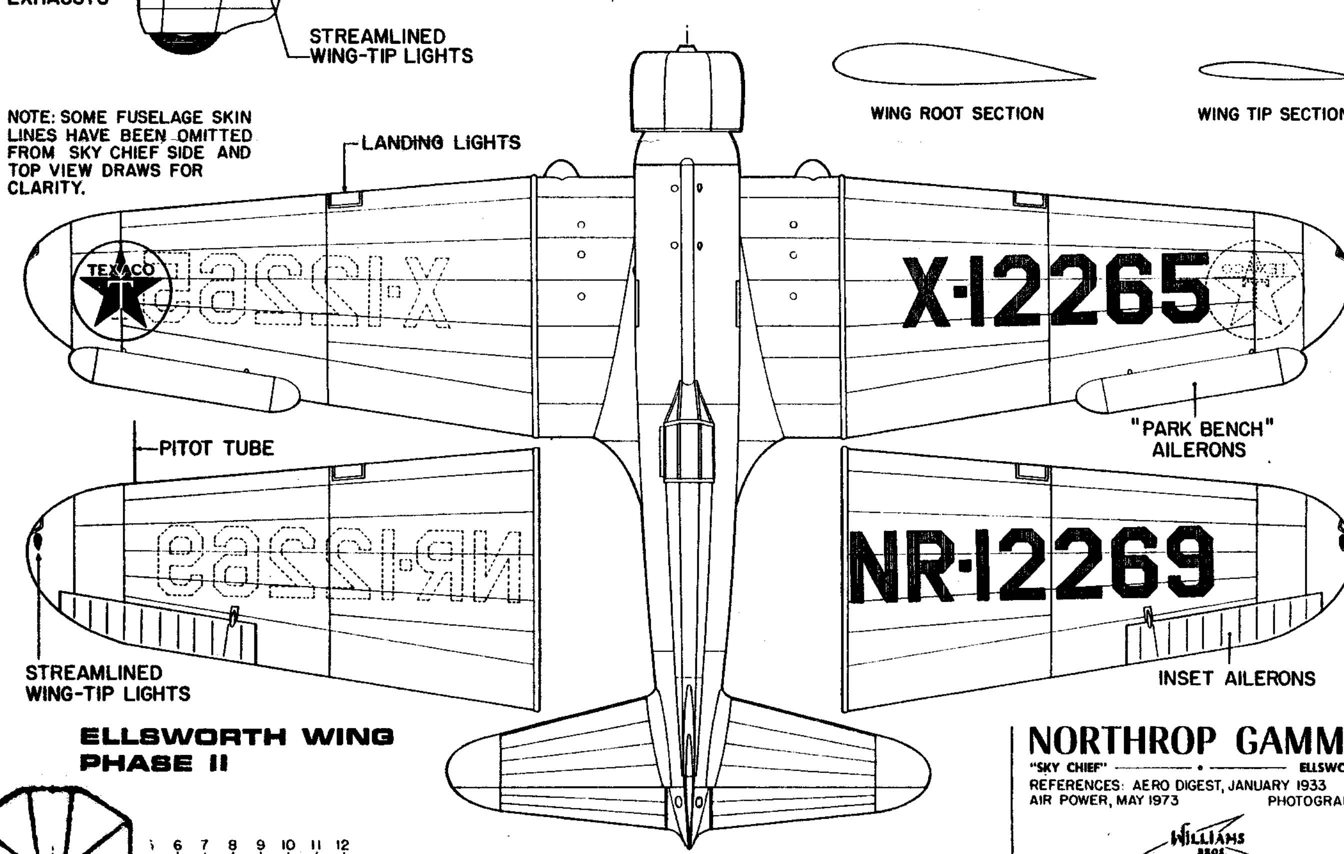
The Ellsworth Gamma exists today in the Air and Space Museum collection of the Smithsonian Institution. Minor changes in detail and markings are in evidence, apparently incorporated since the Phase II reworking of the aircraft. Alterations have taken place in the rudder, and tiny "NO LIFT" signs appear on the stabilizer tips. The Northrop emblems on the fin are black with red birds.

SKY CHIEF, PHASE II: After rework. Single-seat cockpit. Windows in fuselage sides. Tail fin/rudder (trim tab on upper trailing edge). "Park Bench" type ailerons, with two supports each. Horizontal type pitot tube (note configuration) mounted on leading edge of port wing. NR-12265 license markings on both sides of rudder, top of starboard wing, and bottom of port wing. Large "Texaco" emblems on top of port wing, and bottom of starboard wing. Tail wheel with pant. Cowl markings as in Phase III illustration. Flush type wing-tip lights. Air intake stack.

BACKGROUND: The original Gamma, created for Frank Hawks, was equipped with a Wright 14 cylinder engine of 785 horsepower. Lincoln Ellsworth ordered Gamma number two, powered by a Pratt & Whitney Wasp single-row engine.

SKY CHIEF, PHASE I: New, shortly after manufacture. Single-seat cockpit. No windows in fuselage sides, and short fin/rudder. "Park Bench" type ailerons, with two supports each. Hanging type pitot tube mounted under port wing. X-12265 license markings on both sides of rudder, top of starboard wing, and bottom of port wing. Large "Texaco" emblems on top of port wing, and bottom of starboard wing. Tail wheel with pant. Cowl markings as indicated in illustration. Flush type wing-tip lights.





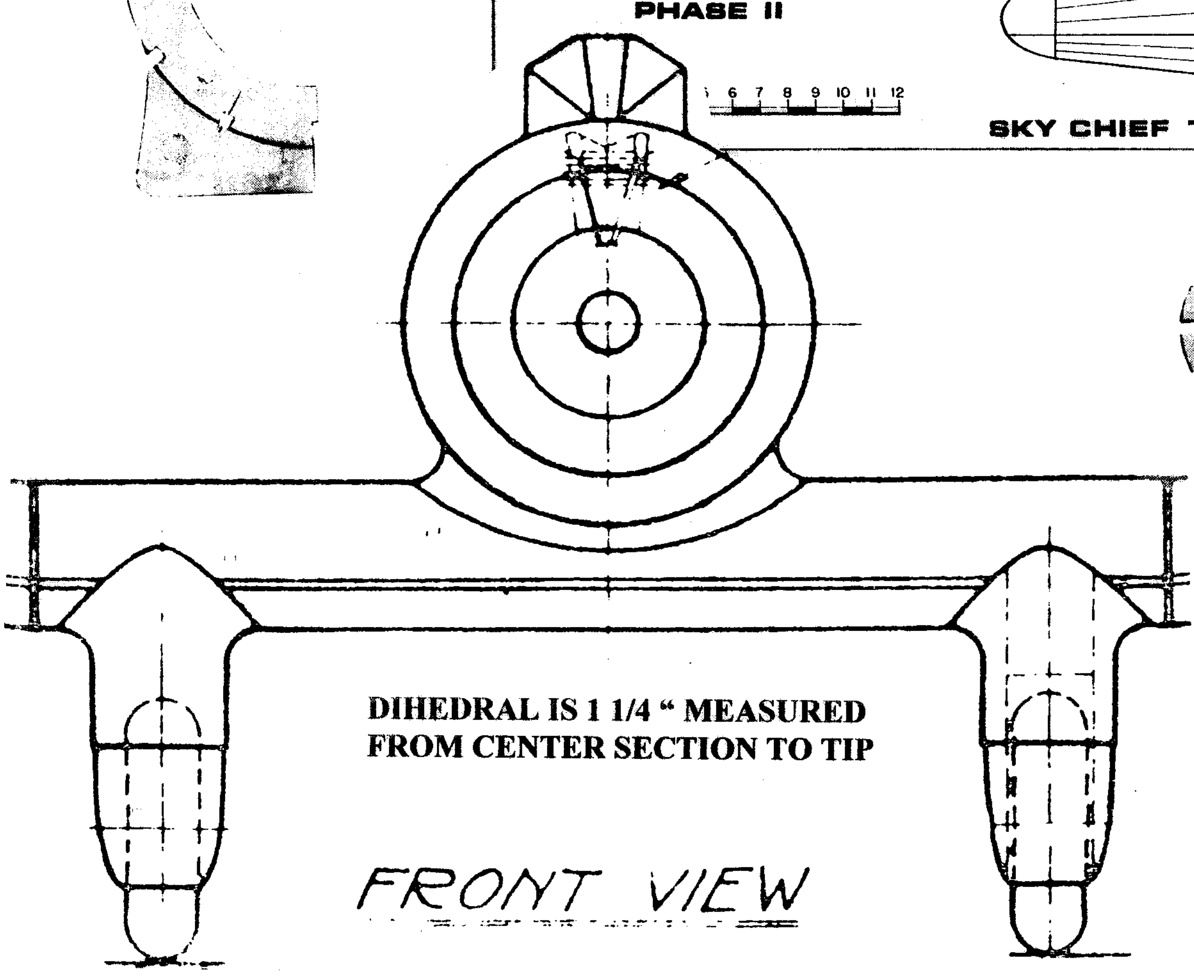
NORTHROP GAMMA

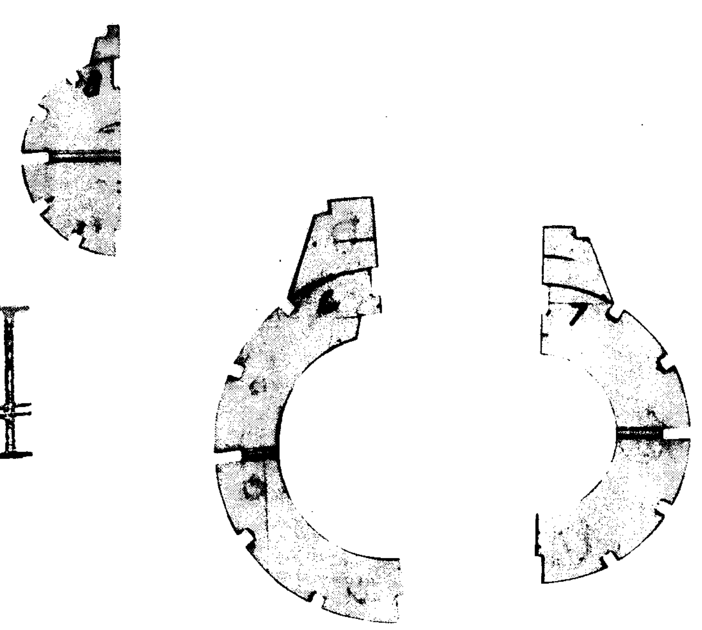
"SKY CHIEF" • ELLSWORTH

REFERENCES: AERO DIGEST, JANUARY 1933
AIR POWER, MAY 1973
PHOTOGRAPHS

WILLIAMS BROS.

181 PAWNEE STREET • SAN MARCOS, CALIFORNIA • 92069





1/20 SQ TAIL

1/16 SQ L.E.

FOAM WING TIPS

1/64 PLY DIHEDRAL BRACE

GLUE TO REAR FACE OF FORMER 5

SLIP WING PANELS ON AND GLUE TO FRONT FACE OF SPAR

3/32 ROOT RIB SAND TO FIT FUSE SIDE

NX3154K

TYP. SLICED RIB (ROOT SHOWN)

1/32 PLY FACE

BALSA PLUG

1/16 OD TUBE BEARING

HARD 1/20 SHEET SPAR

LOWER LONGERON

FIN STRIPES

ALL FORMERS 1/20 SHEET

STRINGERS 1/32 SQ

COVER COWL W/ 1/32 SHEET & SAND TO SHAPE

MAKE TWO

PLUNGE MOLD CANOPY

BALSA BLOCK NOSE WT FROM VIEW ABOVE

PEND L.G. OVER FRONT VIEW

EXPERIMENTAL

1/32 STRINGERS

TWO 1/32 SHEET BOTTOM STRINGERS

FUSE '3X' OF 1/20 SQ

COLOR SCHEME

OVERALL DEEP RED,
SILVER L.G. LEGS
NUMBERS, REGT & FIN STRIPES

REFERENCES

AMERICAN MODELER JAN/FEB 1963
PAUL PLECAN GOODYEAR 'LUKE'
RACING PLANES & AIR RACES Vol III p36
REED KNAERT

LEIGHNOR SPECIAL

1948 GOODYEAR RACER

By TOM NALLEN II Fall 2002

CUT TWO SETS OF LICENSE NUMBERS FROM BLACK PAPER
AND STICK TO TOP OF RIGHT WING AND BOTTOM OF LEFT WING

1/16 SQ. LEADING EDGE

1/16 FALSE SPAR

POSITION OF LANDING GEAR STRUT
GLUE FIRMLY

E D C B A A B C D E

NX20105

TISSUE RECTANGLES
REPRESENT PANELS
TOP OF WING ONLY

1/16 SQ. SPAR

MAKE ALL CONTROL SURFACE OUTLINES FROM BLACK TISSUE STRIPS

WASHOUT (TWIST) BOTH WING TIPS BY CRACKING TRAILING EDGE AT RIB D
AND PLACING A 1/32 SHIM UNDER THE END OF RIB E.

WING WALKS ARE BLACK TISSUE

CENTER SECTION IS FLAT
TO SET DIHEDRAL PLACE A 13/16 BLOCK UNDER RIB E ON BOTH WINGS

1/16 SQ. TRAILING EDGE

STABILIZER

E
D
C
B

WING RIBS

COLOR SCHEME:
BLUE FUSELAGE
WING AND TAIL
YELLOW

CUT TAIL NUMBERS FROM PLAN
AND STICK TO RUDDER AS SHOWN

N C 2 0 1 0 5 N C 2 0 1 0 5

WINDSHIELD PATTERN

FRONT COCKPIT COVER PATTERN

USE CELLOPHANE
OR THIN CELLULOID FOR WINDOWS

REAR COCKPIT COVER PATTERN

THIS PLANE WAS DESIGNED
FOR USE IN THE U.S.
GOVERNMENT SPONSORED
CIVILIAN PILOT TRAINING
PROGRAM

INSTRUMENT PANEL

CUT FROM PLAN AND STICK TO BACK OF FORMER 3

F4

F5

ALL SHEET BALSA IS 1/16 THICK
ALL STRIP BALSA IS 1/16 SQ.

STIFF PAPER COVER
FOR TOP OF FUSELAGE
BETWEEN FORMERS 2 AND 3

F3

SPINNER SERVES AS NOSE PLUG
MOUNT PROP IN FRONT OF SPINNER

F1 F2 F3 F4 F5 F6 F7 F8

SIDE STRINGER

MOUNT STABILIZER
ON TOP LONGERONS

MOTOR PEG

F1

F2

NOTE; FUSELAGE IS NARROWER
AT BOTTOM THAN TOP
1/16 SQ. STRIP SHOWN BELOW EACH
FORMER GOES BETWEEN LOWER LONGERONS

AIR INTAKE MAKE FROM TWO PIECES
OF SCRAP BALSA

POSITION OF WING FILLET

RIB A

MAKE TAIL WHEEL FROM SCRAP BALSA

F6

CYLINDER COVERS MAKE TWO FROM BLOCK BALSA
GLUE ON EACH SIDE OF NOSE AS SHOWN ON SIDE VIEW.

SHOCK ABSORBERS CUT FROM PLAN AND WRAP
AROUND LANDING GEAR STRUTS AS SHOWN

BELLY PIECE
ADD AFTER WING IS GLUED ON

WING FILLET PATTERN
MAKE 2 FROM STIFF PAPER

FRONT VIEW OF CYL. COVER

TOP VIEW OF CYL. COVER

F8

F7

LANDING GEAR STRUTS ARE 1 1/2 INCHES LONG
MAKE FROM DOWEL FROM MEDICAL SWAB

3/4 INCH HARDWOOD WHEEL

4

USE PIN FOR AXLE BIND TO STRUT WITH THREAD AND GLUE

AIRDEVIL MODEL CO.

AITI PT-1 Trainer

WINGSPREAD-16" PRICE- 10¢
DRAWN BY- Ginsberg
TEST PILOT O.K.- Pulski

NO.1

6-A

NO.6

2-A

2-B

NO.2

2-C

2-D

3-A

3-B

NO.3

3-C

3-D

4-A

NO.4

4-B

BODY CROSS SECTIONS

ELEVATOR

E-9

$\frac{1}{16}$" SQ.

ELEVATOR

E-13

STABILIZER

ELEVATOR OUTLINE MADE FROM BLACK PAPER

⑧

⑦

⑥

⑤

④

③

②

①

5-A

NO.5

5-B

7-A

NO.7

7-B

8-A

NO. 8

8-B

BODY CROSS SECTIONS

WING RIB SECTIONS

E

D

C

B

A

AILERON OUTLINE MADE FROM BLACK PAPER STRIP

TRAILING EDGE

$\frac{1}{16}$ X $\frac{1}{8}$

WING RIBS

SPAR

Ⓔ Ⓓ Ⓒ Ⓑ Ⓐ Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

WING

LEADING EDGE

$\frac{1}{16}$ SQ

AMERICAN INSIGNIA

LANDING LIGHT

WING TIP

EXTRA WOOD PIECE GLUED TO NOSE BLOCK
S BRINGS PROPELLER FORWARD AND OUT

SPLICE

AERIAL MAST

PLAN VIEW

RUDDER OUTLINE MADE FROM BLACK PAPER STRIP

AMERICAN TAIL INSIGNIA (ARMY)

PROPELLER

"X" SHOWS LOCATION OF STRUTS.

LEADING EDGE 1/16 SQ. ON CORNER

CRACK HERE FOR DIHEDRAL

UPPER & LOWER WINGS ARE IDENTICAL.

SPAR 1/16 SQ.

GUSSETS OF 1/16 SCRAP TYPICAL

T

TIP BOW 1/16 SQ.

CONTROL SURFACES MAY BE REPRESENTED BY INKED LINES.

W-3 (4)

W-4 (4)

W-5 (2)

ALL 1/16 SHEET

1/16 SQ. ON BOTTOM

W-3

W-5

W-4

W-1

W-3

RIB - MAKE 12 - 1/16 SHEET.

W-4

"T" MAKE 4 - 1/16 SHEET

T

AILERONS ON TOP WING ONLY.

W-2

5/8" DIHEDRAL BOTH WINGS

NOSE BLOCK AND PLUG 1/4 BALSA. 1/16 BRASS TUBE BUSH.

FORMER 1 1/16 SHEET

2 & 3

4

5

6

7

FORMERS ARE 1/16 SHEET BALSA.

THREAD RIGGING

ALL STRUTS ARE 1/16 x 1/8. CUT INTERPLANE STRUTS "LONG" AND FIT INDIVIDUALLY.

COVER TOP OF FUSELAGE WITH BOND PAPER TO #4

BOTTOM ONLY

STRUTS 1/16 x 1/8 BALSA.

BREAK RAZOR BLADE TO THIS SHAPE FOR CUTTING PARTS

1 2 3 4 5 6 7

1/16 SQ.

FRONT

REAR

LANDING GEAR STRUTS TRUE LENGTH. 1/16 DOWEL.

WHEELS 2 PIECES 1/16 SHEET. CROSS GRAIN. ALUM TUBE BUSH. PIN FOR AXLE.

1/16 SQ.

3/32 ALUM. TUBE

STAB. LOCATION

LOCATION OF LOWER WING

TOOTHPICK SKID

F-1

S-1

S-2

CUT ALL NUMBERED PARTS FROM 1/16 SHT.

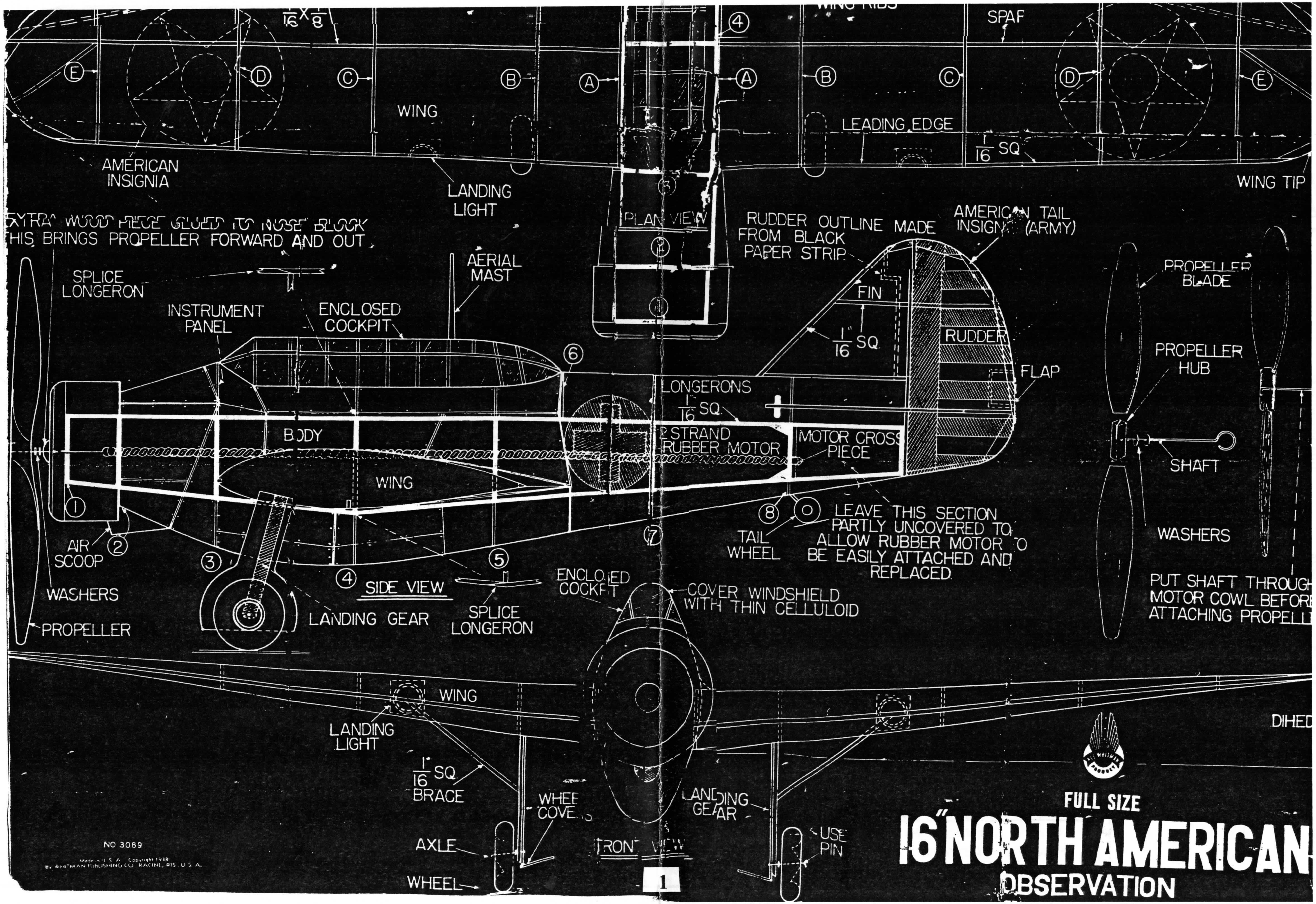
THE SNYDER "BABY BOMBER" WAS A 1921 HOMEBUILT. "INDIAN" MOTORCYCLE ENGINE. IT WAS RACED SUCCESSFULLY. COLOR SCHEME IS UNKNOWN. PHOTO SHOWS "DARK" FUSELAGE, PLAIN METAL COWL AND LIGHT (POSSIBLY CLEAR DOPED) WINGS + TAIL. NO LICENSE IS REQUIRED.

SNYDER "BABY BOMBER"

SERIES: PSEUDO KIT NO. 6

SPAN = 16" LENGTH: 12"

DRAWN BY: JOHN BLAIR


FULL SIZE
16" NORTH AMERICAN
OBSERVATION
1/16 X 1/8
SPAR
WING
LEADING EDGE
1/16 SQ
WING TIP
AMERICAN INSIGNIA
LANDING LIGHT
PLAN VIEW
EXTRA WOOD PIECE GLUED TO NOSE BLOCK
THIS BRINGS PROPELLER FORWARD AND OUT
SPLICE LONGERON
AERIAL MAST
INSTRUMENT PANEL
ENCLOSED COCKPIT
RUDDER OUTLINE MADE FROM BLACK PAPER STRIP
AMERICAN TAIL INSIGNIA (ARMY)
FIN
1/16 SQ
RUDDER
FLAP
PROPELLER BLADE
PROPELLER HUB
SHAFT
WASHERS
PUT SHAFT THROUGH MOTOR COWL BEFORE ATTACHING PROPELL
LONGERONS 1/16 SQ
2 STRAND RUBBER MOTOR
MOTOR CROSS PIECE
BODY
WING
TAIL WHEEL
LEAVE THIS SECTION PARTLY UNCOVERED TO ALLOW RUBBER MOTOR TO BE EASILY ATTACHED AND REPLACED
AIR SCOOP
WASHERS
PROPELLER
SIDE VIEW
LANDING GEAR
SPLICE LONGERON
ENCLOSED COCKPIT
COVER WINDSHIELD WITH THIN CELLULOID
WING
LANDING LIGHT
1/16 SQ BRACE
WHEEL COVERS
AXLE
WHEEL
FRONT VIEW
LANDING GEAR
USE PIN
DIHED
NO. 3089
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