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MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE Canada $2.75

COMMAND AIR Classic

OSHKOSH '85

9 KIT REVIEWS!

50 Great Modeling Tips

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CONTENTS

56th YEAR OF PUBLICATION
Volume 112, Number 1
January 1986

Above: One of the many colorful airplanes seen at Oshkosh this year, the Christen Eagle above was no exception. Read all about the 1985 grand event on page 62.

Cover: St. Augustine, Florida, is the setting for one of the more respectable biplanes around, the Command Air, flown here by Jim Moser. This rare version of the 5C3 is a real show stopper and an excellent choice for a model to put that Technopower or O.S. radial on. Read Budd's article on this grand antique on page 20. Photo by Budd Davisson.

Hawkshaw, p. 77

Gamma Gull, p. 49

Midwest Fantail II, p. 66

Western Soaring Champs, p. 38

FEATURES

CONSTRUCTION

COLUMNS

DEPARTMENTS

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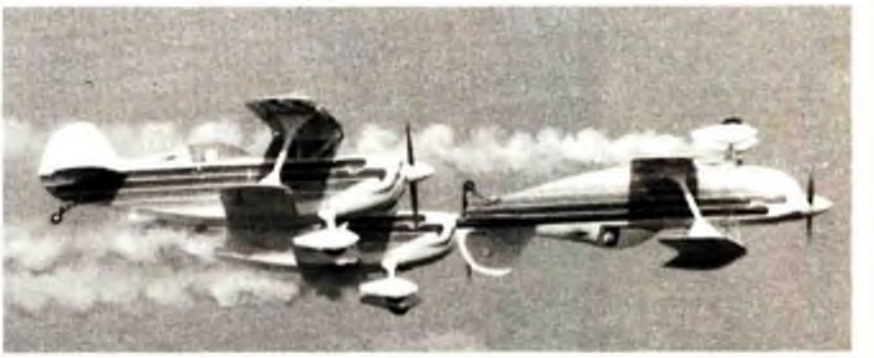
CONTACT

by DAN SANTICH



IN DECEMBER 1974, an event took place that captured the attention and imagination of the entire modeling world. On a strip of desert outside Las Vegas, 32 of the world's top pattern fliers put their skills to the test in an attempt to win what was then the highest cash prize ever offered for a modeling event—$5,000 for first place and total prizes of $11,000. The contestants were selected by taking the top finishers at the Nationals and Internationals, as well as other top pattern fliers from around the world. It was truly an international gathering of the cream of the crop in aerobatic flying.

The idea of the Tournament of Champions came from Bill Bennett, chairman of the board and CEO of Circus-Circus Hotel/Casino, and *Model Airplane News*. Working together, a contest was formulated that would gain the stature of the most prestigious modeling event in the entire world. In 1984, cash prizes totalled $125,000, far and away the most ever given away at a modeling event.

Over the years modelers have followed the TOC with excitement and envy, many hoping to one day be invited to participate. It gave a shot in the arm to pattern like nothing before it, and pattern contests around the country flourished with renewed interest in an event that was previously on the down slide. If an event can bring about excitement and enthusiasm from the modeling community, *Model Airplane News* is all for it, and that is the reason for our dedication to the concept of the TOC.

On September 11, 1985, Circus-Circus Hotel/Casino issued a news release stating that they would no longer continue the sponsorship of the TOC. *Model Airplane News*, as co-founder of the TOC and co-sponsor for the first five years, fully intends to see that it continues.

There are major considerations to think about. Additional sponsors, locations, dates, qualifications, parameters of design, maneuvers, judges, and logistics are but a few. The bottom line, however, is that all of these things will be sorted out to the advantage of the modeler.

A full report on the new TOC, where it will be held, etc., will be provided as the information becomes available.

THIS MONTH: For those whose hearts are in the clouds, Gordon Rae gives us his beautiful Gamma Gull, a design he adapted to R/C and gave new life to. Randy Randolph did his homework and came up with Hawkshaw, a nifty little airplane anyone can enjoy. In the product review section, David Trost finds a bit of nostalgia in the new Fantail Launch II by Midwest Products and we offer nine great kits for the winter building season.

On top of all that there are 50 great modeling tips by Jim Newman. If there is another modeling publication that gives you more good, enjoyable modeling information, I sure would like to know about it! DBS

AIRWAVES

I want to tell you how much I enjoy the new look of *Model Airplane News*. In fact, my modeling friends have expressed similar sentiments to me. *M.A.N.* is the one we *read* each month. It is informative, balanced, and extremely well laid out. In a word, it's a pleasure!

Please give your staff my congratulations for a job well done.

BOB FOSTER
Greensboro, North Carolina

Who Said Donkeys Can't Fly!

From Sayre, Pennsylvania, comes word that the Valley R/C Club and Dan Luchaco have what may be the wave of the future in modeling events, the Donkey Pylon Race. Now, some hot pylon jockeys might think their plane is a donkey, especially after being lapped 5 times in a 10-lap race. Well, when you get lapped here you really get *lapped*—by a *real donkey*. You might also get bucked, kicked, or any other thing the unpredictable animal pleases to do. The object of the event is to ride a donkey around two pylons, get off, start your plane, and take off as quickly as possible. As many contestants soon found out, *they* took off much sooner than their planes did!

from THE VALLEY R/C MODEL CLUB
Sayre, Pennsylvania

A Cover Comes to Life

I congratulate you for your magazine. I have been reading it for several years. Bravo for the cover pictures. Two years ago I received my July issue and the cover picture of the Boeing Stearman caught my eye right away. I decided I should build that plane. It is done and it flies beautifully and I think I copied it pretty well, thanks to you.

JAQUES GAMLIER
France

Budd Davisson Speaks

Folks, I goofed! In my article "Radials, the Only Engines," in the November 1985 issue, I made the statement that the Pratt & Whitney R-4360 had 4 rows of 9 cylinders each row. Thanks to all of you wide-awake aviation buffs out there who sit around and wait for me to goof, it should be noted that the engine in question had 36 cylinders, but were arranged with 7 per row and not 9. Thanks for keeping me honest. I still love radials!

Budd

*We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06829. Letters may be edited for clarity and length.*

EDITOR'S FLIGHT-LINE REVIEW

by DAN SANTICH

Aerofax

Minigraphs. Documentation for scale models is often difficult to find and is sometimes impossible, particularly when a specific version or color scheme is required. Aerofax (P.O. Box 120127, Arlington, TX 76012) has a series of 40-page books called "Minigraphs" that are absolutely beautiful. Every possible detail of the subject aircraft is presented in sharp photographs, both black and white and full color. Line drawings are also included, as well as those necessary three-views. The quality of the book is such that it will last for many, many years, the paper being the main contributor. If you have a scale model planned for your next project, try a Minigraph. It will give you all the information you will ever need.

1919-1939 Air Wars

Published quarterly by *Air Wars* (8931 Kittyhawk Ave., Los Angeles, CA 90045) this is a new, 28-page booklet that is chock full of photographs and stories of aircraft of that period. An historical treasure, these books go into the most intimate detail about the design, use, and fate of everything from engines to airframe structure. For the collector, historian, modeler, or even casual browser, these books will complement any aviation bookshelf. The subscription rate is $18 per year in the U.S. and $25 per year for foreign subscriptions (sent surface mail). ■

Each month model products will be reviewed personally by the editor. This will be a "hands on" evaluation whenever possible and these products will receive close scrutiny under actual operating conditions. These reviews do not constitute any recommended priority over an existing product of similar design or nature, but merely reflect the use of available items from your dealer or hobby shop.

Four-Stroke Smoke

by DAN SANTICH

One Modeler's Method

A MODEL airplane flying in a blue sky presents a very dramatic picture, particularly if it trails a plume of white, billowy smoke. Any time a model does this it draws attention. Air shows and fun-flies are greatly enhanced by the use of smoke from the participating aircraft. Spectators are usually awe-struck at the sight of it.

With the popularity of four-stroke engines and the dramatic increase in scale model flying, one feature that has eluded most builders is the ability to get their models to smoke. I'm sure many different methods have been tried, but according to our four-stroke expert, Eloy Marez, I'm one of the few who has accomplished this feat! Either that, or no one else has come forward with the answer.

If you've had success in getting your four-stroke to smoke beyond a trickle, let us know. In the meantime, here is my method. There may be better ways, but I simply lucked onto a combination that seems to work.

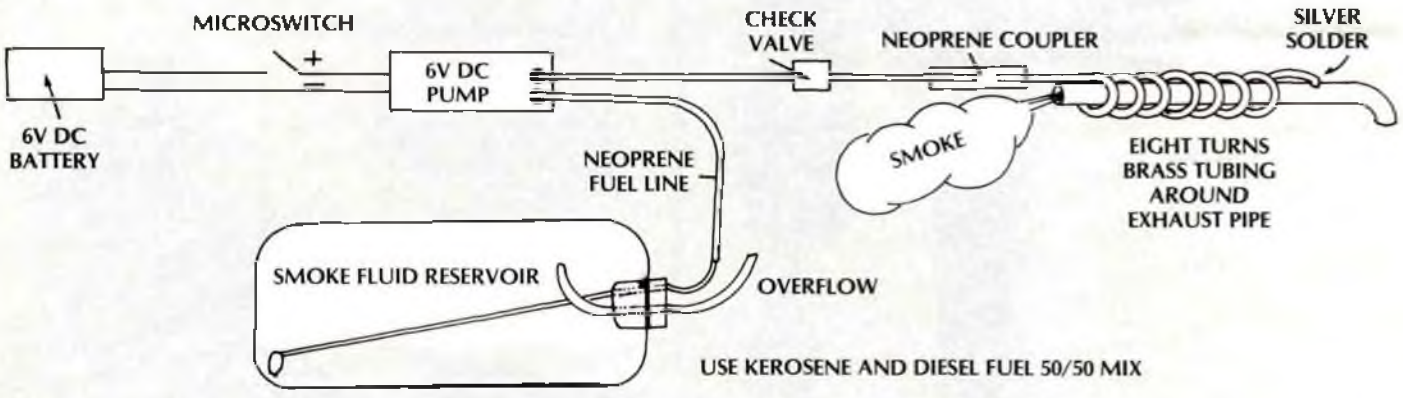
The engine I used was the Kavan FK-50 twin. The illustration will show you how I hooked up my smoke system. As you can see, I used a 6-volt Sonic Tronics* Fuel Pump to drive the fluid into the exhaust. The fluid was a 50/50 mixture of kerosene and diesel fuel. Preheating the fluid seemed to be the key, and I did this by wrapping annealed ⅛-inch i.d. brass tubing around the exhaust manifold and injecting it into a location close to the exhaust flame. I first tried it by spraying the fluid into the exhaust muffler chamber, but it didn't work. The closer you can get to the exhaust valve of the engine, the better. That's where the heat is, and you need lots of heat. You do have to be careful not to get it so close that it will back-up into the exhaust chamber, however. This would most probably douse your plug.

In the hook-up, install a microswitch to activate your fuel pump. On the line from the pump to the manifold, install an in-line check valve to prevent the fluid from backing up from the pressure of the exhaust. Make sure the pump is protected with a capacitor across the motor to prevent radio noise. Also, use a separate battery for the pump. Never drive auxiliary functions like this off the airborne receiver battery.

Getting your four-stroke to smoke is a lot of fun. Good luck.

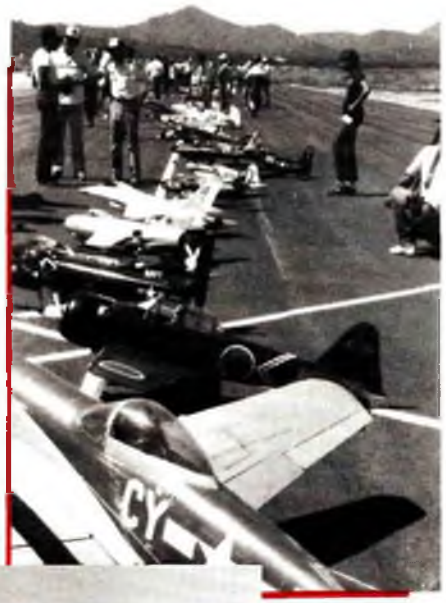
**The following is the address of the company named in this article:*

Sonic Tronics, 7865 Mill Rd., Elkins Park, PA 19117. ■



1/8th Air Force Fly-In

by ELOY MAREZ



Conglomeration of aircraft of all types and descriptions even included Donna Freeman with her Balsa USA Eindecker.

WHAT IF we held a contest and nobody came? Wha if we had to cancel it due to lack of interest? Suc sobering thoughts must cross the minds of mor than one contest director as they strive to plan an event. Afte all, they want to draw not only a great number of the contest oriented R/C fliers, but also beginners and experts alik Somehow, I really doubt if such thoughts ever occur to ⅛t Air Force Commander Al Casey, CD Charlie Beverson, an the rest of the team organizers.

The Fly-In has grown to be one of the most popular an well-attended R/C events in the Southwest. It's not only fc those of us who are considered "locals," as it's an eight-hou drive from where I live to Phoenix, but for consister attendees who have logged a lot more miles to come fly. Dav Platt drove from Florida and annual attendee Dennis Croo came from Illinois. Some brought their latest creations, a clean and shiny, without scratched wing tips. Others brougl proud veterans of 100-plus missions. But they all came t enjoy, and to fly! *They* in this case were 146 entrants, with total of 211 airplanes. Contestants ran the gamut from 1 year-old Time Lime of Phoenix, to 73-years-young Te Rohlfing of Ukiah, California.

Actually, the numbers were exceeded somewhat, as the were some non-flying R/Cers present who brought airplan to show but who were not registered. The Tucson "Bar stormers," who were also present, put on an enjoyable ar impressive airshow on Sunday. My guess is that there were least 250 different airplanes in the pits during the two days this event.

This year's contest was held on the weekend of March and 24. As in the past, the site was the Sun Valley Flyer's R/ field, located on the northern side of Phoenix. The field boas a paved runway, adequate pit and parking areas, and mornir coffee and hotdogs for lunch. The area is clear in all directio and away from any obstructions or neighbors.

This event is described as a *Fly*-in, and "fly" is the k word. You can fly as often and as much as you like; the sky constantly full of airplanes. The only controls are tho necessary for safety's sake. Keri Marshall, with some he from husband Art, kept the transmitter impound and fr quency control flowing smoothly, while Steve Tillson ar John Mangino monitored flight-line activities and safet Together they directed a perfect "10" weekend of smooth ar safe flying.

Kent Walters' Dauntless was attracted to the smaller Dauntless of Buzz Watson.

Top, left: P-39s were flown in formation. Middle: Clyde Courtney used a Quadra to power a Fokker. Right: Dan Parsons and Billy Hempel flew real attention-getters. Bottom, left: Terry Torok was one of the better looking members of the 1/8th. Middle: Dave Platt's Me 109 came from Florida. Right: Modified Pica Spitfire by Richard Kaufman.

As an all-around modeler and one who flies everything he builds, I can't really say what impressed me the most at the 1/8th Air Force Fly-In: the high caliber of workmanship, or the superior degree of piloting proficiency of so many of the fliers. I admire and respect both the builders and the fliers, but it *is* a "fly-in," and anyone who went there merely for the flying did not leave disappointed.

We were treated to an excellent display of R/C airmanship on all types of aircraft: war planes, classics, twin- and four-engine, jets, helicopters—everything imaginable with an engine and a radio in it. We all thrilled to the sound and sight of two giant-scale P-39s flown together by Joe Zimmerman and Joe Aguilera. California's "Scale Squadron" was ably represented with expertly-built and simultaneously-flown Zeros in the hands of Diego Lopez, Jerry Smith, and Dave Lien. Ken Meyer's Quadra-powered Thrush Commander is always impressive and he handles it with such finesse that we were all willing to overlook his complete deviation from scale maneuver. Who ever saw a crop duster come over the pea patch laying a thick cloud of dust, *inverted*! We did at Phoenix and thoroughly enjoyed it.

We also thoroughly enjoyed Kent Walter's Dauntless climbing to a mere speck in the Arizona sky, from which it would come screaming down in true "Battle of Midway" style, to lay a bomb on the runway right in front of Kent. How he does it so consistently and without any major corrections is beyond me. I guess that is what separates great pilots from the rest of us.

In the realm of great pilots, we must also list Frank Gray, who put on some truly heart-stirring flight exhibitions with his Staggerwing Beech. This airplane really comes alive in Frank's hands. Everytime he flew, he treated us to a series of perfect hesitation rolls, and on seeing his low-level knife-edge flight the full length of the runway and beyond, I thought for a minute that I was back in Las Vegas watching one of the TOCers.

The jets are always exciting to watch, and this year I think there must have been at least twice the entries of last year. This might be due to the inspiration of Larry Wolfe, who always comes with some of the best-built and most detailed models present. Even Bob Thacker had a blowtorch this year, a MiG-15 that he claims is a trainer for some exotic, ducted-fan project he's designing. At least he built this one correctly, the

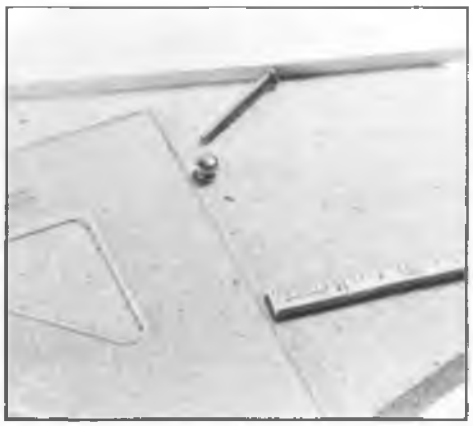
(Continued on page 64)

HOW TO:

by RANDY RANDOLPH

Make a Bevel Sanding Jig

In model construction the use of cyanoacrylate glues has made the need for close-fitting joints more important than ever. Often it is necessary to sand a bevel into the end of a balsa strip to secure a good fit. The photos show how to make an adjustable jig that will do this job, as well as square the ends of strips or sheets when necessary.



1.

2.

1. The materials needed are a piece of ⅛- or ¾-inch particle board 10 inches square; a strip of ½x¼-inch hardwood; a 6-32 bolt, 1¼ inches long with a matching thumbscrew; a drill; a right triangle; and a ruler.

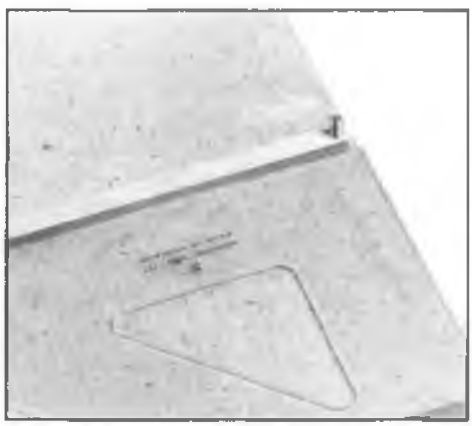
2. Measure to the center of one edge of the board and make a mark ¼ inch from the edge...

3.

4.

3. ...and drill a hole at this location to match the bolt. Countersink the back side so the head of the bolt is below the surface of the board.

4. Round one end of the hardwood strip with a sanding block, then drill a hole to match the one in the board, ¼ inch from the end.



5.

6.

5. Slip a bolt into the hole in the board and epoxy the head into the countersunk hole. Place the hole in the hardwood strip over the protruding bolt and use a right triangle to align it with the edge of the board. Make a mark on the board along the strip to set the 90° location.

6. Tighten the thumbscrew to hold the strip in place. Use a sanding block along the edge of the board and flat against it to sand in the bevel. The hardwood strip can be moved to any angle desired by loosening and re-tightening the thumbscrew.

FROM THE COCKPIT

COMMAND AIR: Forgotten Successe

article and photo by BUDD DAVISSON

HERE I was again...the nose was just beginning to level out at 1,000 feet AGL and I realized I had forgotten to ask what the cruise rpm was supposed to be. My logbook doesn't show a heck of a lot of Command Air time (read that as none), and I couldn't shout loud enough for my check pilot in the front cockpit to give me any advice. But, left to my own devices, I figured I would just reduce power a little bit and hope I was close.

As I started to bring my throttle hand back, I saw a hand come up out of the front cockpit. A finger was reaching over the front windscreen as if to fingerpaint in the specks of oil on the front side of it. I watched as the finger etched out a cryptic 1-6-0-0 in the oil and I realized that was to be our intercom system for the flight. I brought the throttle back a little farther and watched as the large alarm clock hand on the tachometer unwound to cruise power ("Ahoy, engine room, give me 1,600 turns!").

One of the really neat things about aviation is that no matter how long you've been in it, no matter how much time you've spent rubbing elbows with esoteric airplanes, you know that there's a long, long way to go before you even scratch the surface of our aviation heritage. Every time you kick over an aeronautical rock, you'll find something under it that surprises you to no end. A Command Air is one of those surprises. It's one of those machines that existed in my aviation knowledge only as a name. A name with no history and, until this balmy afternoon in north Florida, one that had escaped my logbook.

The reason so many aircraft flit around the edge of our aviation knowledge is because a whole herd of companies came and went in a flash in the era surrounding the crash of 1929. Although it's difficult to tie down, it has been reported that as many as a hundred aircraft companies were happily engaged in stitching fabric, welding tubing, and splicing wood during the first thirty years of man's endeavors to get off the ground. Many companies built no more than one or two airplanes before deciding they were better off refinishing spokes on Model Ts. Others banged out machines in significant numbers, yet are still virtually unknown outside the cloistered circles of the hard-core antiquer. The Command Air is one of those. But even as I was being instructed by shaky lines on an oil-covered windshield, I was amazed that the Command Air had fallen into a crack in aviation's memory.

The Command Air Company was not one of your storefront or backyard operations. In the first place, the experts say the company built somewhere between 250 and 300 airplanes in the period between 1927 and 1930. But these weren't just any airplanes. The Command Air, for instance, was one of only three aircraft designs to pass the 1929 Guggenheim Safety Trial, in which all existing aircraft designs were test-flown and judged for safety. However, one of the notes reportedly made by the committee was that they thought the 46-mph stall speed of the Command Air was entirely too high for the average pilot.

In truth, I get a little frustrated in talking about the Command Air because I know so little about it and the company. What little I do know points to a fascinating story of frustration and limited success. And they have left behind a very small number of airplanes with which to judge their designs.

The Little Rock, Arkansas-based company of Command Air had many firsts. Besides being one of the few winners of the Guggenheim Trials, they designed and built something like a half-dozen different models. They were issued 14 approved type certificates for designs and, of the total produced, something like 160 used OX-5s, while versions of the 3C3 AT (with the little 110-horse Warner) and the 5C3 (with the 160-horse Challenger) are the only survivors.

Two Command Airs are known to be airworthy, with approximately eleven known to exist.

With only two airworthy, you don't stumble across a Command Air every time you walk out to the local airport. In fact, my introduction to the 3C3 AT at St. Augustine was a result of Jim Moser's continual babbling into the phone about how much fun they were having with this barn-sized antique. This was from a guy who has his choice of dozens of sporty airplanes to fly, but every single conversation for a couple of months was punctuated with his ramblings about the Command Air. So I finally decided the only way to shorten our phone conversation was

(Continued on page 98)

9 FOR THE SKY

Here's a neat assemblage of R/C aircraft to start the winter building season.

St. Croix Models Long EZ

Fly into the 21st century with this canard!

Type: *Sport scale*
Wingspan: *65 inches*
Weight: *6 pounds, 7 ounces*
Engine: *Fox .45BB*
Channels: *4*

A scale model of Mike Melville's Canard, the St. Croix Models (P.O. Box 279, Park Falls, WI 54552) kit is of excellent quality and goes together quite easily and fast. Construction is balsa and foam with hardware to complement it. Also included are full-size plans, instructions that include step-by-step sequences, and a beautiful, clear canopy. Special attention is given in the instructions to the building of the foam wing so that the six sections are done right the first time. A real attention-getter at the field, the Long EZ is well worth your consideration for something a bit different.

JMI Eagle

Type: *Sport scale*
Wingspan: *49 inches*
Length: *45 inches*
Weight: *8¾ pounds*
Engine: *.90 recommended*
Channels: *4*

Beauty in form and flight, this is one of the finest Christen Eagle kits we have ever reviewed. It is imported from Germany by JMI (7001 Acton Rd., Dalzell, SC 29040) and is of excellent quality. It features a beautiful fiberglass fuselage and cowl, pre-sheeted foam wings, pre-formed cabane struts, and formed canopy. Also included are step-by-step instructions and detailed plans. We powered her with a dieselized Fox and she ripped holes in the sky!

Biplanes are a hit at any field, so give the JMI Eagle a chance to spread her wings and you will do yourself proud!

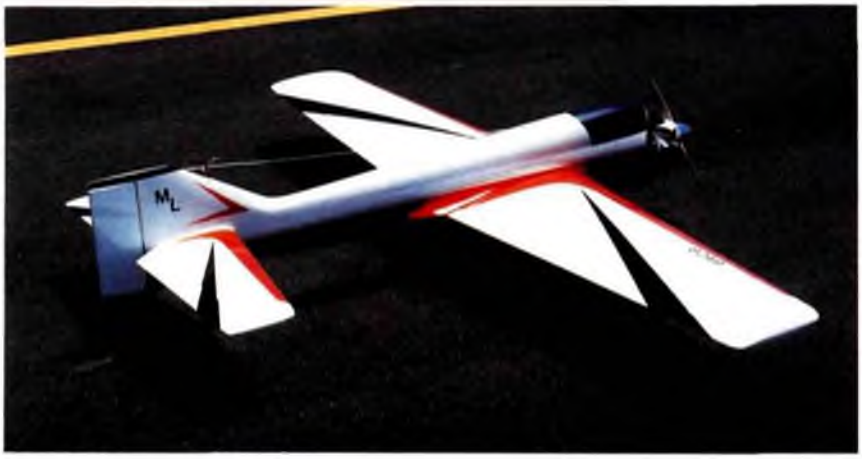
Cambria Model Aircraft Fokker D.VIII

Type: *Giant scale* ***Engine:*** *ST 2000* ***Weight:*** *15 pounds*

Cambria Model Aircraft (Unit C, Mochdre, Newtown, Powys SY16 4LF) is a British manufacturer of popular model kits. This popularity is due to the excellent choice of models, as well as the first-rate engineering that goes into them. The Cambria kit of the Fokker D.VIII contains all the associated hardware, three sheets of full-size plans, excellent quality balsa and die-cut parts, sanded plywood parts, a formed 10-inch cowl, and even a pair of 6½-inch wheels. Five sheets of instructions with 39 stages of construction leave nothing to the imagination, and flying and trimming notes are also given. Our review of this kit proved it to be a fine one, as well as a fine flying model.

Great Planes Illusion

Pattern at its best!



Type: *Pattern*
Wingspan: *65 inches*
Wing Area: *750 square inches*
Weight: *7.25 pounds*
Engine: *.60*

One of the most widely seen pattern ships in recent times has been the Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) Illusion, designed by Dave Brown. Using elements of past winning designs, the Illusion is a state-of-the-art pattern ship that fits the AMA pattern well. The kit is of top-notch quality with a beautifully formed fiberglass fuselage and foam-core wings. All balsa necessary for covering is included with the kit, as are the accessories and assembly manual. Full-size plans and a a picture pamphlet leave nothing to your imagination where building is concerned. The kit is available through your local hobby dealer.

Rubin Series Cessna 40

Ready to fly means instant fun!

Type: *Advanced trainer/scale*
Wingspan: *60 inches*
Wing Area: *520 square inches*
Weight: *6 pounds, 6 ounces*
Engine: *Picco .40*
Channels: *4*

Manufactured in Argentina, the Rubin Cessna 40 is a semi-scale trainer designed for .20- to .40-size two-stroke engines. It is an ARF kit and comes complete with pre-assembled landing gear, wheels, and wheelpants. In addition, the control surfaces are pre-hinged. This model should not be built or flown as a first project, although it certainly falls into the intermediate or advanced categories. The Rubin Cessna 40 is available from Kanning Hobby Center (17932 Sky Park Circle #E, Irvine, CA 92714).

Cox Cessna 182 Skylane

A classic plane for the neophyte!

Type: *Sport scale*
Wingspan: *36 inches*
Weight: *22 ounces*
Engine: *.049*
Channels: *2*

The Cox Hobbies (1525 E. Warner Ave., Santa Ana, CA 92705) Skylane is a ready-to-fly model built of special O.H.S. structural foam-laminate material. All control surfaces are hinged and mounted, as is the engine, a Cox QRC .049. This engine is equipped with a muffler and a spring recoil self-starter. A few hours of assembly time and radio installation will put you in the air. Flying the Cessna was found to be both fun and easy.

Hobby Shack "Quick Built Series" PT-19

Type: *Sport scale*
Wingspan: *52½ inches*
Wing Area: *418½ square inches*
Weight: *4 pounds*
Engine: *.19-.40*
Channels: *4*

For the scale builder in all of us!

The Hobby Shack (18480 Bandilier Circle, Fountain Valley, CA 92728-8610) Quick-Built kits have proven to be very popular with modelers. Although not ready-to-fly type kits, they nonetheless offer a quick way to get into the air due to the outstanding engineering and parts fit of the kit. A sheer joy to assemble, the airframe and wing structure can be ready to cover in one evening. The vacuum-formed cowl fits perfectly, and when the model is covered and painted, a beautiful set of full-color mylar decals will add the final touch.

A .19- to .40-size two-stroke engine, or even a .46 four-cycle, will make this airplane come alive. These craft can be very competitive in scale contests.

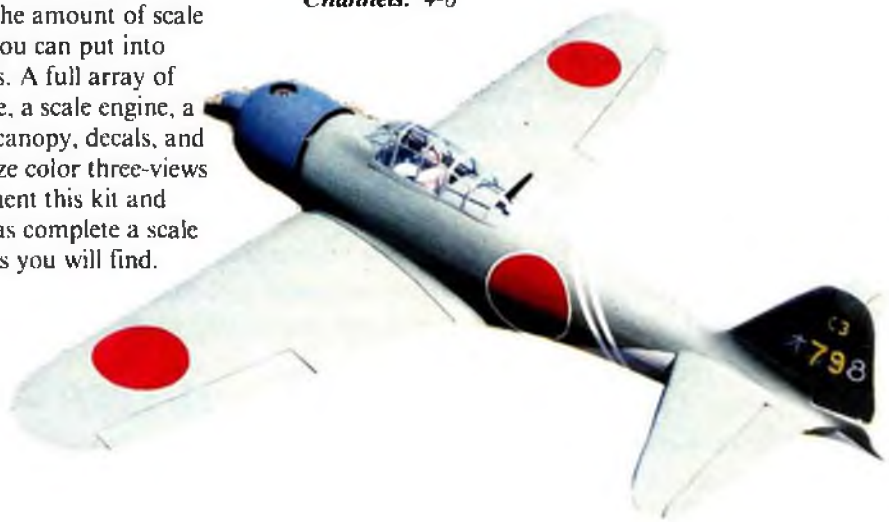
Royal A6M5 Zero

Samurai flier!

Type: *Sport scale*
Wingspan: *62⅝ inches*
Wing Area: *706 inches*
Weight: *8 pounds*
Engine: *.60*
Channels: *4-6*

Royal Products (790 W. Tennessee Ave., Denver, CO 80223) has been importing some of the best scale kits going for a long, long time. When they introduced this line, the kits quickly became contest winners due to Royal's attention to scale outline. Best of all is their ability to perform. In the hands of a competent pilot, no quarter is given in the points battle for realism in flight.

Entirely built from balsa and plywood, a light, strong framework is the basis for mind-boggling surface detail, if you choose. There is no limit to the amount of scale fidelity you can put into these kits. A full array of hardware, a scale engine, a molded canopy, decals, and poster-size color three-views complement this kit and make it as complete a scale project as you will find.



Model Tech Piper Cherokee

A sport scale winner!

Type: *Sport scale*
Wingspan: *49 inches*
Wing Area: *433 square inches*
Weight: *3½ pounds*
Engine: *O.S. 28FSR*
Channels: *4*

The Model Tech line of pre-built models distributed by World Engines (8960 Rossash Ave., Cincinnati, OH 45236) represents a major contribution to the modeler who wants something to fly but has little time to build. Not a "ready-to-fly" model but rather a pre-constructed balsa model ready to cover is the proper description of the kit. It has a beautifully done balsa fuselage and balsa sheeted wings. The tail group is pre-shaped balsa and is sanded to finishing texture.

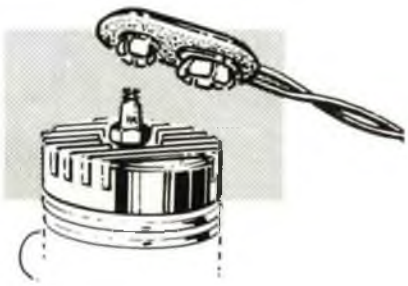
A sport flier's delight, the Model Tech Cherokee is a ball in the hands of experts and beginners alike.

50 Great Modeling Tips

by JIM NEWMAN

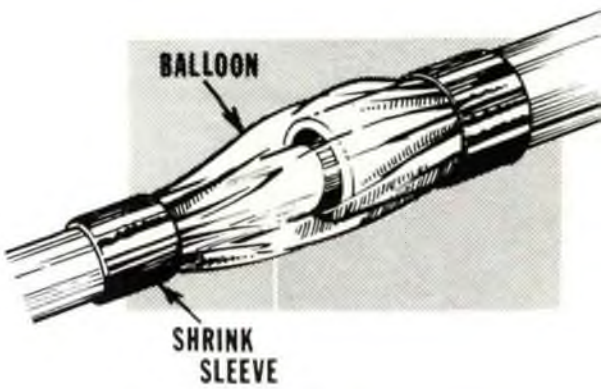
The "Hints & Kinks" section of *Model Airplane News* has always been a very popular feature among modelers. The tips came from you, the guy who tried them and wanted to share his findings with the rest of the world. And, and a result, virtually thousands of modelers have been helped in their modeling activities.

Presented here are 50 of the most useful tips featured for the past 10 years, and we hope that by presenting these we have passed on something that might aid in the hobby. DBS



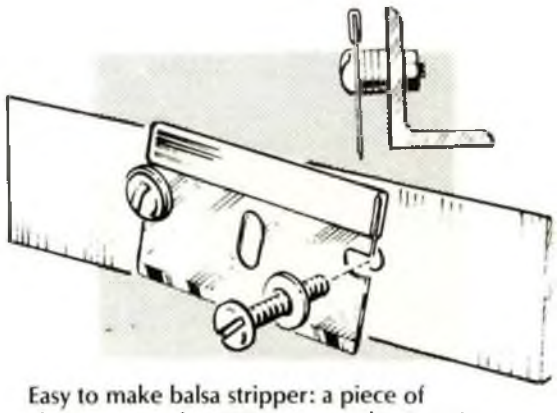
Nine-volt battery snaps will fit glowplug. Press other snap against cylinder head to complete the circuit.
Andy Strong, Concord, California

Convincing instruments. Cut out dials from magazine ads. Use brass tube punches.
Ron Wilson



Boater's waterproof pushrod exit. Neck of toy balloon slid over nyrod. Seal ends with heat-shrink tube. *E.W. Hailey Jr., Nashville, Tennessee*

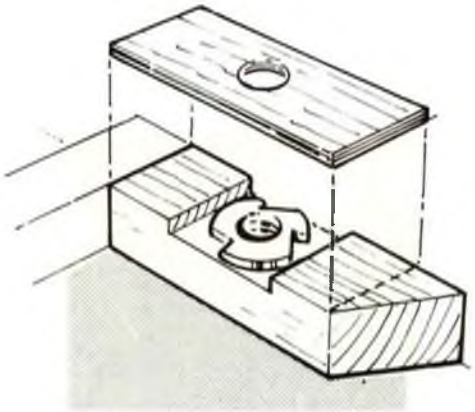
Open gimbal transmitter sticks quickly accumulate grass, dirt, etc. Foam rubber dust excluders can be cut from soft foam rubber.
Jose Vargas, La Paz, Bolivia



Easy to make balsa stripper: a piece of aluminum angle, 4-40 screws and nuts, tube spacers to give desired widths.
Miles Chappell, Santa Clara, California

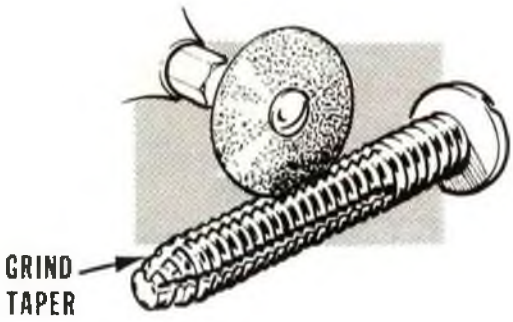
Glow battery in metal-cased flashlight. Solder and tape one lead to case and other to bulb contact. On/Off switch is great safety feature, preventing dangerous short circuits of Cox-style, exposed glow clip.

Bob Courtney, Whittier, California



Blind nuts have been known to fall out inside the structure. Recess as shown, then glue 1/16-inch ply plate over the top to capture the nut. Sketch shows wing strut attachment.

Herb Collins, Hewitt, New Jersey

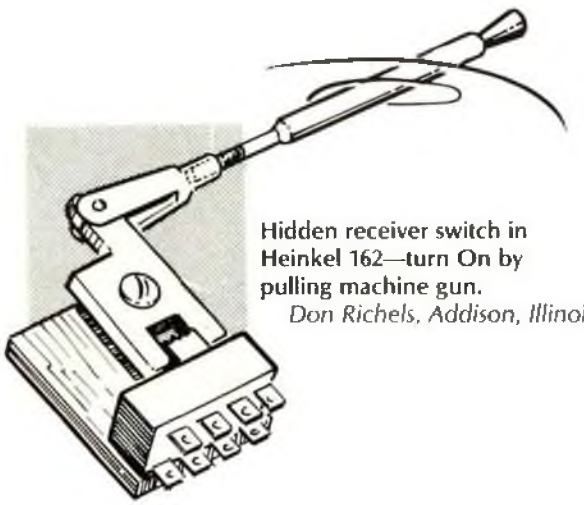


Grind slots in screw. Makes good tap for maple wing mount blocks.

Col. Richard Uppstrom, Oxen Hill, Maryland

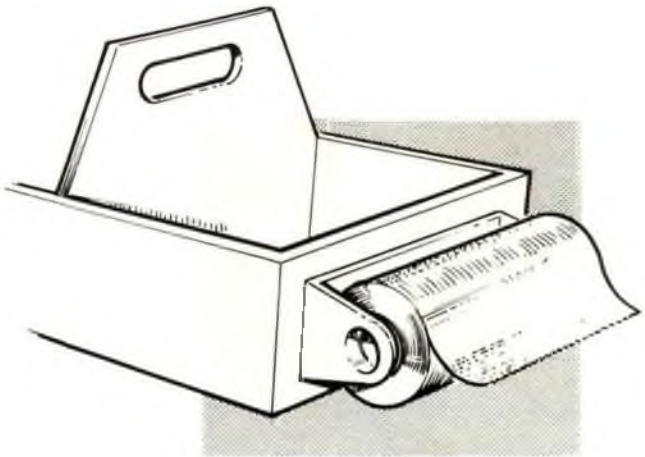
Pull old nylon hose over balsa fuselages then dope in place. Adds lots of strength and gives smooth, seam-free covering.

Bill Billings, Lima, Ohio



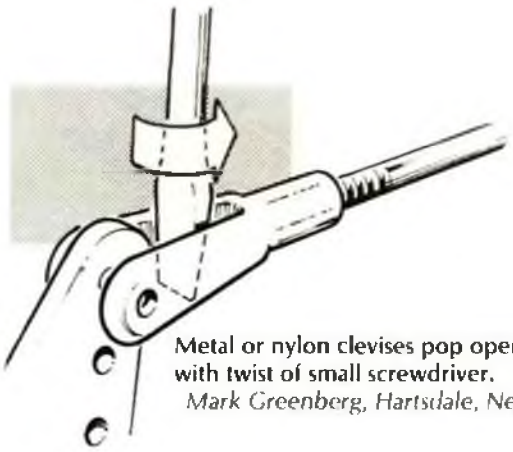
Hidden receiver switch in Heinkel 162—turn On by pulling machine gun.

Don Richels, Addison, Illinois

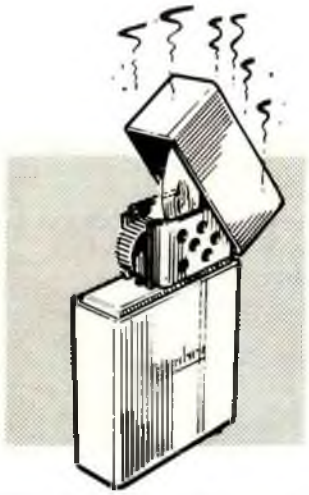


Mount cheap paper towel holder on end of field box. *Tim Pregler, Jenks, Oklahoma*

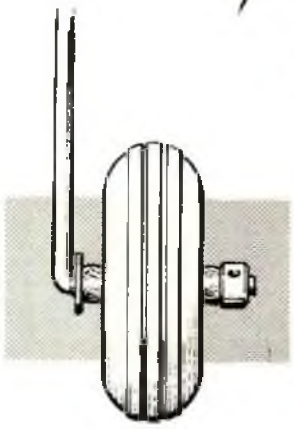
50 Great Modeling Tips



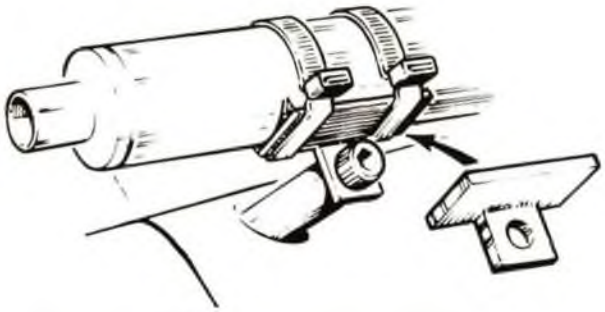
Metal or nylon clevises pop open easily with twist of small screwdriver.
Mark Greenberg, Hartsdale, New York



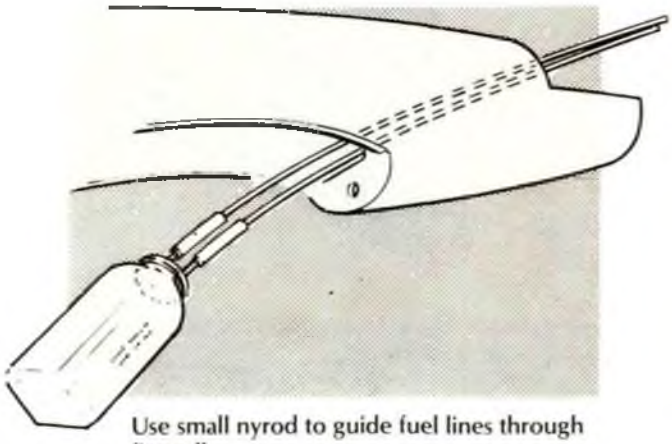
Heated cigarette lighter cap is a portable MonoKote iron for field repairs.
John Feist, Tallmadge, Ohio



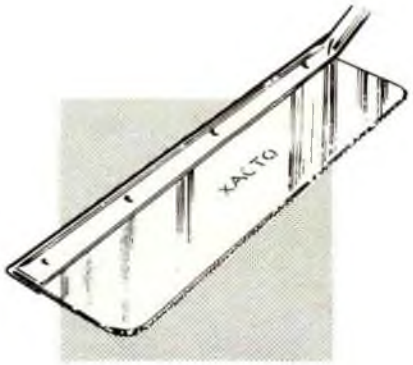
Nosewheel friction brake is two slices of surgical rubber tube; one each side of wheel. Move collar in or out to adjust amount of drag.
Ken Kurz, Savoy, Illinois



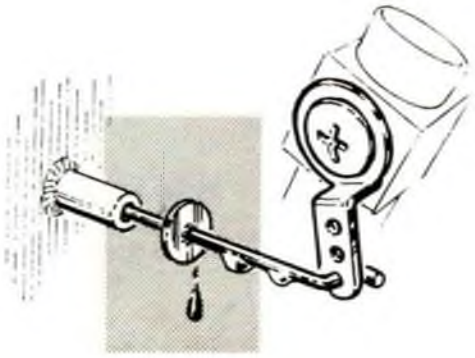
Use a plate with straps around tuned pipe held in place with long wing hold-down bolt. *Dave Brown*



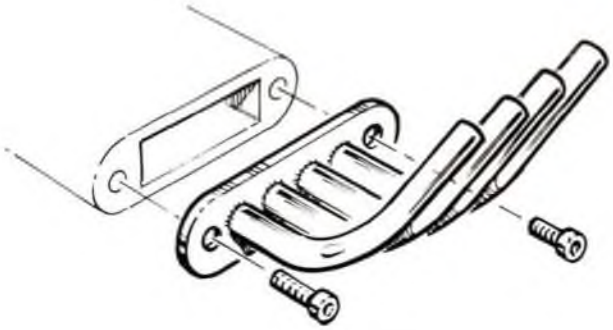
Use small nyrod to guide fuel lines through firewall.
Dan Santich, Danbury, Connecticut



Grind off and sharpen corners of razor saws to eliminate sticking and gouging.
Dan Mansolino, New York, New York

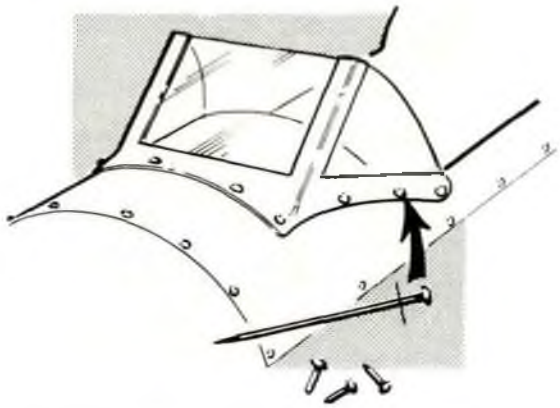


Large washer soldered to throttle pushrod prevents those oil droplets from working back along rod to the throttle servo.
Calvin Orr, Westchester, California



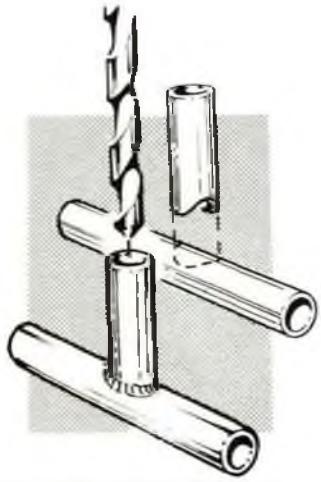
Custom headers easily bent from soft copper tubing. Silver-solder into 1/32-inch brass plate. Tubing easily softened—heat to cherry red, and immediately drop into cold water.

Ron Chupick, Warren, Michigan



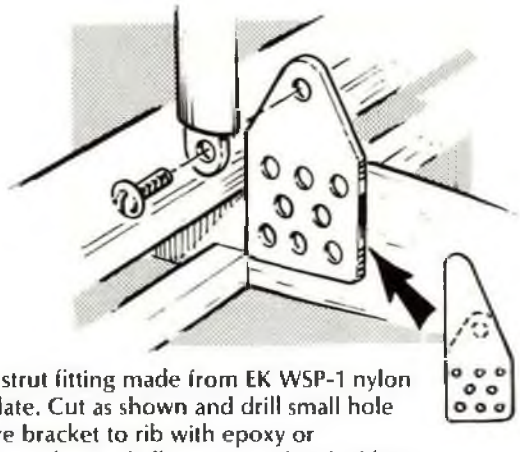
Cut short pins resemble rivets or screws on larger models. A tiny spot of epoxy in the hole secures them. Hardware store 1/8-inch long escutcheon pins work fine too.

Gary Olivi, Memphis, Tennessee



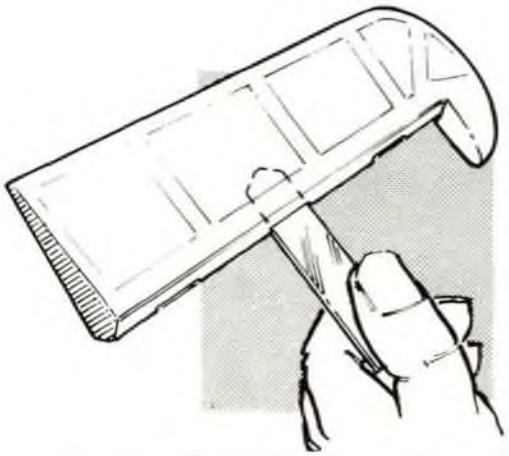
Easy T! File brass tube to shape, clean and solder. Drill out after soldering. Be sure to clean out metal chips before use.

Ron Booth, Gustine, California

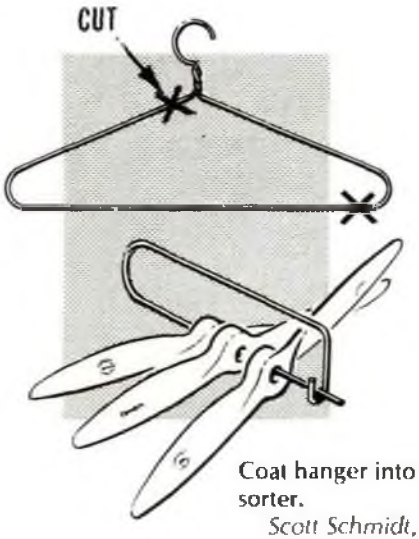


Sturdy wing strut fitting made from EK WSP-1 nylon Wing Skid Plate. Cut as shown and drill small hole at top. Secure bracket to rib with epoxy or cyanoacrylate and microballoons. Strut fixed with 2-56 screw threaded into the nylon.

Ken Wardrip, San Jose, California



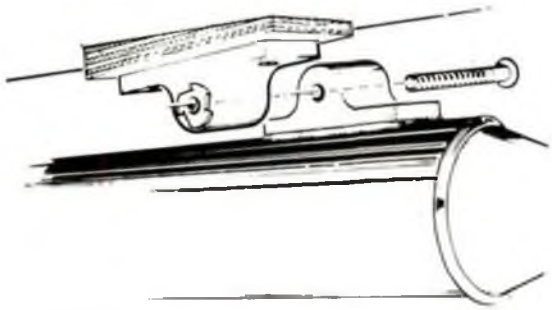
To paint control surfaces, insert strip metal handles into hinge slots. Extra strips could form legs for part to stand on while paint dries. *Dave Ettinger, Florissant, Missouri*



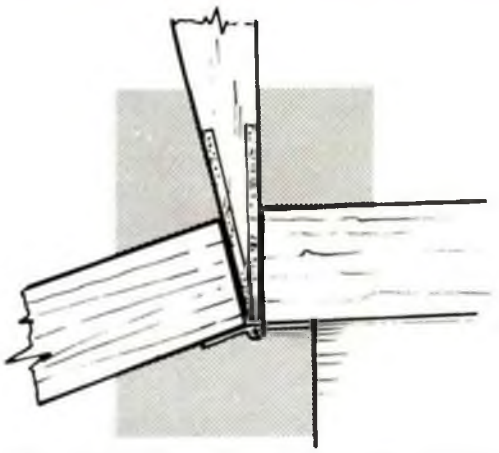
Coat hanger into prop sorter.

Scott Schmidt, Laurel, Maryland

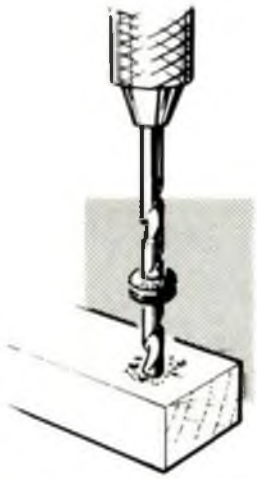
50 Great Modeling Tips



Methods of mounting tuned pipe to fuselage. Uses Goldberg nose gear blocks and captive nut. *Jeff Tracy, Australia*

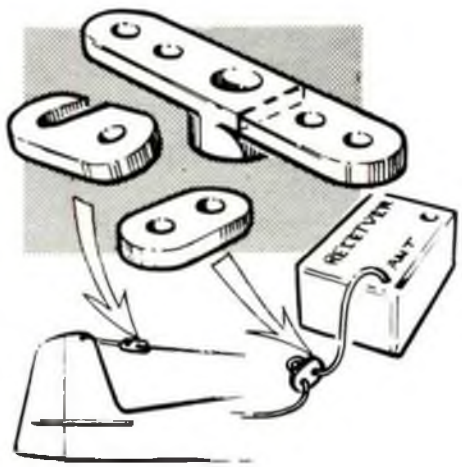


Drop-leaf table used carefully to clamp built-up trailing edges while glue sets. Insures nice straight trailing edges. Protect table with plastic, and prop up the drop leaf with a stick. *Richard Berard, Lake Park, Georgia*



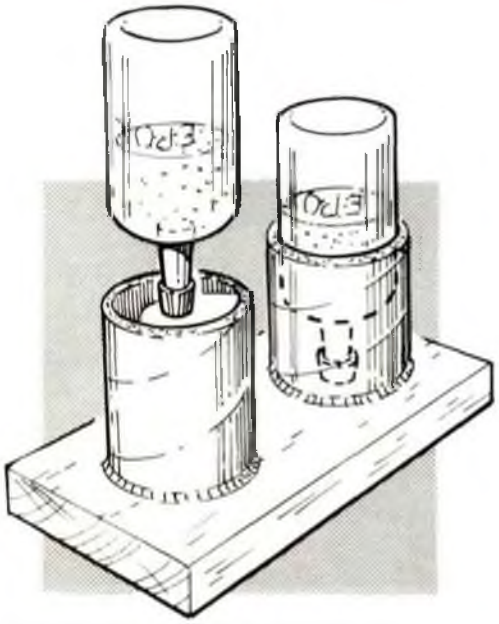
A rubber grommet on a drill is a useful depth indicator. *Jeff Hough, Crete, Nebraska*

Heat knife blade on MonoKote iron, then use blade to seal down covering in awkward-to-reach places. *Jim Meador, Oklahoma City, Oklahoma*



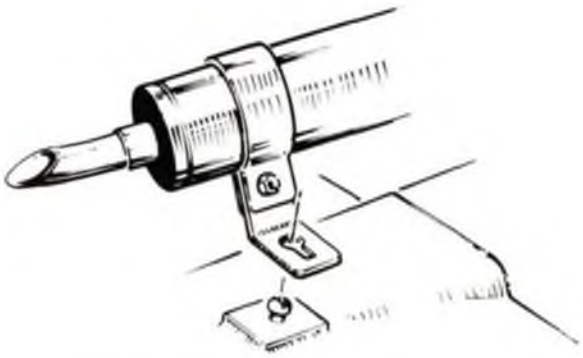
Use those broken or trimmed off servo arms for strain relief cleats or antenna to rubber band anchors. *Paul O'Dell, Calumet Park, Illinois*

Attaching plastic motor mounts to wing instead of fuselage allows side thrust to be adjusted readily, by slackening the two fixing screws. *Greg Peattie, Scarborough, Ontario*

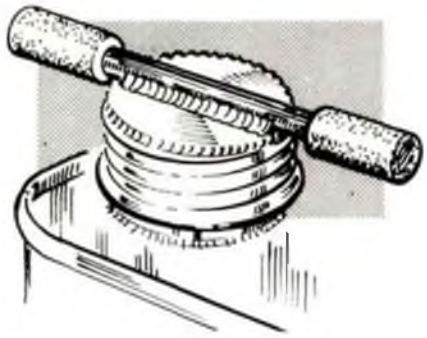


Don't waste time waiting for epoxy to reach nozzles. Set bottles inverted in this handy holder made from paper towel card tubes. *Scott Suhr, Angoura, Canada*

Extended drills reach normally inaccessible places. Silver solder drill into appropriate-size brass tubing.
Jim De Young, S. Holland, Illinois



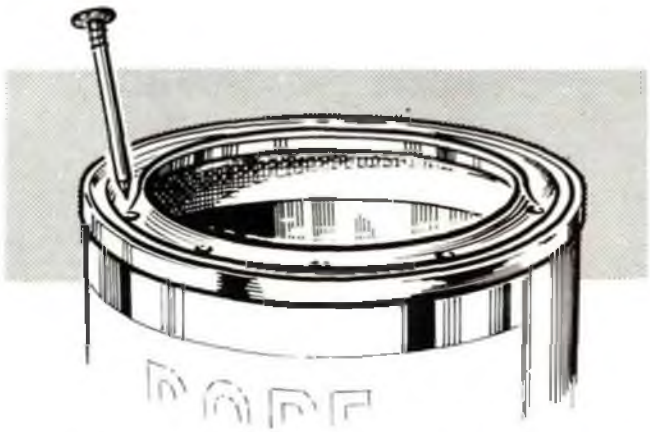
This modeler uses a keyhole slot in clamp. Plywood block secured to belly pan is base for bracket.
Tom Prosser, Australia



Solder 3-inch nail to spare fuel can top. Transfer top to new can to be screwed down tight. T-bar makes it easy to unscrew now! Fuel tubing protects fingers. *Frank Scott, Dayton, Ohio*

Need a smaller soldering iron tip? Bind a piece of #14 solid copper wire to existing tip with #22 copper wire. Flow solder onto the wrapping for better heat transfer.
Robert Charron, Lynn, Massachusetts

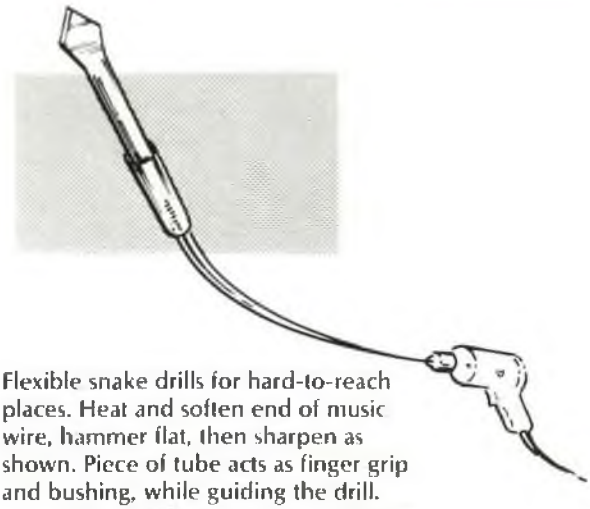
If transparent type fuel tube is difficult to slip over tank tubes, heat and stretch end with pencil or similar shape object but take care not to burn tube.
Joe Neglia Jr., Elmhurst, New York



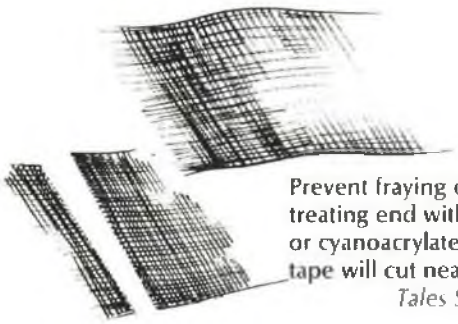
Punch holes around lid of dope can to allow overspill to drain back into can. Also reduces splatter when resealing.
Dave Ponsler, Anderson, Indiana

50 Great Modeling Tips

Use aluminum angle stock bracket mounted on side of fuselage with holes for adjusting the length of a tuned pipe.
Benito Bertolani, Italy



Flexible snake drills for hard-to-reach places. Heat and soften end of music wire, hammer flat, then sharpen as shown. Piece of tube acts as finger grip and bushing, while guiding the drill.
John Cabigas, San Jose, California

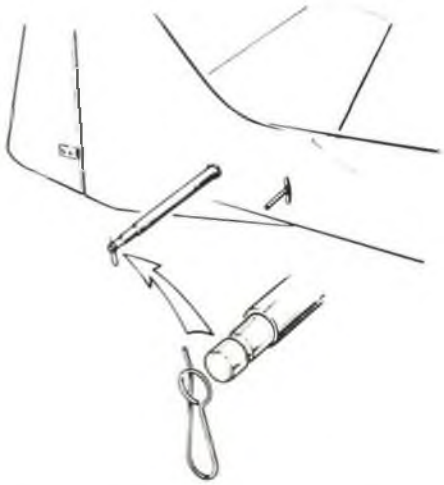


Prevent fraying of glass tape by treating end with thin clear dope or cyanoacrylate. When dry, the tape will cut neat and clean.
Tales Sarmento Munhoz, Londrina, Brazil

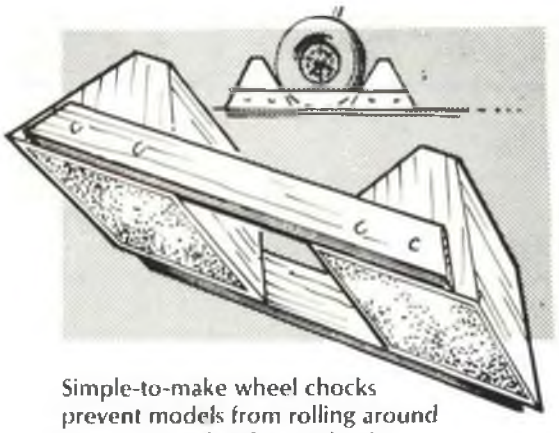
Aluminum cowl from round bottom "pop" can. Cut with Dremel abrasive wheel.
Col. H.H. Rice, Staten Island, New York

Here's an unusual tuned pipe exit on modeler's Bootlegger design. Design uses an OPS rear exhaust engine for power.
Steve Helms, California

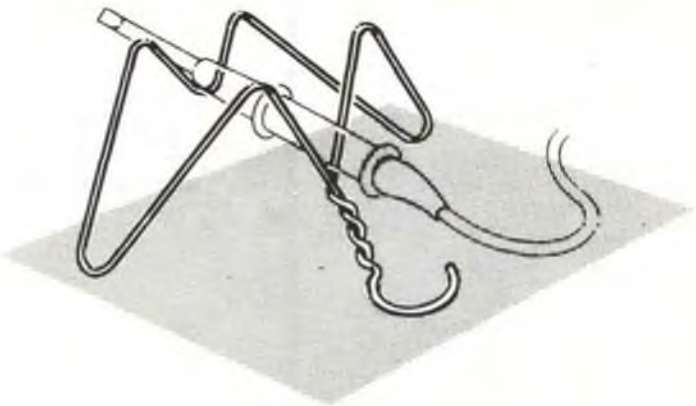
"Riveted" windshield frames—any color you like! Use Rotex or Dymo tape; just keep printing periods. Cut to desired width and press in place. Seal edges against fuel.
Louis Librandi III, Harrisburg, Pennsylvania



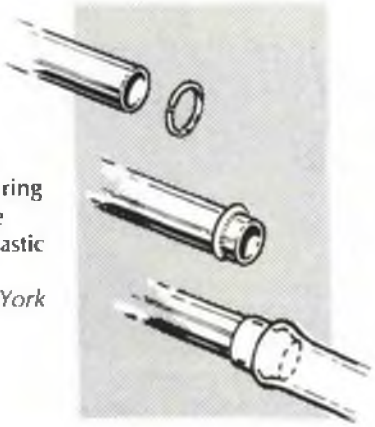
Modelers' Flame design uses a spring clip to hold the flying stab in place. The forward pin is to actuate the stab.
Tom Prosser, Australia



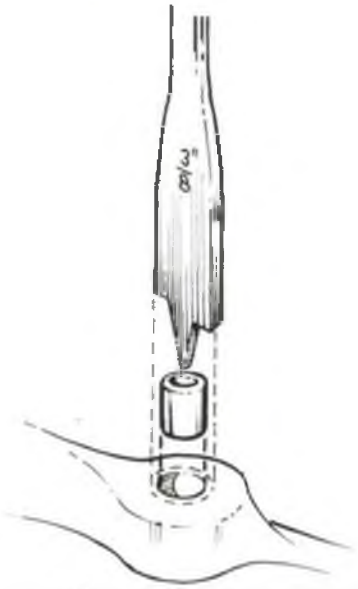
Simple-to-make wheel chocks prevent models from rolling around in wagons and pickups. Chocks don't slide on floor rug with coarse sandpaper on bottom.
Jack Burns, Oak Park, Illinois



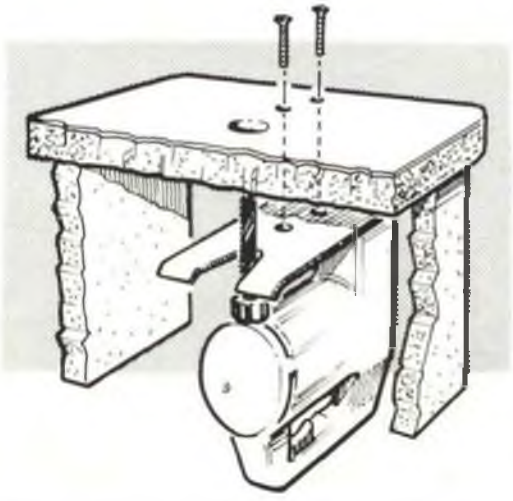
Soldering iron rest formed in a jiffy from humble coat hanger. *John Parttimaa, Weston, Ontario*



Positive grip for fuel lines onto brass tubes. Solder a ring of copper wire around the tube before putting the plastic fuel line on.
Allan Kerr, Avon, New York



Some ¼-inch o.d. tubing epoxied to tang of ⅛-inch diameter speed bit will act as pilot guide while reaming out propellers to suit K&B .40s.
Jerry Miller Kinkler
Kersey, Pennsylvania



No bandsaw? Attach jigsaw under small formica-topped table using countersunk screws. See your Formica counter-top dealer for scrap sink cutout. *Don Olson, Metairie, Louisiana*

Prevent fuel running back along nyrod and flooding throttle servo. Pass rods through short length of black rubber fuel tube to act as an effective wiper.
Robert Barto, Pottsville, Pennsylvania

PATTERN MATTERS

by DEAN KOGER

THE BIG news, in case you haven't already heard, is that the Las Vegas Tournament of Champions is past history. Circus Circus Hotel Casino, the sponsor of this event, announced on September 11 that they were permanently discontinuing the TOC. Perhaps no other modeling event has been so influential in setting trends as the TOC. It was certainly a major factor in the introduction of FAI Turnaround pattern, and it played a big role in the giant-scale revolution by showing that large models really could fly well. The TOC's association with full-scale pilots and judges gave modelers a large degree of credibility by showing that we all share the same goals and problems. No matter how much we hate to see this event end, we all owe a big thanks to Bill Bennett and Circus Circus for putting on the TOC since 1974.

Plans for the TOC-winning Reed Falcon flown by Steve Rojecki are now available. See text.

Speaking of the TOC, plans for the Reed-Falcon biplane flown to first place by Steve Rojecki in the last TOC are now available from the designer and builder, Ken Bonnema*. The 3-sheet set of plans costs $33, and fiberglass parts and the canopy will be available from Aero Composites*. Addresses are given at the end of this article.

U.S. at the World Champs

The recently completed World Championships mark the first time in a great many years that the U.S. did not win the team championship. With individual placings of eighth (Brown), ninth (Frackowiak), and eleventh (Cunningham), the U.S. team had to settle for third place. Although we all would have liked to have seen another first place, we need to remember the competition is tough and getting tougher, so congratulations to our team for giving it their best shot.

It appears that the original intentions of the designers of the Turnaround pattern are not what has evolved. We were told that one of the primary drives of going to the Turnaround pattern was to reduce the noise footprint, presumably an important consideration for European flying sites. Yet, the designs used by the top finishers at the World Championships don't seem to be significantly different than traditional pattern planes. The successful flying style seems to be fast airplanes flown quite far out, large maneuvers, and a resulting large noise footprint. One of the attractive points that Turnaround seemed to initially offer was that new and varied designs would be used.

Actually, I feel that with the introduction of Turnaround, the judges were at somewhat of a loss as to how to judge it. The U.S. approach favored slower, closer flying, while the Europeans stayed with fast two-cycle planes flying farther out. I think the best way to approach this is to start judging maneuvers rather than

flying styles. It really shouldn't matter if your plane is fast or slow, does large or small maneuvers, is a two-cycle or four-cycle, etc.

On the technical side, quite a few fliers have been running their Futaba PCMs on 5-cell (6-volt) receiver battery packs. It seems to improve servo speed, power, and centering, plus improves the receiver voltage regulation. I believe Futaba carries a 5-cell 500-mAh pack, or you could easily add a cell to an existing pack. However, if you do this a couple of warnings are in order. An expanded scale voltmeter to check battery condition will no longer work (ditto for battery cyclers), and current drain will probably go up a little so you might not get as many flights on a charge. Obviously a little caution is in order if you want to try this.

Pattern Organization

An organization which I will occasionally put in a plug for is the National Society of Radio Controlled Aerobatics. The NSRCA is our only National pattern organization and can only be really effective if we all support it by joining. Dues are $10 per year. The newsletter is well worth the cost of the dues and is probably your quickest source of late-breaking news. Membership applications should be sent to Suzi Stream*.

Visit to China

China has invited the U.S. to send a team to participate in their Nationals during late October. Dave Brown, Chip Hyde, Don Lowe, Steve Rojecki, Dave Wilson, and myself will be going, along with several judges and officials. I'll have a complete report in a future issue.

Dean Koger, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829.

**The following are the addresses of the persons and company mentioned in this article:*

Ken Bonnema, 5409 Powell Rd., Huber Heights, OH 45424.

Aero Composites, 411 Townsend Place, Dayton, OH 45431; 513-849-0244.

Suzi Stream, NSRCA, 3723 Snowden Ave., Long Beach, CA 90808. ■

by BILL FORREY

Western States Soaring Champs

ON JUNE 22, with the help of co-CD Kevin Webb and two host clubs, the Sierra Foothill R/C Fliers and the Modesto R/C Club, CD Rich Hansen put together the Western United States R/C Soaring Championships. When I arrived at the field, the wind was blowing 15 mph with gusts up to 20 mph, and the famous San Joaquin/Sacramento Valley 100° heat was nowhere to be found. We met Kevin Webb and were given a briefing on the layout of the field as well as a weather prediction of decreased wind at dusk.

By 9:00 a.m. the contest was underway with the first round scheduled to fly a 5-minute precision duration with 20-point, in-or-out landing in a 25-foot circle. All other flights after the first round were to be 7-minute precision duration with the same landing bonus.

Tony Palethorpe and Prophet from Davey Systems Corp.

From the start it looked like there was going to be a high number of DNFs (did not finish) because there were a lot of guys who folded wings on launch. By 11:00 a.m. the wind measured 18 mph with gusts up to 22 mph. This, combined with stronger-than-average winches, was the cause of the higher-than-normal failure rate on tow.

Present in number were the German thermal designs such as the Multiplex Fiesta SF, the Rowing Merlin, and the Eismann Camaro. It took awhile for these designs to catch on, but they are gaining popularity at a steady pace, especially with the slope flying fraternity. Maneuverability, stability, good L/D, and sharp looks are a few of these gliders' strong points.

As has been the case for years, the most popular design seen at this event was the Sagitta by Airtronics. Dollar-for-dollar, it's still one of the best sailplanes you can buy. Stock versions and flat-wing versions were present, and, as everyone knows, they were competitive.

Other competitive ships of the manufactured variety were Larry Jolly Model Products Pantera, Pierce Aero Paragons (some highly modified and thinned fuselages and reduced camber airfoils) and Geminis, Craft-Air Sailairs, Top Flite Antares, and Airtronics Sagitta XC.

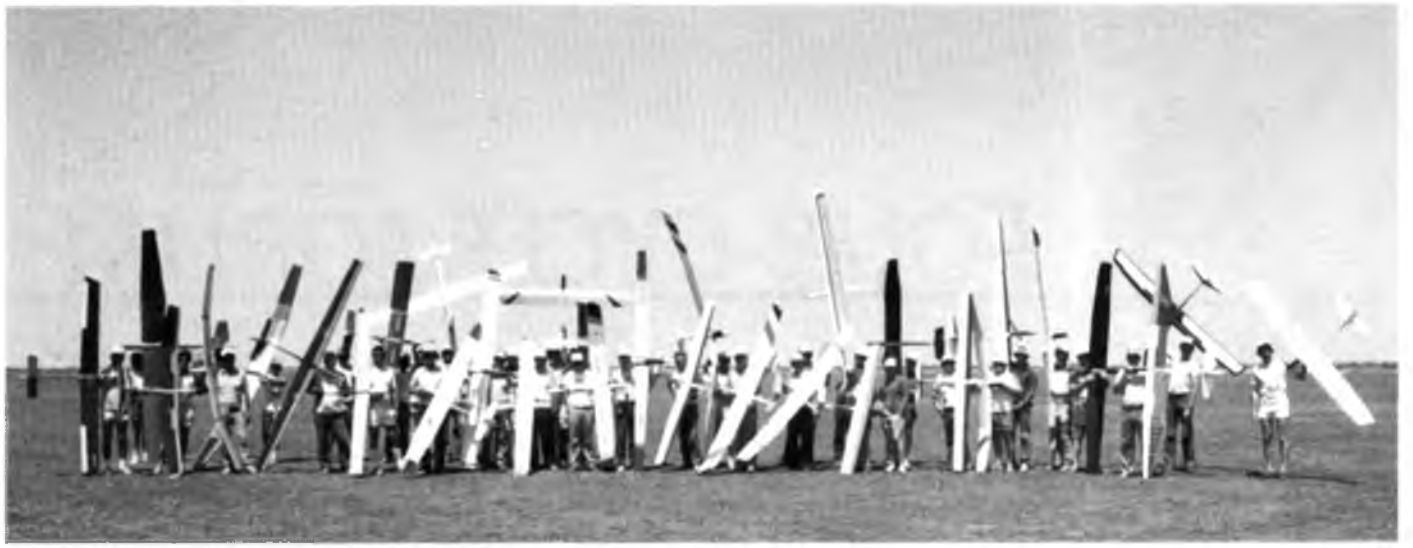
Jerry Arana flew an original design called the Chameleon. This design reminded me of the Bird of Time by Dave Thornberg, only it was shorter in span (about 100 inches), and it lacked the Zaic-like bumps in the trailing edge. It is a fairly conventional polyhedral design with all-flying stab, and a Synergy-type flap/spoiler arrangement.

On Sunday the winds died down to a gentle breeze and the contest turned into a "for-real" thermal event. Pilots were actually making the 7-minute maxes! It was too bad both days couldn't have been so nice.

In the end, raffle prizes were given out, and hand-made wire trophies were awarded, along with cash prizes.

Rich Hansen's goals were met as far as the organization of the contest went. Overall, it was a big success. I'm looking forward to next year's Western States Championships when (hopefully) we won't have such freaky wind conditions.

See ya next year at the "Champs." ■



An after-contest shot, this photo represents only half of those who showed up for the contest.

Clockwise from top left: Chris Pratt flew German Multiplex Fiesta SF; Jim Leuken had his Larry Jolly Pantera; rare photo of Bill Forrey with a borrowed airplane; Tony Palethorpe's winches made from SFVSF plans; Bill Merwin, host and owner of contest site; Joe Wurtz used cut-up plastic silverware tray for landing skid.

← Left, top: Kirby Parker, third place with Dodgson Windsong. Middle: George Ritter claims better handling and flatter glide with winglets on his unlimited. Bottom: Joe Wurtz took second with his Pierce Arrow Gemini MTS.

FOUR-CYCLE FORUM

by ELOY MAREZ

I MENTIONED the Laser 61 from A.G.C. Engineering Co.* briefly in the May issue. This is an engine not found in great quantities in this country, but I find it interesting to read about modeling products so I can compare them to those I know more about. I've heard from a couple of happy Laser owners and I want to share what they have to say about it:

The first is from Frank Skilbeck of Aberdeen, Scotland, who wrote from Houston, Texas:

"I'm presently on a business trip in the USA, picked up a copy of the May *M.A.N.*, and noted your report on the Laser 61 engine. I've had one of these engines since Christmas and would like to advise as follows:

"The engine, which weighs about 26 ounces, is machined entirely from solid stock on CNC machines and is designed to operate on straight FAI fuel (i.e., 80% methanol, 20% castor). The power figures you quote are from an independent test in *Radio Control Models & Electronics*, the December '84 issue. The carb used is a Super-Tigre unit and standard glowplugs can be used, though I run mine on an old O.S. four-stroker plug from my O.S. FS40.

"One unique feature is the piston, which is a cotton reel shape to reduce friction and weight.

"The breathing on these engines is controlled by computer-designed constant acceleration cams. The wedge-shaped combustion chamber has been found to prevent detonation and give smooth running characteristics.

"I've been using my engine for two months, but due to the weather I've only put about three hours on it. It is mounted in a 7½-pound, 56-inch sport biplane and, by using a 13x6 prop, it will nearly climb vertically. Tickover is extremely reliable and pick-up is excellent, which is even more pleasing when you consider that due to the aircraft layout, the tank is 2 inches below the carb and no pressure feed is used. I use straight 80/20 fuel and fuel consumption is well in excess of 10 minutes on 4 ounces.

"The engine has been received extremely well by the British modeling press and crops up in many review models.

"The engines are obtained directly from the factory and because of high demand there is a waiting list. The price of these engines is 120 Pounds (U.S. $150) for a .61, 130 Pounds (U.S. $160) for a .75, 150 Pounds (U.S. $190) for a .90, and 250 Pounds (U.S. $315) for a 1.20 V-Twin. These prices include a 15% tax.

"If you require any further details on the engine, call Niel Tidey, the designer, at 0525-210596 in the United Kingdom. Please note that his telephone number appears in the ads in the modeling press.

"All in all, the Laser is a very pleasant engine with no bad habits, and I'm very pleased with it. I'm not a four-stroke expert however, as I only have one other, an O.S. FS40 which I've had for 20 months. The Laser will eventually be installed in a 58-inch span Complete-A-Pac Bucker Jungmeister I'm building.

"I hope the above information is useful. I always enjoy reading *M.A.N.* when I'm in the States—particularly your column."

The other Laser owner I heard from is C.A. Lange of Albuquerque, New Mexico:

"I read your article on the English Laser in the May *M.A.N.* I don't have much experience in model engines, but I do own a Laser 61. I use FAI (0% nitro) fuel and at this time a 13x5 prop. I get an average engine run of 25 minutes on approximately 11 ounces of fuel."

I'd like to thank both of these gentlemen for sharing their experiences with the Laser engine. C.A. Lange's fuel data is in answer to my question about the Laser's fuel consumption.

One of the most beautiful four-cycle engines available is the 5-cylinder radial from Forest Edwards. This engine has been extensively tested and flown.

Frank's letter, while perfectly clear and informative, does require one bit of translation. For those of you who have not had the pleasure of visiting the U.K. and have not been exposed to their quaint way of talking, "tickover" means "idle." Now that I remember, a couple of my friends over there comment about how funny *we* talk!

In addition, Frank mentions a number of models of the Laser of which I was unaware, plus the fact that you have to

take a number in order to get one of these beauties. That in itself says a lot, as we modelers are not known for our patience, especially when a particular item is really outstanding. The address of the manufacturer is included at the end of the article for those of you who'd like to inquire further.

Worth some further discussion is the statement that the engine is produced entirely from solid stock on "CNC" machines. The initials stand for "Computer Numerical Control" and it is a system by which metal working machinery, a lathe or a mill for example, can be automatically controlled to produce extremely high-quality machined parts. It includes programming equipment that is constantly getting easier to understand and to use; the mechanical means by which to select and apply the proper cutting tool; and accurate measurement capabilities of the part being worked. It can also compensate for cutting tool wear, and for whip of long pieces of material. Once the initial design of the piece has been decided and the machine is properly programmed, it will produce identical pieces one after another. The price? Don't ask; I'm sure you'll know without my telling you that it is outside the range of home workshop equipment!

Worthy of further mention is the use of the "cotton reel" shaped piston, another unique feature of the Laser engine. In this country we might refer to it as the "thread spool" shaped piston. The piston is deeply undercut along its sides, with only the top ring-equipped, and a lip across the bottom actually making contact with the cylinder wall. The advantages claimed are two-fold: less friction and less weight. The reason for the first is obvious; for the second, less weight contributes to a smoother and faster running engine. In this case, the piston is only 0.7 inch high, and is fitted with a single ring, also special in that it is only .042-inch thick. This cancels out owner

(Continued on page 112)

How to Get The Most From Electrics

A little effort will get big results.

by HAL "PAPPY" deBOLT

I'VE BEEN studying electrics for some time now and feel that much good can be accomplished through increased propeller development. I've been trying out some of my ideas on this subject and the results of my efforts so far have been very dramatic, yet they seem far from the ultimate. What I'll reveal here is my basic thinking and how you too can gain these desirable advantages simply. I've heard of others doing some wonderful work with specially-made propellers for electric power, but my efforts have been with readily available "stock" props.

My simple evaluation with a test model should indicate the potential that can be had with reworked props. The first flight with a stock Zinger 11x7½ prop gained about 100 feet altitude and showed 5½ minutes on the watch, most of the flight being under sustained power.

On the second flight I used an 11x7 Rev-Up stock prop which had some undercamber added to its airfoil. This flight reached hi-start height while using up the battery charge. The flight time was over 8 minutes.

The last flight was with a 12x9 reworked prop which I'll be telling you more about. The first portion of this flight easily reached winch height in about 2 minutes when the power was shut off. After about 8 minutes the model was flown down to launch height where the motor was turned back on. Then the first portion of the flight was easily repeated with even some power left over. This was certainly a great deal superior to the first or even the second flight. It was also a great reward for the effort involved.

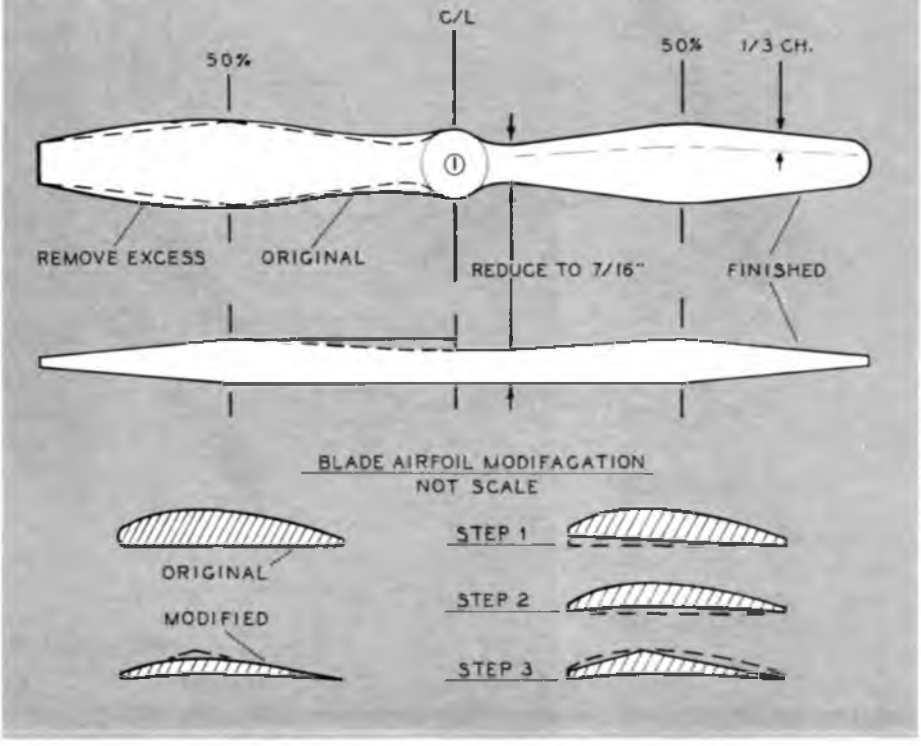
The test model I used is far from the ultimate in weight, yet it climbs well. It's an electric-powered King Condor ARF, powered with an Astro 075 Ferrite motor using a 2.5:1 belt drive and seven 1,200 mA cells. With all standard components, the flying weight is 54 ounces.

These simple tests verified my initial reasoning better than anything else could have done. Let's look into it a bit. First off, the Zinger 11x7½ is an excellent propeller, designed to be driven by over 1 hp and to operate in the 12,000 rpm range, far from the 5,000 rpm available with the electric motor. The Rev-Up 11x7 would not require as much horsepower due to its thinner airfoil, and its wider blades allow it to be used at lower rpm. With the added undercamber it might even be suitable in the 8,000 rpm range. The test results indicate that the Rev-Up is a step in the right direction, even though its efficiency would come at an rpm over 50% greater than what is available.

The reworked prop, which tested best, is the closest I could come to what I envision as the ultimate for this power supply. I should add that this prop in its reworked form probably would be a "dog" on the gas engine it was intended for in stock form. The changes I made to suit electric needs would load the engine so much that it couldn't reach the required rpm for maximum horsepower. One of the advantages of electric motors is that they do not readily "load down" as gas engines do. Instead, they simply draw more current (more power) to maintain the design rpm. There is some reduction under load but nothing like that seen with engines. This fact is useful to remember when searching for ways to get more thrust from electric propellers. It opens up different avenues of design.

For simplicity and to be of benefit to more modelers, I wanted to start with commercially available props and rework them. If you're looking for the ultimate in props, current findings indicate a special type of propeller developed for this special use. This particular reworked test prop has a 12-inch diameter and an 8- to 10-inch pitch, with a thin, wide airfoil that had considerable undercamber. I paid careful attention to drag

End view of reworked prop.



We want to gain greater thrust by using "more" prop.

reduction as I've found beneficial with gas props. I reworked this example from a 12x8 Y&O prop, which provides considerable meat to work with. I've also had similar results with a Top Flite 12x8, a Zinger 12x9, and others.

Now for some simple reasoning. First, understand that the most efficient propeller is tailored to the model size and power supply. In this case, I used a large model that had about 5,000 usable rpm, governed by the motor's ability. I also knew that I would probably be flying at about 40 mph. The large model dictates as much diameter as possible (choose 12 inches as a minimum) and the flying speed dictates the pitch. Forty mph with 5,000 rpm equates to a 10-inch pitch. Our primary interest is to develop the maximum amount of thrust possible in flight, which equates to propeller "lift." Lift is the result of the airfoil used and blade width. We have a fixed diameter and pitch. This boils down to a 12x10 prop with as much lift crammed into a motor that can turn 5,000 rpm. We also should do everything possible to reduce drag. We can replace each increment of drag reduction with more lift, a step toward the desired thrust.

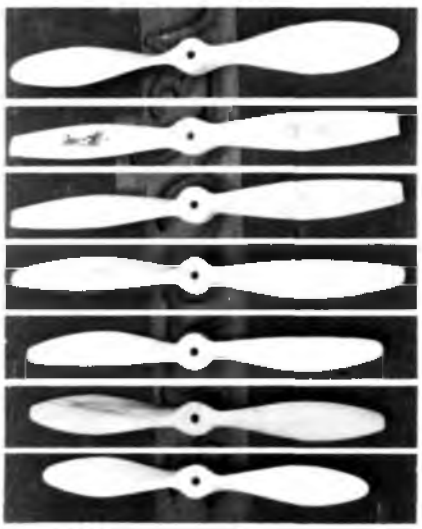
We are really in new territory as far as design goes, so where can we look for guidance? Obviously gas props show us the way *not* to go, but how about rubber-power props? We know that a high performance rubber prop can easily turn over 1,000 rpm. That is a lot closer to 5,000 rpm than 12,000 would be. Also the rubber prop probably has double the pitch we need. So how about a rubber prop design in the electric motor pitch range? The rubber design is certainly highly developed. I've heard of others doing successful work with similar propeller designs.

So that you can see what can be accomplished, I'll describe the method used to produce my 12x9 test prop. The first step is to find the largest, in all respects, 12-inch diameter by 8- to 10-inch pitch gas prop available. The best I found was a Y&O brand, but they seemed scarce. I've heard that Rev-Up produces some wide blades in the desired range, but I haven't found one. I'm seeing some good results with reworked Top Flites and Zingers, which are both readily available. The brand is not important, anything you do will probably be an improvement at this stage of the game.

I produced two similar props, one folding and the other not. Tests indicate the folder to be a bit superior, both under power and in glide. Probably the power portion is due to the use of a spinner which the other did not have. The gain in the glide should be apparent; such a large prop, stationary or free-wheeling, is nothing but drag.

The stock prop you find will be for a gas engine and probably won't have a 10-inch pitch. There will be three major considerations in reworking it: 1. apply drag reduction techniques, 2. thin out the airfoil and add undercamber, and 3. increase the pitch as much as possible. These changes can be applied to any stock prop I've seen. However, the ultimate is believed to have wider blades and higher pitch, so those are good goals to strive for.

The drag reduction is accomplished as shown in the accompanying illustration. What we want to do is to reduce the blade width at the inefficient portions of the blade, in the hub and tip areas. The first step is to reduce the hub thickness in the side view to about 7/16 inch. You can easily do this in a drill press by removing material from the back side of the hub with a router bit. I found a cutter for this use in a flea market, a used ½-inch end mill. Hold the front of the hub *firmly* against the table of the drill press while passing the prop hub under the end of the cutter. Remove only a small amount with each pass and be careful.



Reworked props evaluated with 05 motor and 2.5:1 belt drive.

Reworked 10x8 Top Flite yields reduction in drag from hub area. Plane is King Condor conversion with Astro Flight belt drive.

Next draw a line across the blades at the 50% station. If your prop is maple wood (as most are) I've found that a 7/16-inch width where the hub meets the blade is sufficient for strength. Connect a straight line from the 7/16-inch hub width to the 50% station at both the leading and trailing edges. Scribe similar lines from the 50% station to the tip. Tip widths will vary, a good guide is to use from 1/3 to ½ of the maximum blade width. Using a coarse sanding block, remove all excess material down to the scribed lines, then you can fair in the sharp corner at the 50% station and round off the tips.

Next work on the back face of the blades. Small wood rasps and coarse files are good for the initial work. Consider the existing trailing edge of the blade as a major reference and try not to disturb it with your work.

After you shape the blade you'll notice that there's now some thickness to the leading edge. You will want the finished leading edge to be rather sharp, so with the thickness you now have some ability to increase the pitch. For this purpose, the leading edge guide line will be the *front* side edge of the blade, just as the trailing edge guide line is the back side edge of the blade. You want to remove material down to the front edge guide line, while being careful not to remove *any* at the rear edge guide line, effectively changing the blade angle.

First, connect the front guide line with the rear guide line throughout the blade, creating a flat surface on the airfoil's back or bottom side. This is best done with a flat wood rasp and files.

Now add the undercamber to each blade (rear face). A maximum undercamber depth would be 5% of the blade

(Continued on page 74)

Gamma Gull

by GORDON J. RAE

The port wing responds to the firm pressure of the rising air; then, as I ease the stick over to turn, she banks into the lift. Centering with a little back stick and a touch of corrective rudder, the silky black nose sweeps the horizon and Gamma Gull starts to climb...

"THAT'S A good one, Gordon!" remarked my friend Nick. "Is it a new one?" "No, I designed her in '49," I replied as my thoughts came back down to earth.

Even though I'm a glider guider who's usually engaged in the construction of pylon racing machines and composite material F3B craft, my thoughts have recently turned to the older, simpler ways of modeling. I recalled the gliders of the old days that required just a stack of balsa strips, some sheet, perhaps a little ply, a razor blade, and glue.

Invade your "new world" skies with a bit of the "old country" in the form of this 1940s glider from merry England.

Type: Sport sailplane
Wingspan: 70 inches
Wing Area: 425 square inches
Channels: 2
Weight: 16 ounces

An ageless classic. Gordon Rae conceived the Gamma Gull while serving in the R.A.F.

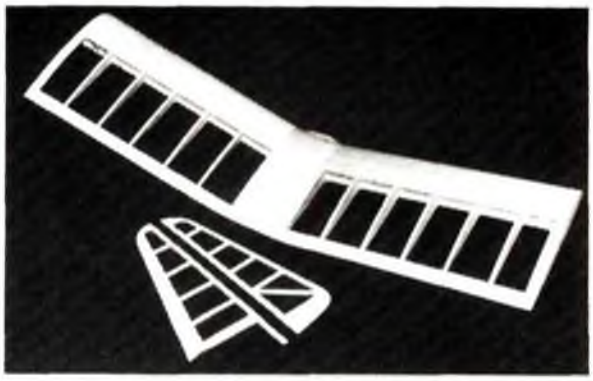
What a thrill! There was Gamma Gull flying again after 35 intervening years!

So, following a recent suggestion by our editor that a glider from my workshop might be interesting, I decided to delve into that dusty box of old plans up in the attic and see what I could find from those "good old days." I came up with just the model I had in mind. My free flight Gull design from 1946-49 looked to be just the job.

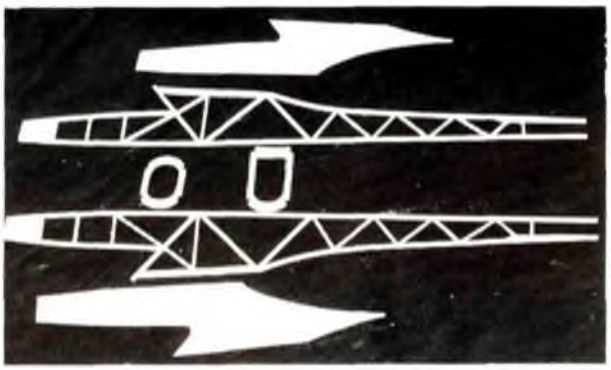
"Gamma Gull" was a gull-wing free flight sports model I used in May 1949 to win the glider event at the Royal Air Force championships. At the time I was serving with the R.A.F. and the 1 to 1 scale aircraft that engaged my working time were North American AT6 Harvards. With my sleeping quarters at the end of the runway, the noisy combination of Pratt & Whitney Wasp and Hamilton Standard were not much appreciated! This then was the environment in which the fledgling free flight Gamma Gull started life, designed and built in off-duty hours in the R.A.F. modeling club workshops of which I had charge.

That was the original free flight Gamma Gull, which was developed from my first Baby Gull of 1946. The model presented here follows the original free flight Gamma Gull design in outline and structure, and incorporates only the modifications necessary for two-channel radio control on rudder and elevator. The information provided on the plan is sufficient for building the free flight or radio control polyhedral or gull-wing versions.

With a 500-mA flight battery and standard size servos, the weight comes out at around 24 ounces, which in turn gives a wing loading of 7.7 ounces per square foot. With an aspect ratio of just over 10.7:1, a tapered planform, and near elliptical tips, the wing is quite efficient. This produces a comparatively small tip vortex and hence very little aerodynamic wash-out. The free flight Gamma Gull, therefore, was provided with 1½° of wash-out, which proved sufficent for flight stability and tow-line



This version uses the gull-wing concept with dihedral center section.



Shades of the past still exhibit good building techniques.

Framed fuselage is a light, strong structure.

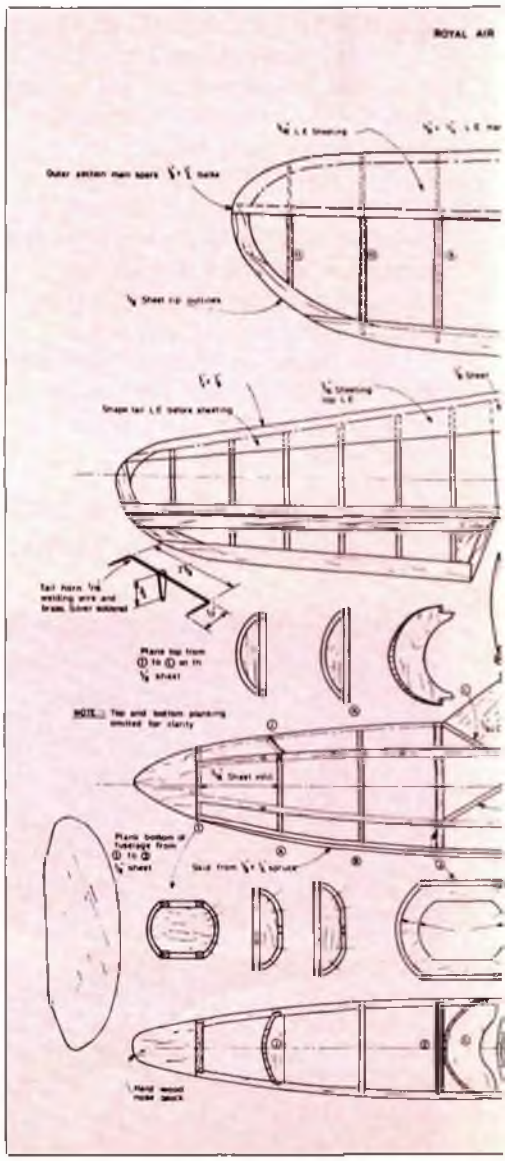
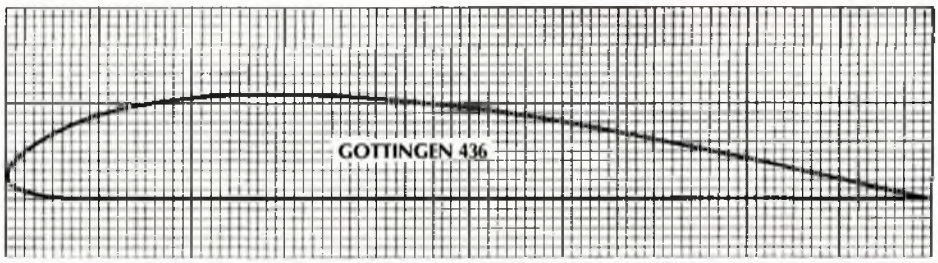


FIGURE 1



GOTTINGEN 436

Station	0	1.25	2.5	5.0	7.5	10	15	20	30	40	50	60	70	80	90	95	100
Upper Surface	2.66	4.53	5.54	7.00	8.11	8.98	10.16	10.82	11.08	10.55	9.60	8.28	6.60	4.70	2.64	1.54	.25
Lower Surface	2.66	1.21	.79	.37	.15	.05	0	0	0	0	0	0	0	0	0	0	.25

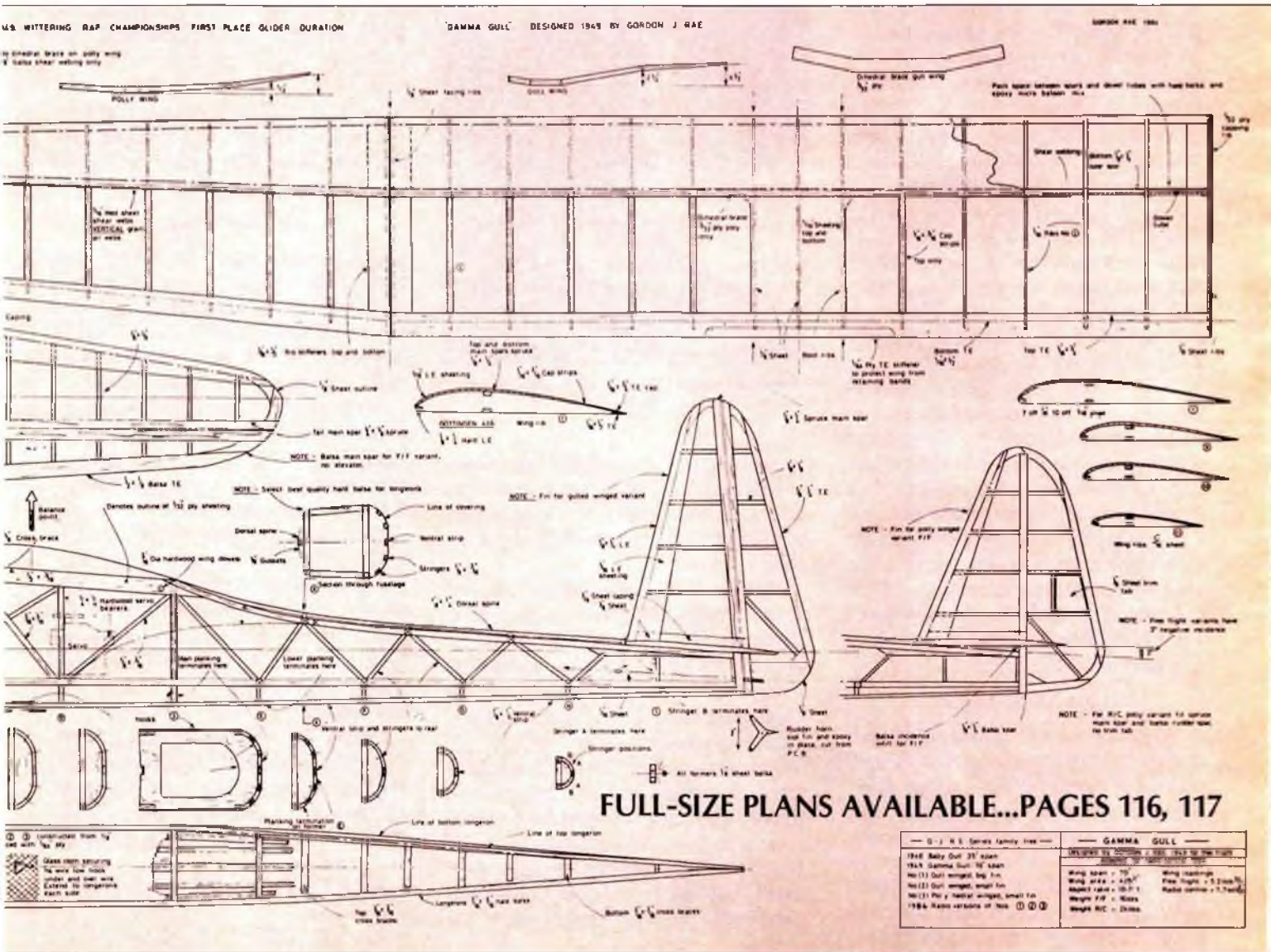
from *Airfoil Sections*, R.H. Warring, 1946

performance.

For the radio variant however, with its wider speed range, 3° wash-out is used. This is of particular benefit at the low-speed end of the flight envelope, and gives excellent control, right down to the stall.

A change of wing section was made from the then-popular Eiffel 400 of the Baby Gull to a Gottengen 436 (figure 1) of the Gamma Gull. This is retained on the radio version. The reduction in drag and smaller center of pressure movement associated with the Gottengen section

(Continued on page 108)



RADIO CONTROL NEWS

by ART SCHROEDER

SOONER OR LATER. It was bound to happen—Turnaround pattern used for all skill levels rather than just the top class. As this is being written, Tennessee's Knox County Radio Control Society (KCRC) is holding the first pattern contest that features Turnaround for all four classes—Novice, Advanced, Expert, and Masters. While I learned of this too late to give any pre-contest publicity, the results of this meet could have far-reaching effects on pattern in coming years. Any procedure that grooms up-and-coming pattern fliers for competition in FAI pattern will certainly enhance America's impact on world class flying.

In this KCRC event, Masters fliers will perform in accordance with official FAI aerobatics (F3B) regulations. All other entrants will select their class of flying. The Advanced group will fly 15 maneuvers with total K factors of 30, and the Experts will fly 19 maneuvers with total K factors of 42. Maneuvers and K factors are essentially those included in the AMA's rule book.

Those flying Novice have center maneuvers and a Turnaround maneuver on the downwind side only. No Turnaround will be performed upwind with regular pattern positioning employed. This should certainly help the less polished fliers. Total K factors for Novice would be 18 with takeoff, traffic pattern, and landing as judged maneuvers.

I commend the Knox County Radio Control Society for trying this and hope to report on results soon.

Ivan's Magic Gadget

When it comes to setting up models and their various control surface throws, most of us simply "eyeball" things. Early flights show how accurate our "eyeballs" really were and we start making changes. Sooner or later we arrive at those perfect degrees of throw for roll, pitch, and yaw.

Often, for one reason or another, the airplane is set aside and radio equipment is transferred to another bird. When reactivated, you go through the same process, never really knowing where adjustments should be made at any given time.

The latest gadget for R/Cers is Ivan's Magic Gagdet. See text for details.

Help is on the way in the form of Ivan's Magic Gadget by Gator R/C Products. The Gadget, which has my vote for this year's "better mousetrap," is a simple protractor device developed by Canadian Ivan Kristensen, reigning American pattern champ.

The device allows accurate measurement of aileron, rudder, and elevator throw—any unequal throw can be easily seen in degrees. All adjustments can be accurately measured and, using the provided log book, records can be kept and the effect of the adjustment noted. If you ever retire and then reactivate an airplane, its perfect trim settings can be re-established very quickly.

Only one simple modification to your airplane is needed and that is the installation of a 1-inch piece of thin aluminum tubing to act as a socket for the Gadget's pointer. Installation is at the trailing edge of the aileron, elevator, and rudder. I found one on each of the ailerons and elevators useful to pick up any differences on either side. Of course, the 1/32-inch wire pointer could be pushed into the balsa control surfaces as a temporary measure, but the aluminum tube is neater, fuel-proof, and far more accurate.

You can bet no future airplane of mine will ever be without Ivan's Magic Gadget. Give this useful tool a try; I think you'll be happy with the results.

A "Hot" Heat

The Field & Bench on Byron's fantastic Zero is coming soon. I can see it from here on my workbench, complete in all its green and grey glory. There is, however, one item in its construction I thought you might be interested in.

When the basic work had been completed, I was faced with the problem of a final finish. I've never been good at fiberglassing so I was left with EkonoKote as a covering for the foam flying surfaces common to all Byron airplanes.

EkonoKote is fine and I've used it on previous Byron airplanes (Pitts, Eagle, and CAP 21) and I was satisfied with the results. However, the Zero was planned for a nice K&B epoxy finish and I was wary of how well paint would stick to EkonoKote—I've had mixed results.

Enter Colortex from World Engines*. This fabric material requires relatively low heat for application, takes paint well, and leaves a harder surface to handle dings and aggressive sanding of primer and paint coats.

It worked, but not without some experimenting.

My initial efforts in applying Colortex

to foam involved low heat (about 200°). Results were terrible—insufficient shrink and poor bonding. I was using scrap pieces of foam so I could afford to make a mistake. I increased the heat settings to around 300°, which is a setting close to that with which I apply MonoKote. At this level, the Colortex bonded to the foam beautifully, shrink was perfect, and no damage was done to the foam.

Application to the Zero went just as well. I completely covered everything in one night. I put one wing in a variety of environments—hot and wet, cool and dry—just about everything an airplane could encounter. There was no apparent loosening, even over extended periods of time.

The only problem I encountered was on wing and stab tips where Colortex had to be worked awhile to negotiate the compound curves. A slight pebbling of the foam appeared, a problem not uncommon to the application of Ekono-Kote over foam. This pebble effect was removed by applying a bit of "Stuff" and sanding it to a smooth surface.

Primer (only one coat) went on nicely and sanded (320-grit) to a great surface for paint. Final coats of warbird paint went on equally as well and the result was very attractive.

Considering the heat, I wondered why it went so well. The only explanation I can offer is that Colortex acts as a heat shield while it is being applied. However, I caution anyone trying this not to remain too long in any one place—slow iron movements could cause problems although it isn't necessary to work at "breakneck" speed.

Colortex on Byrofoam is a good alternative to fiberglassing. It is easier and faster to apply, it is certainly cleaner, and workshop air surely smells better. It provides a decent, hard surface (fiberglass does win here with a substantially harder surface) and it is much lighter (worth perhaps a pound on an airplane

(Continued on page 60)

HELICOPTER CHALLENGI

by GRADY HOWARD

Building the Hughes 500.

THIS MONTH'S column will be a "how to" on building the Hobby Lobby* Hughes 500 helicopter. The kit is packaged well, with each component having its own bag, i.e., rotor parts together, transmission parts together, tail rotor assembly together, and so on. This made identifying each part easier.

You *must* read the instructions and identify the parts before building. This kit is aimed at the modeler who wants to try scale helicopters but doesn't want to spend a lot of money. I used an Airtronics* 4-channel airplane radio with no tail rotor mixing and no gyro. This kit allows you to use the equipment you already have for your airplane without the added cost of a helicopter radio.

The Hughes 500 is imported by Hobby Lobby from England. Most of the parts are molded from nylon or plastic. The fuselage is comprised of good quality fiberglass. The tail boom is already joined and is colored blue. The fuselage halves are finished in white and need no painting except for the windows and trim. The tail boom is fastened to the mainframe via two bolts through a plywood former that is glassed to the tailboom. A bolt holds the top of the boom assembly to the frame. The frame is a simple setup with two pieces of shaped flat aluminum bolted to two pieces of channel aluminum. The landing gear struts are also fastened to this frame, thus the fuselage carries no part of the load.

As a whole, the parts fit together well. Some parts needed cutting or filing to get the proper fit. Getting the fuselage halves to join at the seams when placed on the formers was the most trouble. There were no pre-cut wood parts in the kit, and they had to be cut from the supplied wood. The plywood parts were printed on the plywood.

Above: Hobby Lobby's Hughes 500 imported from England is a good-looking and different model.

Below: Author found the Hughes 500 to be very stable.

The completed mechanical assembly, far left, and close-up of main rotor head showing flybar control arm, right, show good engineering technique.

I had a problem with the clutch drum shaft hole not being large enough, but a call to Hobby Lobby had me another clutch drum in three days. There are no locknuts with this kit so a tube of Loctite is a must. In the air, one loose nut could spell disaster for your helicopter.

The radio installation is rather neat, with all servos being installed to the metal mainframe. Servo mounts are included in the kit. You will need a millimeter gauge to measure the screws, as the plans call for certain sizes. If you are familiar with the metric system, the gauge isn't necessary.

This is a belt-start helicopter, but no belt is included in the kit. You can pick one up at your local sewing machine shop. The battery pack can be fastened to the mainframe by way of rubber bands and J-bolts that are used for small airplane landing gear. The receiver can be stuck to the front former with servo tape.

The fuel tank is included with the kit and mounts very nicely in the front former and bolts to the fan housing. An external fuel filling valve is also included in the parts package.

The tail rotor blades are molded plastic and need no work at all. The main rotor blades are balsa and hardwood, and must be drilled for the blade holder. I used the hole location shown on the plans as a guide by which to drill. I didn't like the thin aluminum blade holders as I felt they would not hold the pitch in the blades. Instead, I substituted a pair of Cricket blade holders and used only one bolt to fasten them to the rotor head. However, I used two bolts in each blade.

I've only flown the Hughes 500 in my yard, so forward flight was limited. With only hovering flight accomplished, I've found the Hughes to be stable and a real good looker in the air. The control response is somewhat slow when compared to the more aerobatic helicopters. There are two ways of thinking on this type of control. Some believe that the slow response will keep the beginner from over-controlling when the copter starts to move. Others believe that a copter with quick response will keep the beginner from letting it get too far before it begins to respond to their commands. I've flown both kinds, and I believe that what you get used to will be what you like. So give it a try, you might like it.

One final comment on this helicopter report: I don't have a gyro on this copter, but I do recommend that the beginner invest in one as it will make learning a lot easier.

Until next month...

Grady Howard, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829.

**The following are the addresses of companies named in the article:*

Hobby Lobby International, Inc., 5614 Franklin Pike Circle, Brentwood, TN 37027.

Airtronics, Inc., 11 Autry, Irvine, CA 92718. ■

Radio installation on the Hobby Lobby Hughes 500 shows compact arrangement.

The swashplate with all linkages installed.

GIANT STEPS

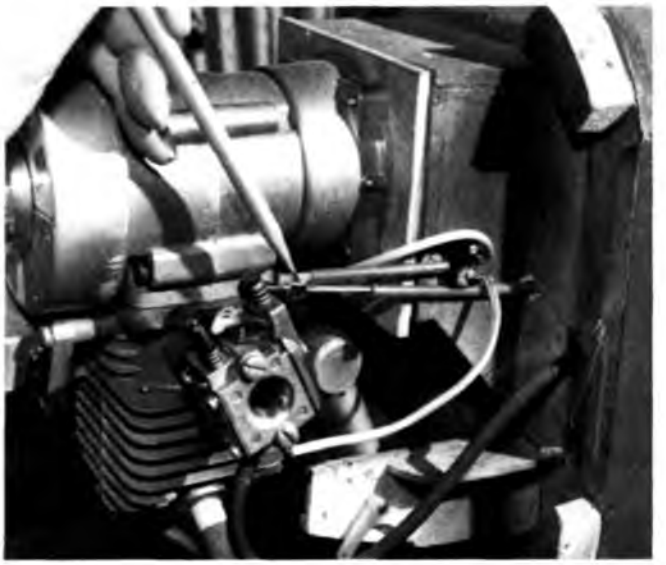
by DICK PHILLIPS

WE HEAR a good deal about the need for a "kill switch" on our larger engines, but we don't hear a lot about what it is and what it's supposed to do. I know of several models that might have survived serious crashes if only a kill switch had been installed. Admittedly, a kill switch isn't necessary very often, but it's real handy when it's required.

Visualize a model engine that for some reason can't be idled back to landing power. In such a situation, the flier only has one option—he can fly around hoping his fuel runs out before his receiver battery expires. Murphy's Law has several things to do with such a situation, most of them spelling disaster!

The better solution is to have a kill switch mounted in the airplane, operating so as to ground out the magneto (or ignition) circuit at low throttle/low throttle trim. In other words, low throttle settings do not operate the kill switch, but as soon as low throttle trim is selected, the engine shuts down. In the above situation, the pilot's options are increased by one—he can make a landing approach and, when satisfied that the model is in the right landing position, pull back on throttle trim and shut the engine down. A properly set up dead-stick landing is to be preferred over flying around on a declining battery, hoping the engine will run out of fuel before the battery gives up the ghost.

Adding a kill switch is not a big deal. A simple microswitch (from Radio Shack or your local electronic parts outlet) is all that's needed. This switch is wired into the magneto circuit so that when the switch is closed, the magneto is grounded out and the engine stops. Microswitches have three contacts, usually marked "NO," "NC," and "C." These markings indicate "normally open," "normally closed," and "common." This means the use of the "NO" and "C" contacts will provide us with a switch that is open until the switch is operated, then it will close. It's a simple matter of running a wire from the magneto lug to the "NO" contact and then running a lead from the "C" contact to ground anywhere convenient on the engine. When the switch closes, the engine stops. It's that simple.



Kill switch use on gasoline engines is a must. Switch activator, indicated by pencil, is via throttle coupling.

Getting the switch to close at the proper time is the trick. In cases where there is a bellcrank changing the direction of the throttle linkage, the switch may be mounted so as to be contacted by the bellcrank at low throttle. Then, if low trim is selected, the slight additional movement closes the switch and the engine stops. Where a bellcrank is not used, a secondary linkage must be provided to close the switch at the appropriate time. This sometimes requires some ingenuity to conveniently arrange.

In addition to allowing the engine to be stopped in the air, a kill switch is also a safety feature in that it allows the engine to be stopped on the ground without your even having to approach the model. If you get in the habit of stopping your engine this way and then leaving the switch closed, there's no chance the engine can be accidentally started by anyone twisting the prop.

This kill switch should be in addition to a hand-operated switch on the exterior of the model and the two switches must be mounted in parallel. In this method of mounting, either switch closing will stop the engine. The cost of these switches is low but their value is high. Not having a kill switch on your large model can make problems you don't need.

Bender for Heavy-Gauge Wire

Those of you who scratch-build may have faced a problem in bending the larger sizes of wire required for landing gear. Most plans call for at least 3/16-inch wire and many use 1/4-inch piano wire for gear legs. Bending such heavy wire can be quite a task, even if you use a heavy-duty vise. There is a solution and I present it here for those of you who have asked how I bend heavy-gauge wire.

The bender shown is not a "home-brew" item. I bought it at a swap shop at one of the big trade shows a few years ago. I wish I had the maker's name as his bender has made things a great deal easier for me and I'd like to give him credit for the design.

The major difficulty in making up this item is the need to make the bends in the

For big birds, big tools are needed. See text for information on this handy little device.

actual bending "persuader." I suspect most of us would have to have this done at a machine shop as I doubt there are many home workshops in the country with the equipment required for this sort of work. The working surfaces of the ends of the bending arm should also be heat-treated to resist the peening that can be caused by the pressures developed while bending heavy-gauge wire.

The holding bolt which is drilled to capture the end of the wire being bent will require heat-treating as there isn't much "meat" there to retain the wire and it must stand up to some pretty considerable forces. The two bolts around which the wire is bent will also benefit from heat treatment.

Now, I'm no metallurgist and the advice I'm about to deliver is what I'd do if I had to reproduce the bending jig. It should produce a working bender that will give you good service.

Drill the end of the "holder" bolt in the stock while it is still mild. (Good quality bolts should be used, not the common garden variety of black iron bolts.) Once the hole has been drilled, heat the end of the bolt you drilled the hole in until it's cherry red and then water-quench it immediately. Remove the heat coloration by polishing the bolt with sandpaper or emery cloth. Next re-heat the bolt, spreading the heat as evenly as possible until the metal becomes straw colored, and again quench immediately. This treatment will provide the required strength and you won't have to get the entire bolt straw colored, just the end with the hole in it.

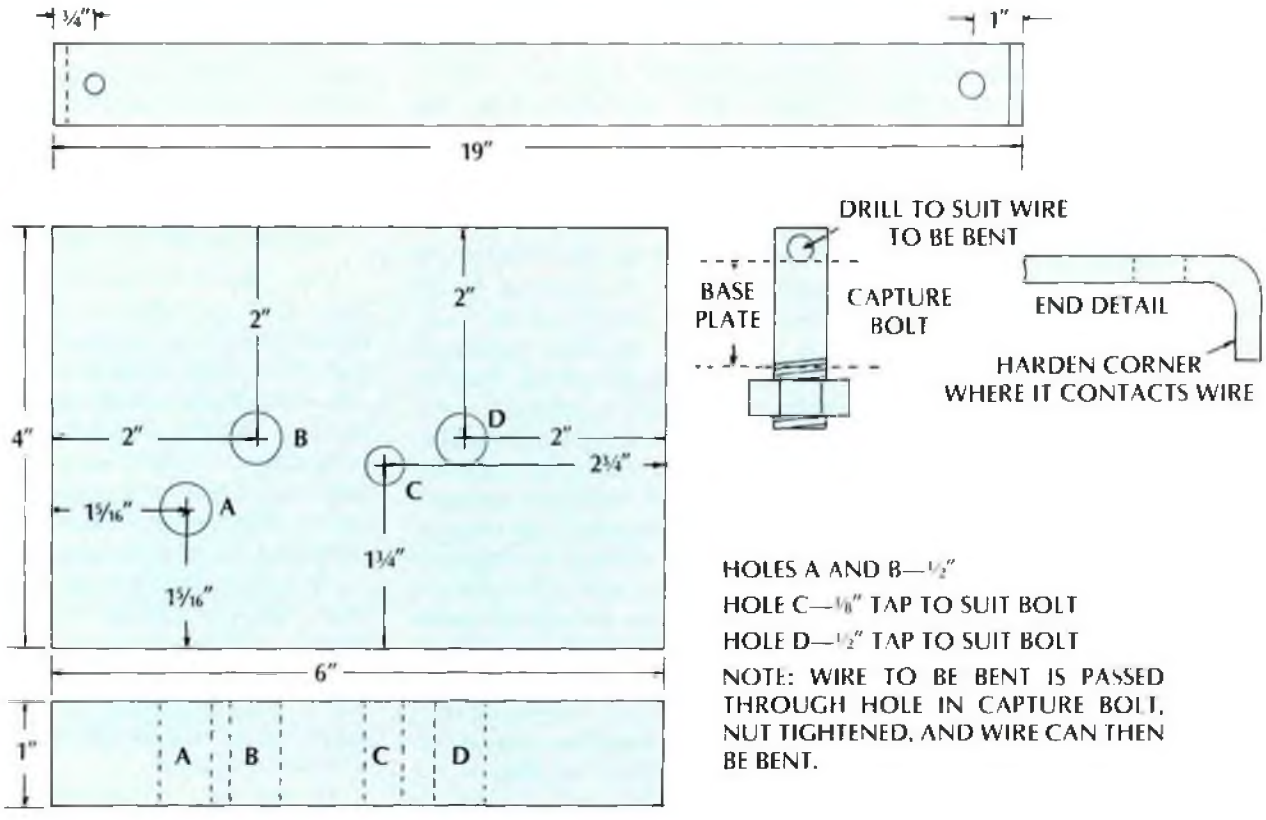
I use a propane torch and a couple of ordinary bricks to reflect heat back into the area where it is needed. Be careful the bricks (and especially concrete blocks) are dry when used for this purpose. If not, the heat may cause any water present to expand explosively and you could be injured by pieces of flying brick. You should always wear eye protection when working with such materials anyway, although such protection is not a substitute for careful work practices.

The bending jig could easily be made up by a machine shop, but the cost would be rather high. Not being able to bend heavy wire may justify the expense of having it made up, however, especially if you do a good deal of large building from plans. I haven't found any wire right up to 5/16-inch that can resist it!

Next month I'll start a series of columns on radio installations in large models. There's a lot to learn about good practices and the assurance of control movements getting where they're needed. I hope you'll join me here.

Dick Phillips, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829. ■

HEAVY-GAUGE WIRE BENDER



HOLES A AND B—½"
HOLE C—⅛" TAP TO SUIT BOLT
HOLE D—½" TAP TO SUIT BOLT
NOTE: WIRE TO BE BENT IS PASSED THROUGH HOLE IN CAPTURE BOLT, NUT TIGHTENED, AND WIRE CAN THEN BE BENT.

(Continued from page 53)

as big as the Zero). I must point out that this is in reference to *my* fiberglass work; some modelers can apply fiberglass with much less weight build-up.

I liked the Colortex in this use and you may want to give it a try. If you do, let me again advise that some practice will be necessary. At least it's another alternative to finishing foam surfaces.

How Old is Old?

My Kraft Signature radio is now over ten years old and it has never failed (or even glitched) over thousands of flights. I'm often asked why my radio has lasted so long, or even why I've kept it so long.

The answer to the second query is simply that I can't buy a single-stick system with a stick that is ideal for that flying style! This, of course, is the all-metal, single-stick designed by Ron Chidgey many years ago for the Pro Line and, thereafter, Kraft Signature.

The biggest criticism leveled at single-stick is relative to its ability to handle three primary control functions without introducing unwanted commands to aileron, elevator, or rudder. To do so requires an absolutely slop-free arrangement of the various pivot points. This is what the Chidgey stick does. Oh how I wish some manufacturer would pick up on this stick! Unfortunately, single-stick fliers are a minority, with Mode II as the vast majority. In any event, I continue to hang on to the one I have—I finally retired the Pro Lines after 15 years of continuous use.

The question as to why my radio lasts so long is also easy to answer.

First, good design, quality components, and quality manufacturing are of paramount importance. Fortunately for all, just about every radio made today has these elements.

Of equal importance is the maintenance and care in usage a modeler gives to his link with his airplane. Annual servicing with an open order to the servicing agent to change, tune, repair, or modify anything suspect in a radio system is a must. Radios should be inspected before every flying session and should be cleaned regularly. Transportation of a transmitter should be done in a foam-lined box. I'm often amused by the careful wrapping in foam rubber that airborne components receive, while the transmitter is carried in a trunk, free to absorb all road shocks and temperature changes. Transmitters are allowed to sit on dusty fields in direct sun without a thought as to what problems this can cause.

Above all, know your radio system! A simple, disconnected antenna check of 50 to 60 feet before each flying session can do wonders for longevity. If you normally get 60 feet and this suddenly drops, it's time to have someone take a look.

Winter is upon us and this is an ideal time to send last summer's "old faithful" back to its home for a check-up. Believe me, you'll be glad you did.

Art Schroeder, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829.

**The following is the address of the company mentioned in this article:*

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236. ■

Oshkosh brings out anything and everything with wings. T-33 in Thunderbird markings, right; flight of prop-driven powerhouses, below; and the resplendent P-51 "Rosie 1," bottom; give you an idea of the appeal of Oshkosh.

Oshkosh

A spectac

'85

I URAVITCH

...f spectacles—if it flew, it was at Oshkosh!

FOR THOSE of you who have never been there, a visit to Oshkosh, Wisconsin—or, more specifically, the Experimental Aircraft Association's Annual Fly-In—can fill your senses with more aeronautical things than you'd believe possible. Airplane enthusiast, airshow afficiando, modeler, pilot, or general public can find something here...

This represented my fourth consecutive year attending this aviation extravaganza and, although many of the aircraft were "returnees," the new appearances were enough to keep me occupied for days.

Some of the highlights were the arrival and departure (with a four-day static interlude) of a British Airways Concorde (G-BOAG, for you serial trackers). The open mike piped over the loudspeaker included a humorous dialogue between Captain John Cook and the tower. The good captain treated the crowd to multiple fly-bys, including full afterburner ("reheat" to our British readers), climb-outs, and a touch-and-go that even the most critical scale judge would award a perfect score!

The appearance of the newly restored Grumman F7F Tigercat owned by the Kalamazoo (Michigan) Air Zoo was a hit. This is one of the two flyable F7Fs remaining.

The non-appearance of the Kalamazoo Air Zoo P-47 T-bolt which we saw on static display last year was not a hit. I had reserved a roll of film with hopes of getting the bubble top flying with Ray Stutsman's Razorback Jug. Maybe next year...

All appreciated the presence of Brigader General Chuck Yeager among the crowd, talking to everyone and the television cameras about the "E double A," with a lump forming in his throat as he reminisced while walking among the warbirds. He later strapped on a borrowed "51" and ably demonstrated that 42 years only makes a fighter pilot better—Amen!

Astronauts Bob Overmyer (USMC) and Bob "Hoot" Gibson (USN) dropped in with a borrowed NASA T-38 to spend some time with the crowd. Hoot is a modeler and flew a scratch-built F-16 at the First Annual Southwest Ducted Fan Fly-In in Lockhart, Texas, three years ago.

TWA Captain John Testrake arrived with the remainder of his 727 flight deck crew Phil Maresca and Christian Zimmerman from hijacked TWA Flight 847. They responded to numerous questions regarding their 17-day ordeal in Beirut. It's good to have them back safe and sound.

The giant strides made in "home-built" aircraft designs typified by Ed Swearingen's SX300 that cruises at 275 mph on

(Continued on page 68)

Above: And you thought all Christen Eagles were white! Right: Ken Flaglov's Gee Bee replica is up for sale.

Try this paint scheme on your model Starduster. Oshkosh is the perfect place to get scale documentation.

⅛th AIR FORCE

(Continued from page 17)

elevator is in the back where it belongs!

There is nothing like the sound of a multi-engine model in the air. Show me an R/Cer who won't stop what he's doing when the sound of a twin- or four-engine model roars down the runway. Albuquerque's Dan Parsons brought his veteran DeHavilland Hornet. This is one impressive flying machine, which Dan handles with the ease most of us show only when at the controls of a much-flown Senior Falcon. High speed, perfect stability, extreme maneuverability, and the sound of two perfectly running and synchronized engines are a joy to the eyes and the ears.

A similar airplane I always enjoy watching, due in part to its in-flight realism and to the expert handling by Tucson's Billy Hempel, is a Grumman Tigercat. Billy's flying is always a show-stopper, no matter what he has in the air.

No scale event worthy of attending is complete without at least one four-engine airplane, and this fly-in was no exception. This year we had Tony Arand and his B-17 Flying Fortress. Many of us have seen Tony's expert flying of this model before, but that never stops us from appreciating it once more. This year, Tony had a special bit of unscheduled realism thrown in. He lost a main gear in flight, and in true, "coming-back-from-Berlin" style, had to put it down on the one remaining main wheel. Just like *Twelve O'Clock High*, it touched down perfectly on the remaining main, to slowly settle to the wing tip and props. Unfortunately, the model then slid off the runway and into the protective barriers, causing some rather severe damage, but we hope that Tony will be able to repair it and we'll once again enjoy it at Phoenix.

New and different airplanes are always interesting, on the ground and in the air. Leo Prescott showed up with an unknown (to me!) model of something known as a "Preston Pusher." It is an airplane now being developed as a four-place kit home-built, using a Lycoming engine of the same type found in the Cessna 172. Leo's model is ¼-scale, sports an O.S. 108 for power, and uses a variable undercamber airfoil. Leo's flying was as well done as his workmanship on the model; in the air it looked as stable and controllable as that previously mentioned Senior Falcon.

The ⅛th's fly-in is not judged like most scale events. I think the "Infidelity to Scale" award presented annually pretty much sums up the tone of the event. The only judging is done by the fliers themselves, appointed to judge a category in which they are not entered. The "People's Choice" is made by the spectators.

And all too soon it is Sunday afternoon, the last flight has landed, and the group is called for the awards presentations. The 1985 winners of unique, specially-made plaques were:

General Aviation: 1. Frank Gray/Jerry Pitzel; 2. Jerry Hermaneck; 3. Ken Meyer.

Military Aviation: 1. Jack Dorman/Bob Frye; 2. Billy Hempel; 3. Tony Arand.

Best Pre-1940 Scale: Frank Gray.

Smacked A– Award: Joe Aguilera.

Best Scale Prop: Bryan Omeara.

Best Detailed Aircraft: Jack Dorman.

People's Choice: 1. Frank Gray; 2. Dennis Crook; 3. Larry Botsford.

(Continued on page 74)

POND & BENCH REVIEW

by DAVID TROST

Midwest Products

FANTAIL LAUNCH II

BACK in the "Gay 90s" a popular summer pastime was to take an excursion on a steam boat. As well as commercial craft, yachts once ran on most of the major lakes and streams of the northern states. The Fantail Launch II is a small, open steam launch that is typical of the small yachts used at the turn of the century.

The people at Midwest Products* have been producing quality airplane kits for many years and have recently introduced a line of boat kits. The Fantail Launch II is one in their series of small boat models suitable for R/C.

THE KIT. The basic boat is made up of balsa planking over a basswood and lite-ply frame. The instruction booklet is short but very complete. It begins by showing line drawings of each of the die-cut pieces and clearly labeling them. It continues by giving a glossary of boating terms and some very helpful construction and finishing tips useful in the construction of the boat.

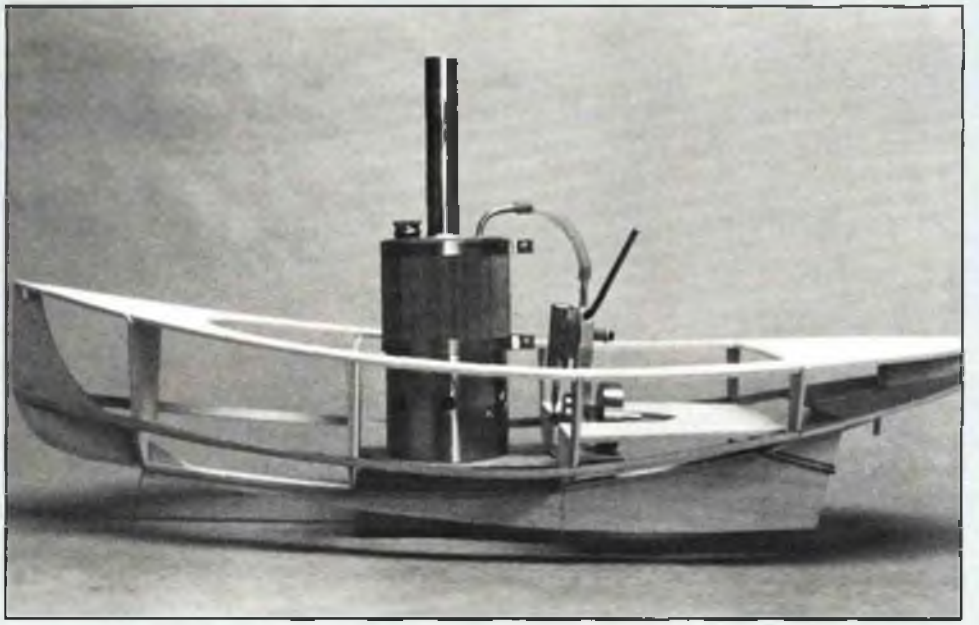
CONSTRUCTION. The steam engine and boiler are constructed of a relatively small number of metal parts which must be soldered or screwed together. The instruction booklet lists the tools required for assembly and describes basic soldering techniques.

The boiler consists of two copper tubes and two end caps. The caps have all the necessary holes pre-drilled. Midwest recommends that silver bearing solder be used to assemble the boiler. Silver solder is five times stronger than 50/50 soft solder and it melts at a higher temperature, so if the boiler runs out of water before the burner goes out, it won't melt apart. Because the silver solder melts at a much higher temperature than soft solder, it has to be heated to a high temperature during the initial soldering to insure a good joint. A standard propane torch works well, but remember that it will take a while with a high flame to get the whole boiler hot enough to get the solder to flow properly. The keys to good solder joints are good fitting parts that have been thoroughly cleaned with steel wool or fine sandpaper, using enough flux, and heating the parts until the solder flows freely.

After soldering the two tubes and end caps together, complete the basic boiler by adding a ⅛-inch steam outlet tube and a flanged screw cap filler port. When the boiler is cool, check it for leaks. You can do this by immersing it in a bowl of water and blowing into the steam outlet tube with the filler cap on. If any air leaks out at the solder joints, the area will have to be recleaned, refluxed, and reheated. You may have to add some additional solder to patch the leak.

After soldering, the metal will be very discolored so polish it to a mirror finish with fine steel wool and metal polish, and then wrap the boiler with fiberglass and a brass sheet jacket. Complete the boiler assembly by adding the mahogany lagging and brass retaining bands.

The engine is a small single-cylinder, oscillating type, which is coupled to the boiler with a piece of silicone tubing. It is built around a cast metal mainframe, in which all the necessary holes have been pre-drilled. The bushings for the



Left: Simple yet complete structure ready for siding. Above: Drive assembly is brass.

shaft and the brass steam inlet and outlet tubes are pressed into the casting. These tubes need to fit tightly into the casting. Do not open up the holes if they do not seem to fit. Just go slowly and work them in. A very tight fit is necessary because the mainframe expands more than the brass tubes when they are heated by the steam, which tends to loosen the tubes. If the fit is not tight, the steam will leak out at the junction or, worse, the tubes could fall out. I recommend building up a fillet of silicone rubber glue around the joints for a little added support.

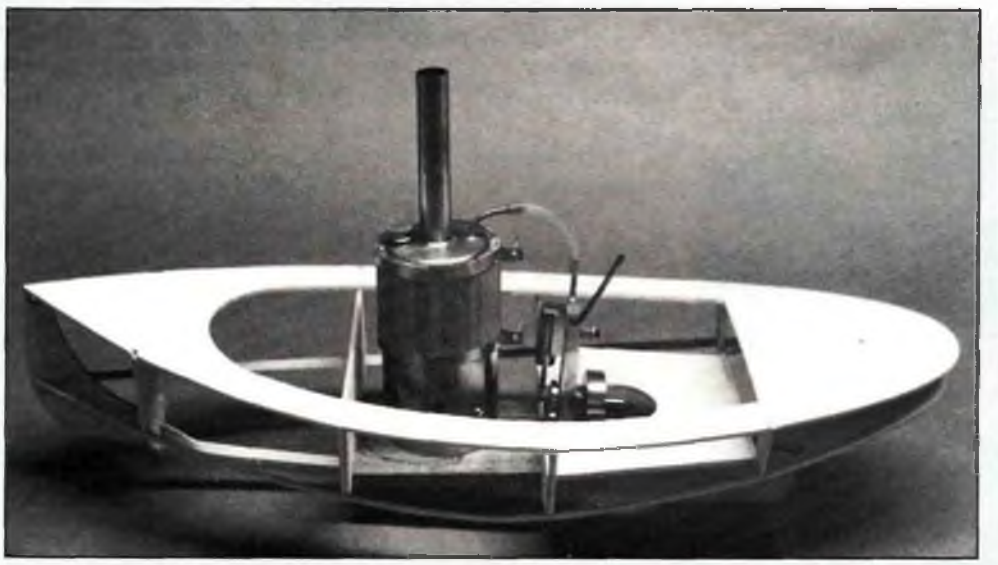
The piston is made up of three brass pieces which are soldered together. I used 50/50 soft solder for all of the engine soldering. The cylinder/valve face consists of two machined brass pieces which are soldered together. A 4-40 machine screw holds the cylinder/valve assembly to the mainframe/valve. The instructions call for a small piece of silicon tubing to be placed on the bolt prior to assembly to provide tension to hold the two valve faces together. I found that a piece of spring from a cheap ball-point pen worked much better. Keep the tension to the minimum required to get a reasonable seal of the two valve faces. If the tension is too high, the engine simply will not run! Use Loctite when installing the bolt or it will quickly loosen. The crankshaft and flywheel are also constructed of machined brass.

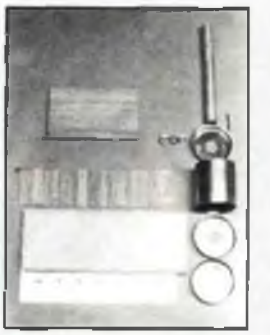
The completed engine and the boiler are mounted on a mahogany base. I recommend waiting to mount the engine and boiler until after the motor base has been fitted into the boat so that they can be placed correctly.

Actual construction is started by laying the keel. I used cyanoacrylate glues (thick and thin) and accelerator exclusively during the construction of my boat. They work well and are fast, but you need to be careful not to get glue on any pieces that are to be stained or coated with clear varnish. The glue will not allow the stain to take evenly and will cause a splotchy final finish.

The keel is made up of several die-cut basswood pieces. The bearing tube for the rudder and the stuffing tube for the

(Continued on page 107)





Left and above: Steam boiler is silver-soldered. A fuel used is lantern kerosene.

Oshkosh '85

Antiseptic engine compartment on a pristine Cessna 140.

Beautiful WACO E, formerly "New York Daily News" camera plane.

Frank Sanders smokes by in his gorgeous Sea Fury.

(Continued from page 63)

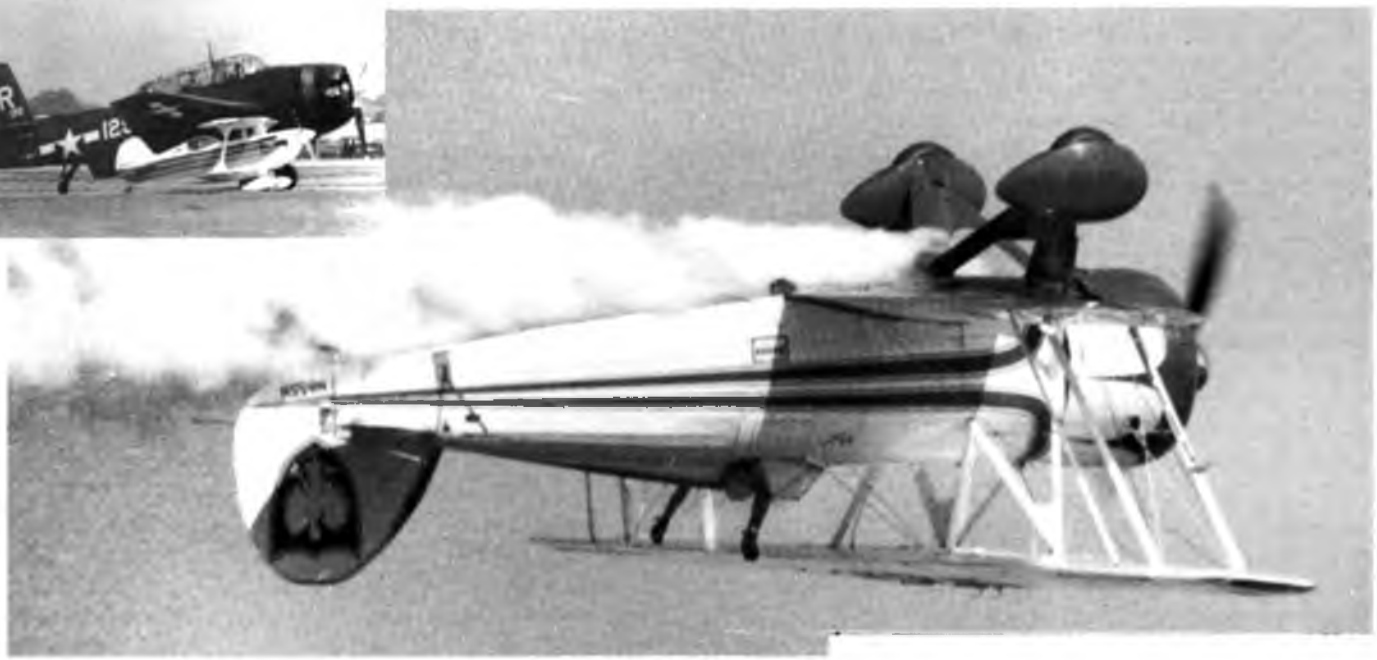
300 hp, the LoPresti Brother's Sharkfire with a projected Vmax of 250 mph on 150 horses, and numerous other beautifully designed and executed flying machines were also represented.

Statistically, this Oshkosh was the biggest and best ever by anyone's measure. Some 1,760 show planes were entered in the judged competition, these being additional to the 15,000 transient types that arrived during the week. A new record was established for aircraft movements by the Wittman Field tower—how about 64,416! That, friends, is a bunch of movement. Proving that the EAA is truly an international organization, visitors from 66 countries attended this year. The photos presented here represent but a fraction of what was seen. Even if you needed a break from the airplanes, you could attend non-stop seminars on all sorts of aviation subjects from propeller design to composite structure to restoration tips to... After that, you could visit the EAA museum, then the exhibitor's booths, and the "fly market," and...

From a modeling standpoint, I would guess that anything you would ever think about building was available at this gathering. Even if you hadn't thought about building a model, you'd probably be inspired by something here! I've frequently said that the toughest part of scale modeling is the documentation. This is an ideal opportunity to work the system backward by obtaining your documentation first. A side advantage is that most of the airplanes in competition are restored and in superb condition, which means you won't have to concern yourself with "weathering."

There is absolutely nothing in the aviation world that comes close to the event, including Farnborough or the Paris Air Show, especially since the flight demonstration restrictions have been imposed at those affairs. Oshkosh has it all—plus! I've already made plans to attend in '86, but I can't imagine what the EAA can do to "top" '85! See you there. ■

Left: The Concord gave rapid, ear-splitting fly-bys. Above: Bob Bishop put on a terrific performance with his Bede 5J Coors Silver Bullet.



Inset: Looks like a model but it's not, an Eagle is dwarfed by a huge TBM. Above: Spectacular inverted fly-by with smoke performed by Bob Lyjak. Note his arms.

Left: Fire and brimstone! The Mid-Atlantic Museum P2V Neptune during start-up. Above: Bob and Pat Wagner thrilled all with their daring routine.

SOARING NEWS

by JIM GRAY

A FEW MONTHS ago I mentioned the subject of aero-towing R/C sailplanes as an alternative to winch-towing, hand-towing, or hi-start launching and, perhaps not too surprisingly, I received some letters about this. One letter, reported last issue, dealt more with the writer's experience in WW II with full-size cargo glider pickup and aero tow using DC-3 (C-47) aircraft. This month we have a very humorous and interesting letter with a couple of good suggestions (if you can pick them out of the tongue-in-cheek presentation). Here's our friend Allan R. Holton from Riverside, California (Allan has lots of practical R/C towing experience):

"This is an account of towing *fine* birds with smelly old power birds. First, find someone who has a .60-powered beast and an undesirable personality—as by the end of the day he will be a sworn enemy and you won't lose a good buddy.

"Make a tow hook like the one in the drawing and put it on the tow plane. It will save the tow bird when he misses the runway on landing, plus the fact that he can 'bomb' the pits with the tow line. I use a remote glider hook (don't tell the power pilot it will mess up his snap rolls) and arrange the release to operate with full-up elevator on the power beast.

"Tow the glider with a *nose* hook *(not a CG hook—JHG)* and make it like the one in the drawing; either one in fact, standard or 'trick' release. Place both birds on the runway and show the power-mad pilot which way is into the wind. On takeoff, get the glider off first and gently circle clockwise to be above the smelly bird. A little down elevator will enable the tow plane to take off. If the power pusher has been taught to talk, have him tell you when he is going to turn. When you want to release, have the tow pilot slow down in a gentle dive as you pull the pin.

"(For power pilots only): If the expert braggy glider guider bugs you, tell him you will find him some lift, then go and find some sink, throttle back a bit and circle, and holler, 'Lift!' He will release from tow and circle. With a little bit of luck, he will have a long walk to pick up his glider!

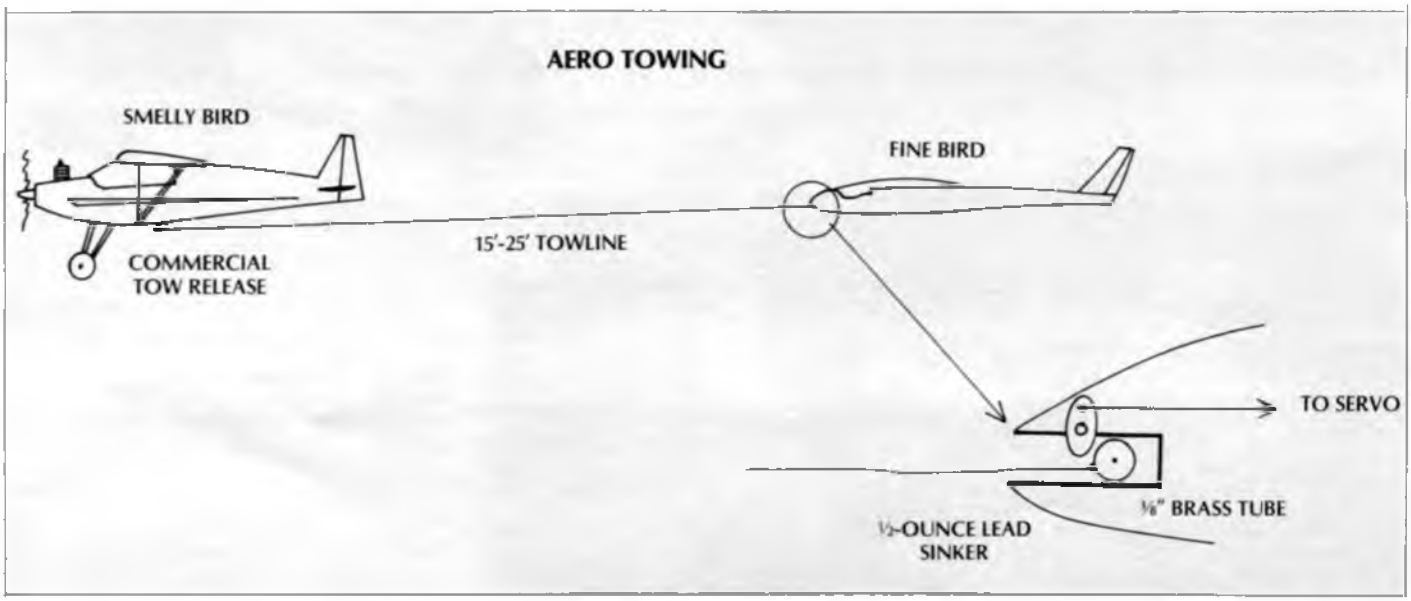
"Also, power pilots, keep a close eye on the glider guider at the time of release, as they like to bang power machines on the tail feathers. Tow-lining soaring craft tends to tie up the frequency pins, so go out to the field that has the lift and fly next to it.

"If your friends are around when you figure out the length of line for towing, make a big deal about prop diameter, airspeed, and prop wash, and then when they go home, cut 15 to 25 feet of winch line, put the plastic rings on it, and go for it!

"What if the putsy power pilot sandbags you into 'down'? (See two paragraphs above.) On takeoff, hold just a little up elevator so his tail is high, as this will prevent him from taking off. Just as he realizes he is in trouble and reaches to cut back the power, release your bird and watch the airshow! This works best when his buddies are around.

"If you use a .40-powered tow plane, you can get a 100-inch bird up, but the tow plane will cover your fine bird with smelly glop and ruin the glide ratio."

Al, how many friends do you think you will make with this letter? It seems to me that both power pilots and glider guiders have been instructed by you to commit mayhem on one another. If a bunch of 'em come looking for you with a piece of towline with some funny-looking knots in it and a loop on one



end, don't come to me looking for help; I'll just claim it's all your fault!

Thanks for sharing with us, Al. I hope you live to write again.

Last Minute Nats Soaring Report

Because of the inevitable two-month magazine deadlines, this news which is hot off the press today may be rather dated when you get it, but here goes anyway.

Unofficial results, as of Saturday, August 3, 1985 (first three places):

Open—Unlimited: 1. Terry Edmonds, Callisto; 2. Helmut Lelke, Heidi; 3. Larry Jolly, Pantera. Standard: 1. Larry Jolly, Meteor; 2. Phil Wegman; 3. Terry Edmonds, Callisto; 4. Helmut Lelke, Heidi. Two-Meter: 1. Tom Brightbill, Pixie; 2. Terry Edmonds, Io; 3. Helmut Lelke, Heidi.

The reason I put Helmut's name in the fourth-place rank in Standard Class is because of the phenomenal sailplane he's been flying: the same one in all three classes. It is a straight-wing, heavy pod-and-boom two-meter design with auto stabilization. It is fast, hot, and heavy, but floats like a butterfly and stings like a bee in Helmut's capable hands. I'm going to ask for more details to present to you in a future column.

Senior—Unlimited: 1. Tim Gold, 2. Sean Lenci, 3. Mike Garton. Standard: 1. Tim Gold, 2. Sean Lenci, 3. C. Mohs. Two-meter: 1. Sean Lenci, 2. Mike Garton, 3. Alex Bereczky.

Notice once again that the top pilots seem to sweep all of the classes! Must be a lesson there for us somewhere, eh, gang?

More Big Al Holton

Al has sent us *another* letter, so help me! I'm going to let you know what he has to say in this one too. Maybe that will keep him quiet for a while so we can get on to other business, but there's one thing for sure...those 1954-variety sailplanes sure look nice, don't they? Heck,

they were flying when some of today's hot shots weren't even born. Man, that's 31 *years* ago!

"Slope soaring in Riverside is quite a problem, as we have seven sites to fly from, and we always go to the wrong one. Landing on dirt roads is worse than landing on 10-grit sandpaper, so we use fan belts from the family wagon to make skids. Some of the big spenders use new ones, but you can find great gobs of used ones in the trash cans of the local wrench-bender's shop.

"The most popular slope banger is the Katie II (Bob Martin R/C Sailplanes, in case you wondered) as it's a great aileron trainer. However, we always bring a Gentle Lady. Would you believe the new hand-flanger type birds will go up on our slopes with no wind? Anyway, we always have something to fly.

"Here are some of the fun things we do on our slopes with the floaters: we anchor a styrofoam cup upside down to the ground, then stack more on top and try to knock off the top cup with a glider. This is a great no-wind task, as you can hand-launch, make a circle, knock off a cup, and still land back on top. Winner buys the Kool-Aid.

Henry Smith's 8-foot Homebrew, circa 1954. Photo by Al Holton.

"Some of the stuff I fly is out of trash cans; for instance, a Quickie wing that was broken in half. I slapped some epoxy on that sucker and bolted it to my Katie II plastic fuselage. You talk about a hummer; that turkey *cooks*!

"You know the kind of landings I like? The bird slides right up to my chair so I don't have to get up to turn off the battery! Touch-and-go landings at the slope are fun too.

"I put a forward plane (canard) on my Super Gryphon and that duck now does 100 mph in a 15-knot breeze, vertical rolls, 500-foot loops, and screaming dives. Out here we get a wind called the Santa Ana, 20 to 30 miles of pure lift, and you can toss out a pattern ship without the noise-maker on and *still* fly it!

Bird of Time, then called Thermic 100, used escapement, rudder-only in 1954. Holton pic.

Super Sinbad over smog-shrouded Pasasdena in 1954. Holton pic.

"I've been flying R/C gu-liders since 1948, starting with an RK61 gas-tube setup in a Super Sinbad. We flew floaters by Jasco: Thermic 72s and 100s. I used to fly with Jim Jenson of Ugly Stik fame and with Ed Phillips who designed a transmitter that would almost run the escapements without the receiver on! *(He means it was powerful—JHG)*

"I firmly believe that R/C gu-liders turn out better power pilots, and although I could go on for hours like this, my soap box is covered with balsa chips.

"As soon as I get the film out of my Kodak Brownie Hawkeye, I'll send some photos of the R/C contest at the ISS field in Riverside. I assume you will retype this for your column. *(Yeah, Al, I had to; your typing and spelling are worse than anything I've ever seen... sheeeesh!—JHG)*"

Al claims he will make a huge sacrifice and find out what's happening down at Torrey Pines, so he can let us know. Don't strain yourself, Al. By the way I wonder if that "easy" lawn chair has wheels? You might get it out on Interstate 5 and have a go.

Well, troops, that's it for this month.

Jim Gray, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829. ■

1/8th AIR FORCE

(Continued from page 64)

Infidelity to Scale: Jerry Kitchen.

The local chapter of the Civil Air Patrol presented a special award to the flier of the best civilian aircraft, which went to Frank Gray and his magnificent Staggerwing Beech. I was pleased to see this recognition of the model aviation sport by a general aviation body, and hope it is only the forerunner of things to come.

Thus, the 1985 1/8th Air Force Fly-In is history, and everyone present had a good time. The 1/8th has already had preliminary discussions about what needs to be done to keep the event healthy and growing. There has been talk about extending it into a three-day event to accommodate the growing number of fliers who show up every year, or to possibly limit the mid-day runway lineup to one day. As one might expect, there is no talk about limiting the number of entries—which is the way the 1/8th Air Force operates. In the words of Leo Loudenslager, they "put the throttle to the firewall and leave it there!" Al Casey's term as Commander has expired and he has been replaced by Roy Pratt, whom we know as another able organizer. To Al, I'd like to add my thanks for a job well done. I have certainly enjoyed my visits with his group, and, Roy, we'll be with you at the Sun Flyer's field in March 1986. ■

FROM ELECTRICS

(Continued from page 46)

width (1¼-inch width is 1/16-inch undercamber). Actually the undercamber will fair out to nothing at the hub and tip. A guide line is needed to start the cutting. From the leading edge, scribe a line that is ⅓ of the chord back, all along the blades. Using a ½ round wood rasp and files, produce the undercamber shape as depicted in the illustration. When the shape is roughed, the finishing may be easier with 60-grit sandpaper wrapped around a suitable oval-shaped bottle. Check the prop balance before proceeding.

The final major operation is the upper curve of the airfoil or shaping the front side of the blades. Here we are concerned with the airfoil shape and *thickness*. The thickness is established first and you will need to measure it with a micrometer or a caliper. You want the airfoil to be as thin as possible for drag reduction purposes, while still providing sufficient strength. With maple wood I've found 7% of the chord to be sufficient (1¼ inch chord would be .0875-inch thick). To be precise, you can work at several stations along the blade creating the desired thickness, however a simpler way seems to produce usable results. The idea is to reduce the thickness in a straight line from the hub to the tip. This is done with a coarse file working span-wise on the blade. When you're finished there will be a "flat" on the blade and the thickness should be about 10% at the 50% station.

A guide line will assist in reforming the airfoil. Scribe this line on the flat, ⅓ of the chord back from the leading edge. Using flat files and working from the trailing edge to the guide line, remove all excess wood until the trailing edge has a knife edge. The area between the trailing

(Continued on page 90)

CONSTRUCTION

Hawkshaw

A nifty looking model for simple R/C fun.

by L.F. RANDOLPH

THERE IS something friendly about a four-cycle engine, so it stands to reason that an airplane powered by one will also be friendly. Hawkshaw is a friendly airplane. By friendly, I mean that it has no tricks up its sleeve that will "get" you when you make a slight mistake, such as picking it green or getting a little slow in the landing approach.

Friendly airplanes track true and straight down the runway on takeoff and groove nice and smooth. They do this even at low speed, when cruising around at low throttle just a few feet above the ground. Friendly airplanes make tailwheel-first landings and glue themselves to the runway on roll-out. Friendly airplanes will do big, round loops, or square ones with a snap at the top if asked to do so. They will knife-edge all across the field and do nice point rolls or slip to a landing if you want. The only thing they won't do is make their owner look bad.

Hawkshaw is all of the things friendly airplanes are and a little more. It is not expensive or difficult to build and, with a .40 or .45 four-cycle engine, it is very quiet and stingy with fuel. Build one and you'll see!

CONSTRUCTION. Begin the fuselage by edge-gluing three sheets of 3/16x3x36-inch balsa to form one sheet 9 inches wide. Cut the fuselage sides from the opposite ends of this sheet. Do not make the wing cutouts at this time. Use one of the sides as a template to cut out two 1/16-inch plywood doublers and epoxy them to the insides of the fuselage sides. Join the two

Type: Sport Trainer
Span: 55¼ inches
Area: 538 square inches
Weight: 48 ounces
Engine: .25-.45
Channels: 4

An ideal model for four-strokes, the Hawkshaw adapts readily to two-strokes as well.

A right triangle used to align bulkheads. Note T-nuts firewall.

sides, with the plywood on the outside, and sand them to the same outline. While they are still joined, make the wing cutout (save the pieces for later) and drill the holes below the cutout for either ¼-inch dowel (if rubber band attachment is desired) or otherwise 3/16 inch. Glue the two servo mount rails and the tank floor rails in their respective places. Mark the bulkhead locations on both sides.

Cut the firewall and the two cabin bulkheads from plywood as shown on the plans. Drill the firewall for the motor mount bolts, throttle, and fuel lines, and install the T-nuts on the back side. Drill F2 for the throttle line. The engine you use will determine the location of the throttle line on F2, as well as the fuel and overflow lines on the firewall.

Glue the cabin bulkheads in place on one of the fuselage sides, using a right triangle or square to make sure they are perpendicular to the side. Glue the other side to the formers directly over the first, again using a square or triangle to keep everything true. The bottom of the fuselage is straight and should aid in alignment. Bring the tail together, bevel, and glue. Watch alignment here. Glue the firewall in place, and make and install the tank floor. Build up the landing gear mount from ¼-inch and ⅛-inch ply-

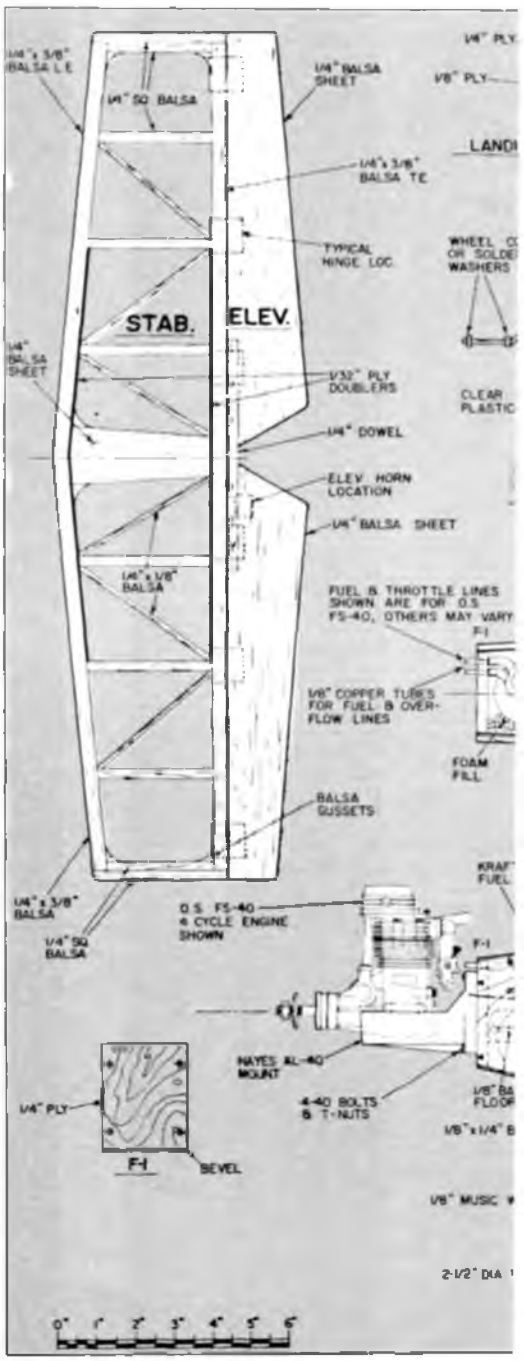
(Continued on page 103)

Above: Streamlined gear fairings dress up the airplane. Below: Make sure both fuselage sides are even.

Fuel tank wedged in place with foam blocks.

Note loop in throttle pushrod for adjustment and strain relief.

FULL-SIZE PLANS AVAIL



Above: Rounding a pylon or just horsing around, the Hawkshaw is a ball. Right: Minimum structure to top of wing gives you a cockpit.

LE... PAGES 116, 117

WING PLAN LEFT SIDE

WING RIB PATTERN

DIHEDRAL BRACES

FUSELAGE TOP VIEW

FUSELAGE SIDE VIEW

NOTE OPTIONAL 7" CANOPY MAY SUBSTITUTE WIND SHIELD & HEADREST

NOTE BUILD LEFT WING HALF THEN TURN PLAN OVER AND BUILD RIGHT HALF. COMPLETE WING AND MOUNT ON FUSELAGE WITH RUBBER BANDS BEFORE DRILLING HOLES FOR WING MOUNT BOLTS. SPAN 55-1/4" AREA 538 SQ IN. WEIGHT 48 OZ

MODEL AIRPLANE NEWS

HAWKSHAW

DESIGNED & DRAWN BY L.F. RANDOLPH

TRACING BY JOE DEMARCO

WATTS UP?

by BOB SLIFF

CARL GOLDBERG MEMORIAL. Earlier this year, noted soaring columnist Bill Forrey had the great idea of honoring the late Carl Goldberg through regional memorial contests that would involve the flying of Carl's own glider design (and kit), the Gentle Lady. Profits from these contests would be donated to A.I.D.S. research, as Carl had contracted the disease through a blood transfusion when undergoing a coronary bypass operation.

Bill's idea came to fruition here in California over the Labor Day weekend through the sponsorship of the Harbor Soaring Society, as well as a good number of industry members. The contest covered two days, with Gentle Lady Sailplane on Saturday, August 31, and Electric Ladies on Sunday, September 1. At the last minute, the Electric Old Timers were added to the Sunday event (with Hobby Horn donating the trophies).

Sailplane on Saturday had the best attendance with some 32 entries. (The top finisher was none other than one of our U.S. F3B team members, Mike Regan.) Sunday, Electric Lady day, had less entries, but with the two events the combined total was 17.

I'd like to point out that at least six of the Electric Ladies also flew in the Saturday sailplane event, proving that these gliders can do double duty between pure glider and electric power sailplane. My dual-purpose Lady flew well both days, and on glider day even received the award of the "Best Looking Gentle Lady." I gave her a U.S. Army flair and called her the "Gentle Crunchette." She flew better than I did, as I came in eleventh. Anyway, once through on Saturday, her weighted "Radome" came out and was replaced with an Astro Super Ferrite (plain bearing) 05. On the front I added a Kavan 1½-inch aluminum spinner and a Taipan 7x4 prop. I also added seven 800-mAh Sanyo cells, along with an Astro Flight On/Off electronic motor control. Balance was okay, and she flew

Bob Sliff's Gentle "Crunchette" received an award. See text.

that evening for the first time as an electric. I didn't even have to retrim her.

Sunday arrived with medium grade wind, Mike Charles as CD, and 17-odd entries in Glider and Old Timer.

Flights were by rounds, with a first round of GL gliders and then a round of Old Timers. After repeating each round, there was a final tally for the winners. Flying was great, though staying up with the wind, especially in the second round, was rather tough. Still, competition was keen, for there was very little thermal activity, making good, smooth flying very important. The rules, too, were such as to make flying challenging and very enjoyable, but before I get into that, let's see who did what:

Sunday Electric Powered Gentle Lady Class: 1. Sam Niece, Astro 05, 2,100 pts. 2. Frank Heacox, Leisure/Yokomo 05, 1,995 pts. 3. Bob Sliff, Astro 05, 1,848 pts. 4. Dick Pantzar, Leisure LT-50, 1,320 pts. 5. Thomas Colp, Astro 05, 1,239 pts. 6. Bill Forrey, Astro 05 (one flight), 1,028 pts.

The Best Looking Electric Gentle Lady Award went to Dick Pantzar.

Electric Old Timer Class: 1. Chuck Hollinger, Astro G/05 Cobalt, Nomad, 1,928 pts. 2. Bob Sliff, Astro G/05 Cobalt, Playboy, 1,707 pts. 3. Ross Thomas, Astro G/15 Cobalt, Playboy, 1,605 pts. 4. Dale Black, Leisure G/LT-50, Playboy, 1,524 pts. 5. Don Nigg, Astro G/05 Cobalt, Playboy, 1,440 pts. 6. Mike Chatles, Astro 40 Cobalt, Bombshell, 1,441 pts.

The Electric Lady day rules worked very well and are an interesting case for electric events in general. At least they offer a fine alternative to the more often used "cell rules" (namely, 7-Cell and Open with a limited motor run). I highly recommend them for other CDs of electric events, so let me detail them for you:

Let's start with Electric Sailplane. Here, with the idea to *fly* to win (not power to win), the following restrictions

Electric Lady winners, top, and Electric Old Timer winners, below, at Carl Goldberg Memorial.

were placed on motor and batteries. The motor had to be a mass-produced, direct-drive ferrite 05, such as Leisure, Astro or other Japanese "can or modular" type motors of the general 05 size. Cobalt and larger size ferrite motors were not allowed, though Bill later said that with the battery limitation, motor choice was not

(Continued on page 115)

Club of the Month

The Des Moines R/C Modelaires are the *Model Airplane News* "Club of the Month" for January 1986. Located in Des Moines, Iowa, this club of 40-plus members has an excellent program of activities during the year that includes a Father-Son Fun-Fly, a Sig Memorial Fun-Fly, picnics, and a recent mall show at Nollen Plaza in Des Moines. This plaza is in the heart of the city and is a central gathering spot for open-air activities, so hundreds of citizens were introduced to modeling at the show.

For a flying site, the members use a sod farm located just off Interstate 80. Unfortunately, the club is in jeopardy of losing this great site due to hard times with the farming community and the return of such land to revenue-producing crops.

Model Airplane News applauds the Des Moines R/C Modelaires and is pleased to award two free one-year subscriptions, which are to be given by them to their outstanding junior members.

Congratulations!

Each month **M.A.N.** will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). **M.A.N.** will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletters to **Model Airplane News, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06829.**

OFFSHORE

by JOHN OIAN

EVIDENTLY I hit a sensitive area with a recent column when I questioned the need for more than one boating organization. This was the biggest response I've had to any column. The responses varied from decidedly pro to just as decidedly con. Included was a letter from Myrtle Coad, Executive Secretary of NAMBA:

"I must take exception to your recent article in *Model Airplane News*. At our Nationals it seemed like every other modeler commented about the piece. You wrote without checking your material! You at one time belonged to NAMBA and should know how to get in touch with the headquarters for information.

"One organization? What would happen if we only had one baseball or football team, or one political party? Who would watch over them to keep them on their toes?

"You quote the numbers of members and you are way off for NAMBA. We have over 3,200 members with 2,300 of them being individually insured with us. Our Nationals had 718 boats registered. Does that sound like a few members to you? We have members in Japan, Denmark, West Germany, and Sweden, to mention a few. Do you really believe that anyone in R/C boating can't afford the cost of two memberships and still be able to compete in two organizations? A great many of us believe in supporting our hobby, be it airplanes, cars or boats. AMA, ROAR, NAMBA, and IMPBA are all doing a service to this country by keeping families together in enjoying a hobby.

"As an 'old time' Fellow member and Hall of Fame member of AMA CD, I can vouch for supporting the hobby. I have written many articles for our model magazines and I have always checked my information first. You do harm to our hobby as a whole if you don't.

"Your statement about cash prizes is

Gus Johnson of Florida retrieving his slightly bent hydro.

way out of line. Our insurance prohibits use of cash prizes because of the situation that developed in slot car racing and how many hobby shops went broke during that time. We are the only boating organization that is also a member of the Hobby Industry of America. I've enclosed the last *Propwash* for you to read to get an idea of the 115 races we sanctioned this year and where some of the clubs are."

Well, Mrs. Coad is right in some areas. I do owe her an apology for not getting my numbers right, but absolute numbers were not the point I was trying to make. I was concerned with our clout when dealing with insurance companies and organizations like the FCC. Even if you use the same figures for IMPBA as NAMBA for the total number of boaters (I know I've not included AMYA, scale boaters, etc.), I would be surprised to learn if the total came to more than 10,000 (organized) boaters. This is still only approximately 10% of AMA, and less than 1% of the other frequency users (CBs, etc.).

As for the comparison between slot cars and boats relating to cash prizes, I feel that we're talking about two very different activities. Yes, while in high-school I did work in a hobby shop that was also a slot car track. At that time, slot cars were very much a youth-oriented activity. What killed it, if I remember correctly, was the escalating cost of fielding a winning car, which quickly took it out of the pocketbook range of most of the participants who were young. I don't know that money prizes would affect boating that much, as there are very few youngsters who can afford to field a minimal boat, even at today's prices.

Consider something as simple as a stock tunnel hull. You're talking an average minimum of $300 to get it in the water, not counting the skill it takes to win. I don't know too many non-parent-subsidized youths who can afford that, not to mention the "round" figures of $800 plus for an X or F boat. Again, I refer back to the model airplanes which have not been ruined by the ability to give cash prizes. Fliers still put the maximum effort into such events as Formula One (take a close look at that one if you think boats are expensive), and they still are willing to fly for trophies in most cases. Unfortunately, banning money prizes does not necessarily keep down the cost of an activity.

Again, I apologize for not getting my numbers correct. My main thrust was to get people thinking and possibly talking about their views on various issues. I think I succeeded.

Jay McGuire's Pay-n-Pak outrigger is an example of the excitement of powerboating.

Who says hydros are the only ones with rooster tails?

The following are some comments from other letters. Unfortunately there is not enough space in this column for all the letters, however, this is a pretty good representation of what was said. You'll have to take my word for it that the selection is fairly drawn:

"Two organizations are not too bad an idea because they generally cover different geographical areas, so most boaters would not have to join more than one organization. Would it be possible for NAMBA and IMPBA to join forces in the negotiations for insurance coverage without merging on other points?"

Sounds like a good idea, but it will probably never happen. This was the most frequent comment, by the way.

One hobby shop owner felt that one organization might allow more mobility between the various phases of the R/C hobby. Another frequent comment from the IMPBA members who responded was that I had confused a couple of the IMPBA classes. They're right. The classes seldom run are A and C (.10 and .29). I should know, I have an A boat in the process of being built!

As for cash prizes, response was minimal, but very polarized. One you have already seen and the other was a comment by an IMPBA assistant director who was absolutely for it.

Well, so goes the survey. I got a lot of responses and hopefully a lot of people thinking. Remember that your organization, whatever it is, needs to know how you, the boater, feel. Don't be afraid to let them know what your views are. It will actually make their jobs easier. Thanks for all the response. The next time I need to impress the publisher with the number of readers I have, I'll know what to talk about.

Beryllium Hazards

Now on to another subject. Most of the props we use are a beryllium copper alloy. In the September 1985 *American Dental Association Journal* there was an article on possible hazards from the casting and finishing of various dental alloys. The following is a paragraph dealing with the hazards of beryllium:

"Exposure to beryllium may result in acute and chronic forms of beryllium disease. Workers exposed to moderately high concentrations of beryllium dust for a short time, or exposed to low concentrations of beryllium for a long time, may experience symptoms of acute diseases. Physiological responses vary from contact dermatitis to severe chemical pneu-

Gary Yeoman's .40 "V" is a delight in the water.

monitis, which can be fatal. The chronic disease state is characterized by symptoms persisting for more than one year, with the onset of symptoms separated by a period of years from the time of exposure. Symptoms range from coughing, chest pain, and general weekness to pulmonary dysfunction."

The National Institute for Occupational Safety and Health (NIOSA) recommends a limit of .5 micrograms per cubic meter of air based on a 130-minute sample. It was reported that levels exceeding this amount were accumulating when finishing of these alloys was done without the benefit of an exhaust system.

The alloy used in our props is 2% beryllium, which is about the same percentage found in some dental alloys. Relatively high concentrations of beryllium are given off during the melting and casting process, which we fortunately are not party too; however, it would make good sense to do your prop finishing and polishing in a well ventilated area, and to wear a filter type mask during the process to prevent any future problems.

John Olan, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829. ■

FROM ELECTRICS

(Continued from page 74)

edge and the guide line should be flat and have no curvature. When completed, the trailing edge area of the blade will be relatively thin.

Treat the leading edge area, from the guide line forward, in the same fashion, except leave the actual leading edge about 1/32-inch thick so that it can be rounded off with the final sanding. When both steps have been completed you will have what is commonly called a "diamond airfoil," triangular in shape.

By thinning the blade in this manner you have control over the shape being developed without using templates, and the final airfoil throughout the blade will be precise.

Bring the airfoil down to final thickness and shape by fairing off the center point of the "diamond" to create a curvature. Give careful attention to the area of the blades just outside of the hub as there's a great change in shape here, from the hub to the blade airfoil. Manufacturers do not give this area much attention, often leaving sharp edges and considerable thickness at both the leading and trailing edges. You need to clean this mess up to reduce drag. You also need strength in the area, so the blade must remain quite thick within an inch or so of the hub. Do the clean up by flowing the two shapes together as neatly as possible. Using the leading and trailing edges as guides, streamline the cross section while maintaining maximum wood thickness at 1/3 of the chord. Average hubs are only about 1 inch in diameter so you should see that if a spinner is used you will have more area to work with. What falls inside the spinner does not count!

The propeller is now ready for final sanding and balancing. Actually, if you took the time to check the balance as each step was completed, you would have pretty good insurance that both blades are identical and that little balancing will be needed now. The sanding should remove all file marks and sharpen all edges, *except* the leading edge which should be slightly rounded.

If this is a trial prop and out of the ordinary, you will not know how well it suits your power supply without tests. You don't want to overload the motor. Using stock props, the manufacturer monitors the current draw from the battery and the rpm to find his recommended sizes and they obviously suit the motor's ability. This effort has been to improve the efficiency of the propeller so that we can gain greater thrust by using more prop than would be possible with stock types. The precise test would be with an ammeter and tachometer, noting that the reworked prop meets the manufacturer's specs for a stock prop. Not everyone has an ammeter, so a simpler test would have to do in most cases.

Let's say that the manufacturer states his recommended prop turns 5,000 rpm. We can assume that the current drain would be in a safe range also. A simple check would be to have the reworked prop turn within 500 rpm of the specified 5,000. Then check the current drain by allowing the motor to run for about a minute. If the battery and motor do not get excessively warm, you will know that the motor is not overloaded. Go fly and compare results. Should you feel that the motor is overloaded, at this stage the only cure probably would be to reduce the diameter.

For example, my "best prop" tachs 500 rpm below a stock prop, the batteries stay cool, and the in-flight motor run is about 5 minutes. This is within the manufacturer's specs for the motor.

With gas engines prop rpm is a pretty good guide because the engine responds precisely, rpm-wise, to the prop load. Unfortunately, electric motor rpm is not precise. Over quite a broad load range the motor will maintain rpm by simply drawing more power (current), so you can't use an rpm check to compare props on an electric motor; it has to be an in-flight evaluation. You might consider this an advantage for electric motors, starting at the low end of the thrust scale. If more thrust is desired, you can simply increase the prop size—within limits, of course. All it will cost you is battery duration. This ability is amplified when geared motors are used due to the mechanical advantage provided by the gear system.

I have not spoken of one advantage gained through this rework process. Experience has shown that in every instance the reworked prop will unload more in the air than will a stock prop. In some.

(Continued on page 98)

FIFTY YEARS AGO...

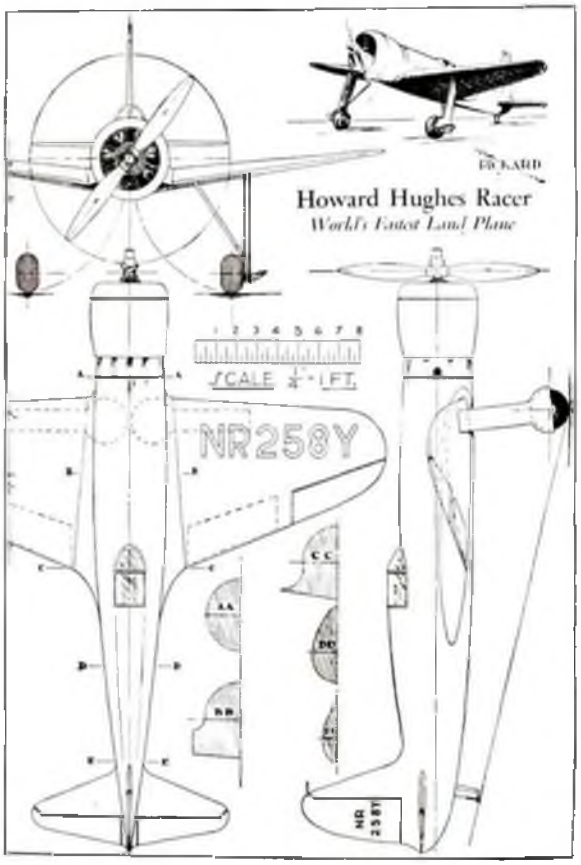
by DAN SANTICH

"FLY a Record Breaker." That was the heading for an advertisement by Aircraft Industries of Los Angeles, California, for their Baby Cyclone Engine. Indeed, the engine had captured many first place trophies and held the California Endurance Record of 1 hour and 3 minutes.

On the other side of the country, Maxwell Bassett of Philadelphia was blazing his own trail with a Brown

Junior-powered model. It wouldn't be too long before the Tlush Super Ace, Forster, and Bunch engines would be gaining prominence. Cyclone Aircraft (not the engine makers) of Brooklyn, New York, introduced one of the first kits especially designed for gas engines. It sold for $5 and had a 7-foot wingspan. Soon, this kit would be competing with Berkeley, Ohlsson, and Bunch gas-powered kits.

M.A.N. offered some tips on these new powered models and one article by James Condon offered the solution to test-flying a gas model without cracking up. His method was to attach a string to the ignition On/Off switch and run alongside the aircraft, ready to pull the switch if the airplane got out of hand.



Left: Scale drawings were as popular a feature back then as they are now.

Right: Unique method of test-flying. See text.

This was probably one of the first "fail-safe" systems ever devised.

Howard Hughes was making a name for himself in the history books by piloting his Hughes Racer to a speed of 352 mph. The Douglas DC-3 Transport was introduced, Hawker Aircraft of Great Britain rolled out their new low-wing, single-place fighter named the "Hurricane," and Germany's aircraft industry was shifting to more and more offensive type aircraft with the Dornier Do.23, the Focke-Wulf "Weihe," the Junkers, and the Arado Ar.77, all capable of bombing cities outside Germany.

In the preface to *Jane's All the World's*

PRODUCT NEWS

THE CONQUEST 6NLK/Dual Rate 6-channel system by Futaba Corporation of America (555 West Victoria St., Compton, CA 90220) is ergonomically contoured for comfort and is equipped with G-Series precision adjustable gimbals for control. Features include two adjustable dual rates, modular RF board, servo reverse switching for all 6 channels, electronic trims, and nickel-cadmium operation. The Conquest 6NLK system comes complete with triple-tuned R7H 7-channel receiver, 4-S28 precision servos, NR-4m nickel-cadmium flat pack, FBC-8B(1) dual charger, servo trays, switch harness, frequency flags, and hardware. Models in 72 and 75 MHz are available.

THE "PREP-TACKER" by Craft-Air (20115 Nordhoff, Chatsworth, CA 91311) is an incredible perforating tool that all but eliminates bubbling when applying any iron-on film covering. Preparing wooden surfaces for covering by applying over 700 perforations per square foot will take many hours *less* time with Prep-Tacker. This amazing tool is now available for $9.95.

THE VIOJETT SYSTEM is not just another fan, but a completely new product line of fan, engine, fuel system, airframe structure, and specially molded fittings to make ducted-fan jet modeling an easy and quick assembly process. From Bob Violett Models (1373 Citrus Rd., Winter Springs, FL 32708), the Viojett is shown with a special K&B 11cc engine manufactured exclusively for Bob Violett Models. Many unique features, such as a long shaft, one-piece case design, special bearings, trimmed down external dimensions, remote needle valve operation, and unexcelled horsepower-to-weight ratio, make this engine a real complement to the Viojett. For more info on the complete Viojett product line, send $1 to Bob Violett Models.

FOX MFG. (5305 Towson Ave., Fort Smith, AZ 72091) has added the new Mark X Series Carburetor to the Fox 15X Baffle Type Motor, which was previously available in only the control-line version. This new carburetor can also be installed in the Fox 15BB motor, which has been very competitive in FAI. A stock adapter is needed to install the new carburetor on the Fox 15BB motor, but all motors shipped after July 1985 are equipped with the Mark X for the same low price, $49.95.

MRC-TAMIYA (2500 Woodbridge Ave., Edison, NJ 08817; 201-985-7800) introduces the Toyota Tom's 84C Racing Master MK.6. The kit is designed for those who want great performance out-of-the-box at a reasonable price. It comes with six ball bearings for the front and rear axles, four low-profile compound tires and hubs, spring-loaded front suspension, and the track-proven rigid rear axle using the dial-adjustable stabilizer. The electric motor is the time tested Mabuchi RS-540S, coupled to the differential gear through your choice of two different gear ratios. See you local hobby dealer or contact MRC.

THE LITTLE TORCH from Burlington Roundhouse (319 Barrett St., Burlington, IA 52601) welds with incredible precision an unlimited range of materials; brazes the tiniest elements with uncanny accuracy; solders hard or soft, with amazing versatility; and heats with infinite control at an infinite variety of flame settings and sizes. There are thousands of modeling applications for this handy tool. The Little Torch weighs only 1.5 ounces and fits like a pen in your hand. It comes with five tips to provide a wide range of flame lengths and heat output for various metals and thicknesses.

THE PIGGY-BACK Transmitter Pack from SR Batteries (Box 287, Bellport, NY 11713; 516-286-0079) doubles the flying time of *any* transmitter and is already being used by some of the country's top fliers. It eliminates the transmitter's internal battery pack and gives you 950-1,000 mAh capacity instead of the usual 450-500 mAh. This new external pack consists of eight SR 900 Series Cells contained within a heavy-duty extruded aluminum battery box which mounts on the back of your transmitter. The Piggy-Back was specifically designed with all Airtronics, Futaba (including PCM), JR, and Kraft transmitters in mind. The price of the complete unit is $49.95 plus $3 for shipping.

CRAFT-AIR (20115 Nordhoff, Chatsworth, CA 91311) announces the RV-4, today's most popular two-place, sport, home-built, low-wing aircraft. With a wingspan of 56 inches and a wing area of 550 square inches, the RV-4 is designed to fly with either a .30-.40 two-cycle or a .45-.65 four-cycle motor. The kit features all machine cut and sanded parts with precision die-cut formers. Aluminum landing gear, ABS cheek cowls and wheelpants, and a clear canopy are also included. Introductory retail price is $89.95 from your local hobby dealer.

THE "ROBBY-COMPLETE" PT-109 from Robbe Model Sport (Suite 345/55, The Office Center, Plainsboro, NJ 08536; 609-799-4712) is designed to be ready to go in one evening. Everything you need to complete the PT-109 is included in the kit. All you add are an economical 2-channel radio and drive batteries. The length is 20½ inches, the beam 7 inches, and the weight 41 ounces. The PT-109 kit has a stepped speed controller and a pre-wired motor. The deck separates from the hull for easy access and there is a special rubbing strake for a water-tight seal between the hull and the deck. Adhesive and tools are included and a multi-colored decal set and a pre-colored hull make painting unnecessary. The complete kit retails at $84.95. Contact your local hobby dealer or Robbe for more information.

PERFECT PAINT: Cheveron Hobby Products (P.O. Box 2480, Sandusky, OH 44870; 419-627-1877) is taking the guesswork out of paint selection by putting an actual paint chip on every can of Perfect Paint. Now you can be confident when choosing the exact color you need. Perfect Paint's glossy colors are computer-matched to Mono-Kote and many camouflage colors are computer-matched to the Federal Standards. Perfect Paint will cover dopes, epoxies, metals, fiberglass, styrofoam, and plastic with a smooth, hard, mar-resistant surface that will not crack or chip. It is extremely fuel-proof, virtually odorless, blushless, has excellent flow properties, and is non-toxic.

THE RAINBOW is another "Robby-Complete" Kit from Robbe Model Sport (Suite 345/55, The Office Center, Plainsboro, NJ 08536; 609-799-4712). Easy-to-understand drawings guide you through the assembly stages in just 2-4 hours. Every "Robby-Complete" kit includes a special mounting plate that makes radio installation easy. The Rainbow has a one-piece water-tight Plura hull, aluminum mast, ready-to-use sails, and a sail control arm that fits a standard Futaba servo. Adhesive and tools are included and a multi-color decal set eliminates painting. Rainbow is 19½ inches long, its beam measures 5½ inches, and it weighs 52 ounces. A 2-channel radio is required. Rainbow retails for $89.95. For more info, contact your local hobby dealer or Robbe.

THE MACH 40 by Roush Manufacturing (1728 Bywood S.E., Canton, OH 44707; 216-484-6810) is a down-sized version of Norm Page's Mach I. With a wingspan of 58 inches, a wing area of 580 square inches, and an average weight of 5½ pounds, the Mach 40 is a smooth-flying sport or aerobatic airplane that locks in any direction you point it. It is designed to fly on a .40-.46 four-stroke engine. The Mach 40 is available directly from Roush for $69.95.

FROM ELECTRICS

(Continued from page 90)

cases the difference has been very dramatic. This is caused by the prop having less inherent drag. In flight, the prop load is reduced and with less drag the motor can reach higher rpm. This factor should be remembered when checking the rpm of your new prop, you can have a lower static rpm than with a stock propeller.

Should your reworked prop rpm be higher than the guide rpm, go ahead and fly, knowing that the next time you can increase the size as you wish. You should see an improvement over what you had before.

One incident while making my rpm checks will not be forgotten easily. I ran the stock prop first with a helper holding while the taching was done. Next I turned the motor on with the reworked prop, and immediately my helper cried, "This thing is going to blow me away!" On the way to the flying field you can imagine me wondering if I had just made a better "fan" or did I really have a much better propeller?

All sorts of testing can be done with your prop at this stage, alterations made, etc., however once you're satisfied, give it a protective finish. A simple and adequate finish can be had with several coats of plain spray enamel. Simply sand neatly between coats and the result will look very professional.

All this would be for naught if it did not lead you to further experimenting. Don't just make your second prop a copy of the first. Instead, when you see how the first one works, use the ideas discussed to determine how the second one could be made still better.

Good luck! ■

FROM THE COCKPIT

(Continued from page 21)

for me to trundle on down to St. Augustine and see what the hell he was talking about.

To someone like me who spends most of his time in a two-place Pitts, a Command Air 3C3 is bigger than your average biplane. In fact, it's bigger than your average everything. Jim was dragging me around the airplane in a circle, pointing out its better features, but every other sentence came out, "Neat, isn't it?" Since the airplane was actually owned by a gentleman who lives in England and keeps it at AeroSport in St. Augustine for relaxation when he comes to the colonies, we thought it best to have somebody on board who had some idea of what he was doing, since I certainly didn't. So Jim threw one of his friends into the front seat, pointed at the back, and said, "Go flying."

I scrambled up on the lower wing and immediately noticed that the sheet metal had a bathtub-type cutout (i.e., both cockpits were in the same cutout, separated by only the rear instrument panel). As I slid down into the cockpit, I could see one reason Moser liked this airplane—he's 6 feet, 5 inches and here's a machine that doesn't even begin to intrude on his many corners. I, on the other hand, felt a little lost in it. Deciding to explore the general territory within the boundaries of the tubing, I slid my feet up to the rudder bar and it was just that—a bar pivoted in the middle with brakes being of the heel variety. Historically, I hate heel brakes because you can never get them when you have the rudder full down and desperately need them. On the Command Air, however, the geometry is surprisingly good and I found I could always swing a heel inboard and tap a little brake whenever I needed it.

Aside from the stick, rudders, and throttle, there wasn't a heck of a lot else to look at. I scanned the instrument panel and found it was somebody's idea of a joke, if only because the airspeed indicator went up to 700 mph! I knew full well if you threw the heaviest part of the airplane, the 110-horse Warner, overboard at 10,000 feet, it wouldn't reach 700 mph before it hit the ground. And trying to force the Command Air past even 200 mph would be like trying to break Mach 1 with a parachute.

Somewhere in the middle of my musings somebody yelled, "Hot and brakes!" and I suddenly found myself sitting behind a 7-cylinder collection of exposed rocker arms that looked like a bunch of beetles doing a jitterbug on a radiator. Each one of them was spitting minute amounts of rocker arm grease back at those of us fortunate enough to be scrunched down in the slipstream.

Pocketa-pocketa-pocketa. I brought the throttle up and started wending my way out toward the runway, occasionally finding it helpful to stab a little brake to tighten a corner, since the tailwheel didn't seem to want to give me anything remotely resembling a tight turn.

Lined up into the wind (they say they've never tackled a crosswind, but I had already heard tales from other sources of the airplane's lack of cross-

(Continued on page 100)

FROM THE COCKPIT

(Continued from page 98)

wind capabilities), I straightened out my left arm and heard the pocketas get closer together until they merged into a sound that can only be made by a radial engine that's doing its very best to pull the fabric-covered hangar behind it into the air.

As soon as it was rolling I picked the tail up and found myself blessed with more rudder than I knew what to do with, which made running down the centerline no problem whatever. Having had the briefest of checkouts ("Budd, you sit there and have a good time."), I didn't know and didn't particularly care what speed it needed to fly. I just kept the tail slightly down and, in little or no time, the airplane lifted off in what appeared to be a dead-level attitude. I glanced at the airspeed to get some sort of guide for establishing a climb attitude and just as quickly dismissed it as being there only to occupy the hole. Yes, the needle came up off the peg, but, with the number 700 at the top, you don't get a heck of a lot of movement at the bottom. I cautiously established something that looked like a positive deck angle and watched as the altimeter leisurely wound its way up to 1,000 feet, where I got my first message in the windshield oil.

So, there I was at 1,000 feet. Now what? Don't expect glowing reports of wingovers and Immelmanns with 8-point rolls and hammerheads in between. The Command Air is not one of those airplanes. The Command Air is a little slice of old-time aviating in which simply clearing the trees and giving yourself a vantage point enjoyed by few mortals was simply enough. Its takeoff was indicative of the mode of transportation the Command Air represents—it doesn't fly, it floats. Its acres of wing endow it with so much innate lift that the engine is there only to get it rolling, only to excite those wing panels with passing air and coax them into taking man and machine into the third dimension. It is not a machine that rushes through the air, leaving jagged holes where it has forced its way between Nature's elements. No, this is a machine that rides along on the crest of liquid summer sunsets and gives you all the time in the world to absorb the thrill and the emotion that is flight.

This is not a machine for personal amazement. This is a machine for three-dimensional meditation.

Knowing that no form of meditation was going to get the airplane back on the

(Continued on page 102)

FROM THE COCKPIT

(Continued from page 100)

ground, I lined up on downwind and obediently brought the power back, putting the nose down to what seemed to be a reasonable attitude. The airspeed indicator didn't move! Knowing how big, dirty airplanes of the era loved to assume the glide angle of a shuffleboard puck, I made my turn onto baseleg a little shorter than usual, so I wouldn't have to depend on too much power to get me to the threshold.

Turning final, I saw instantly I had underestimated the airplane's desire to stay in the air. In no way was it going to fall out from under me and come streaking toward the grass alongside the runway. If I expected to get it down, I was going to have to force it down. Putting my hand into the left corner and my foot into the right, I set the Command Air up slightly sideways and watched as it scribed a straight line through the air toward the end of the grass runway.

Having no idea what its characteristics would be in the flair, I straightened out just a bit high and crept the power lever forward to feed a few hundred extra rpm into the prop.

As the edges of the runway came into view, I leveled off at a prudent altitude and the airplane came to a semi-halt in the air. It was at that point I realized I was several feet too high and was about to make my usual vertical descent onto the ground a little more vertical than I wanted. A little more power softened the whole affair and those giant wheels and the long stroke landing gear let me settle onto the sod with my dignity more or less intact. The next landing went much better, although I still broke the glide too high and had to nurse my way back to the ground.

In all honesty, the Command Air 3C3 AT is not the kind of machine I'd want to own because I'm born of a different age, an era in which fire and brimstone performance is often preferred over mood-elevation. But that's my problem, not the airplane's. The airplane is a fascinating combination of mechanical motions that say much for Vollmecke and the Command Air Company. They built a fine, solid airplane that could hold its own against many of its peers and, in fact, flies much better than many of them. It makes one wonder what else Vollmecke, Command Air's chief designer, may have had up his sleeve had the company been able to ride out the Depression. Perhaps today one of the big three would be Command Air, and it would be an aviation household word.

Unfortunately, that's not the way the story was written.

Today the Command Air exists as a single-line entry in aviation's obituary column of those who have come and gone. But it would still make a whale of a model. With those gigungas wings it would be a natural for a Technopower radial. Or, if you want to go bigger (dare you to go to quarter-scale!), you could hide something like a four-stroke Magnum 91-S in the nose, disguising it as one of the cylinders where its exposed rocker arms would be right at home. But don't let me see you giving this airplane warp-9 performance. Let it float along. Let it poke along so slowly you can retrieve it by running along under it and grabbing it. Let it be a change of pace. You'll be the only guy at the field who can zig when he should have zagged and pushed when he should have pulled, and who will have an airplane that gives him plenty of time to correct his mistake. It'll do that as a model, because it does it in 1/1 scale. ■

HAWKSHAW

(Continued from page 79)

wood and glue it between the fuselage sides and to the back of bulkhead F2. Add the cross-grain 1/16-inch balsa sheeting to the fuselage bottom, and note the 1/16-inch plywood at the tailwheel mount.

Before sheeting the top of the fuselage, install the outer nyrods for the elevator and rudder, and the inner nyrod for the throttle line. Mount and connect the fuel tank and wedge it in place with foam. The 4-ounce tank is just right for the .40 sized four-cycle engines, but a larger one should be installed if a two-cycle engine is to be used. The fuel lines are carried through the firewall by 1/8-inch copper tubes epoxied through the firewall. Epoxy the birch or maple wing mounts in the position shown and clamp while the glue cures. Complete the top sheeting and sand. The wing mounts will be drilled when the wing is fitted.

The ribs for the wings can be cut from 1/16-inch sheet, one at a time, by making a cardboard template and tracing around it with a ball-point pen to make a printed sheet, then cutting them out with a razor knife. I like this method because it conserves wood, but, if you would rather, stacking rib blanks together and bandsawing them all at the same time is faster. Buy or strip the spars and leading and trailing edges and cut out the 1/8-inch plywood doublers. Cut the webs so that the grain runs vertically.

Build directly over the plans after covering them with waxed paper. Pin the trailing edge sheet in place, then the bottom main spar, and add the ribs. Note the four center ribs have 1/16-inch trimmed from the top and bottom to allow for sheeting in this area and the notches are widened for the dihedral braces. Slip a scrap of 1/16-inch wood beneath them to hold them at the proper height on the spar. The ribs at the very center of the wing should not be added until both wing halves are joined, therefore start installing ribs with the second center rib and add ribs to the tip. Glue the webs in place, with the thick ones at the center, and add the top main spar, the 1/8-inch square trailing edge, the front top spar, and the leading edge. Do not add the top trailing edge sheeting until

(Continued on page 106)

HAWKSHAW

(Continued from page 103)

after the wings are joined. Turn the plan over and build the right wing on the back side of the plan.

When both halves are complete, bevel the leading and trailing edges and the spars at the center to match the dihedral angle, and join them with the ⅛-inch plywood dihedral braces at the main spars. Be sure there is no wash-in or wash-out in the two panels. The best way to accomplish this is to lay one panel flat on the bench and elevate the other with a strip of wood across the wing, parallel to the ribs, until the tip is 1 inch from the bench. The bottom of the trailing edge and the bottom of the main spar should be the same distance from the bench at every rib. If they're not, adjust the center joint until they are, then glue.

When the center joint has cured, cut the two remaining center ribs as shown to form the servo well in the bottom of the wing. Sheet the top and bottom of the center section. Note that the sheet goes between the spars, not over them. Sand and finish the leading edge, and epoxy the aileron hardware to the trailing edge. Glue the tip plates in position and sand the nearly finished wing.

Slip two pieces of 3/16-inch dowel through the holes in the fuselage and secure the wing in the saddle with rubber bands. Make sure that the spars are directly over the hardwood pads on the fuselage sides, then use a 5/32-inch drill to drill through the spars and into the pads. Remove the wing from the fuselage and enlarge the holes through the spars to ¼-inch (just touching the dihedral braces) and tap the holes in the pads for ¼x20 nylon bolts. Bolt the wing on the fuselage and build the fairings using the pieces saved from the fuselage cutout.

Build the headrest. A scrap of ¼-inch balsa is the former at the wing trailing edge. After the headrest is complete, slice through it with a razor knife and separate the two sections at the trailing edge. A 7-inch canopy can be used in place of the windshield and headrest to give the airplane a more modern appearance.

Build the stabilizer right over the plan just as the wing. Don't forget the plywood doublers at the leading and trailing edges, as these add practically no weight and make the structure much stronger. Cut the elevator from ¼-inch balsa sheet, inlet and glue the ¼-inch hardwood dowel carry-through in the leading edge before making the rudder clearance cutout.

Cut the fin and rudder from ¼-inch sheet balsa just as the elevator, but note that the top of the fin has an additional piece at the top with the grain running perpendicular to that in the rest of the fin. Sand the leading and trailing edges round and smooth.

I used MonoKote on the original model and I recommend it. Follow the instructions that come with the film. The ailerons are epoxied to the torque rods when they are hinged to the wing trailing edge. I usually use hinges made from the covering material, but any of the popular hinging systems are fine. Cut the trim from MonoKote and iron it in place after the covering is complete. I covered the original airplane in olive drab with yel-

low wing and tail. The insignia on the fuselage side is a loose copy of that used by the 94th Pursuit Squadron of the 1st Pursuit Group in the mid-Thirties.

To finish up, bend the two landing gear legs from ⅛-inch music wire, then add the balsa trim and cover them with the same covering material as the fuselage. Mount the wheels and install the gear on the airplane with clips and wood screws. Bend the tailwheel yoke from 1/16-inch music wire, then slip it through the tailwheel mount and bend the tiller. Solder and washers hold the wheel in place on the yoke. Cut a slot through the ⅛-inch and 1/16-inch plywood at the tail to receive the tailwheel mount, epoxy in place and hold with wood screws. Slip a piece of fuel tubing over the tiller and attach it to the rudder with a U-shaped bracket and a 2-56 screw and nut.

Mark the location of the windshield, trim away the MonoKote, and epoxy it in place. Mount control horns on the elevator and rudder, and install the radio equipment. The servos are mounted on a ⅛-inch plywood tray, glued to the mounting rails. Bolt the engine mount to the firewall and install the engine. Hook up the tail surfaces with clevises and nyrods, and the throttle with .025 soft iron wire.

The aileron servo is also mounted in a plywood tray which is glued to ¼-inch balsa risers in the wing servo well. Use aileron hardware to connect the ailerons to the servo. Check that all controls move smoothly and correctly. Balance the airplane at the main spar by adding weight to the nose or tail, then balance along the centerline and add weight to either wing if needed.

FLYING. This is a gentle and forgiving airplane, but is also a good performing one. After distance-checking the equipment, taxi down the runway to become familiar with the ground handling. You will find it similar to tricycle gears, but much better on grass. Hold back stick (up elevator) while taxiing.

The takeoff is quite normal, but if you are unfamiliar with four-cycle engines you will think the engine is running too slowly and you will probably hold it on the ground longer than necessary. The Saito .45 and O.S. FS-40 provide enough power to loop on takeoff, but on the first flight do what is comfortable and climb out at a gentle angle, then trim for level flight.

Hawkshaw will do any of the popular maneuvers other than those which require protracted vertical climb of over 100 feet or so. This is an economical airplane to fly, the 4-ounce tank will fly a .40 four-stroker for 18 minutes at full bore and even longer with reduced throttle.

I hope you enjoy Hawkshaw but, remember, don't let your friends fly yours make 'em build their own! ■

P&B: FANTAIL

(Continued from page 67)

driveshaft are installed into the keel during this assembly. I used Midwest's optional running hardware kit in my boat. It consists of a bushed stuffing tube, a 2 mm steel driveshaft, a three-bladed plastic propeller, and a piece of

latex tubing to act as a universal joint between the engine and the driveshaft.

Next join the two die-cut lite-ply deck halves on the centerline. Since die-cutting plywood is inherently inaccurate, the deck halves have to be cut slightly oversize and must be sanded on the centerline to create a good fit. Use the plans and the formers as a guide when fitting these pieces. Complete the framework by adding the keel and formers to the deck. To insure a straight hull, I recommend that the deck, the formers, and the keel be fitted, blocked up, and clamped in place prior to gluing. When good alignment is established, drip thin cyanoacrylate glue on the joints.

Sheet the bottom of the hull with two die-cut 1/16-inch balsa pieces and plank the sides with 1/16-inch balsa sheet. Complete the boat by adding a basswood subdeck and mahogany seats, toe rails, and coaming. Fit the engine/boiler mounting plate tightly into the hull, but do not glue it in. The hull will be much easier to dry and the engine will be easier to maintain if the mounting base is removable. After fitting the motor base, mount the engine and the boiler in the positions shown on the plans. Initially, I mounted the engine flat on the base as per the instructions. With the engine mounted this way, the engine shaft and the driveshaft are not lined up well. During my running tests I found that the engine ran better if I placed a wooden wedge under it to improve the alignment of the crankshaft and the propeller shaft.

For finishing, I glassed the hull with Midwest 0.6-ounce glass cloth and two coats of K&B polyester resin. The Midwest cloth is the easiest I've ever worked with. It goes around compound curves like magic. I covered the whole hull in only two pieces without a single wrinkle. I first painted the hull with Krylon white and after rubbing it down I painted it with Krylon green below the waterline. I sprayed the rest of the boat with Varathane gloss varnish.

I used a JR radio and installed it with servo tape under the seats as shown on the plans.

PERFORMANCE. Running the steam engine is very easy. Add 3 ounces of water to the boiler through the screw capped port, along with a few drops of oil for lubrication. Fill the burner cup with sterno. Place the boiler over the burner and connect the piece of silicone tubing between the engine intake and the boiler. Light the burner and wait for the water to boil. After about five minutes, steam will begin to hiss out between the piston and the cylinder. You can then start the engine by flipping the flywheel in a counterclockwise direction. If it doesn't start, wait another 15 seconds or so and flip it again. If the engine is hissing and it doesn't run or only runs for a few turns after flipping on repeated attempts, check to make sure that none of the moving parts are binding. Also check that the spring that holds the two valve faces together is providing the minimum tension required to maintain a seal.

I found that the 30-mm diameter, 16-mm pitch propeller provided with my hardware kit was too small for the engine. I called Mr. Rogala of Midwest and he sent me several other propellers to try. I found that the boat ran best with a 35-mm, 18-mm pitch prop. Mr. Rogala assured me that a large propeller will be included in all future hardware packages.

The boat cuts through the water well but I suggest you avoid the water if gusty winds prevail, as shallow draft boats don't like gusty wind conditions. In more temperate winds, the Fantail Launch II is a great deal of fun and attracts lots of attention down at the pond. It's a great entry-level R/C boat kit and the results are very pleasing, but remember, this boat was not designed to tear up the lake. It is best suited to pools and small ponds.

**The following is the address of the company mentioned in the article:*

Midwest Products Co., Inc., 400 S. Indiana St., Hobart, IN 46342. ■

GAMMA GULL

(Continued from page 51)

endow the larger model with an increase in relative flying speed and an improvement in pitch stability. This wing section has subsequently proved its worth on the radio-control Gamma Gull, contributing to its predictable behavior and good penetration.

However, for those of you who prefer a slower flying model with enhanced still air and light wind thermaling performance, the Eiffel 400 as used on the Baby Gull is a good bet, although you'll have to optimise that thin trailing edge. To this end, I've included the appropriate section and ordinate tables in figure 1. The same spar positions and general construction should be used as with the Gottengen.

It is interesting to note how the pro-

gressive development of the Gull, which resulted in larger size and increased weight, has affected the Reynolds Number efficiency. The prototype 35-inch span, 3-inch chord Baby Gull operated in the region of Re. 25,000. This compares with the original free flight 7-inch wing chord Gamma Gull of around Re. 55,000.

Now when we come to the radio-control version, with its increase in wing loading, which in turn obviously gives a higher flying speed, the Reynolds Number has been pushed up still further.

While flying the Gamma Gull and thermaling into the blue in a nice climbing spiral at optimum lift drag ratio and speeds of, say, 16 feet per second (11 mph), we have around Re. 55,000. When the thermaling climb is spent, straighten her up, click on some down trim, and off she nips at, say, Re. 130,000-plus, i.e., 37 feet per second (25 mph).

These Reynolds Numbers, although mainly academic, do serve to illustrate the increase in wing efficiency obtained by doubling the size of the wing, in particular its chord. They also show the effect of the higher flying speed obtained as a result of the increase in wing loading. Both factors result in an increase in Reynolds Number related efficiency. Who will be the first to double-up again to 140-inch span?

So there you have it, a true vintage glider in the sports category with distinct lines and proven performance, which with its three-piece wing is also compact for easy transport.

CONSTRUCTION. In the following construction notes I'll cover the more unusual and important aspects, and I'll leave the obvious to you.

Examination of the fuselage side-view drawing will reveal differences in the tail settings for free flight and R/C. You'll note on the R/C version that the tail is set with its undersurface parallel with the undersurface of the wing. Bear in mind that even though the flying surfaces sit flat on the same datum line, the wing is still at about 3° angle of positive lift. This lower angle of attack of the wing, together with appropriate CG position, permits a wider speed range without the associated pitch trim changes one would get with the free flight settings of a wing at plus 3° to tail datum.

The fuselage, if built correctly, is surprisingly strong for an all-up weight of only around 5 ounces. Starting at the hardwood nose block (use balsa if you must) through the sheeted and planked front section and onto the open rear, aft of the wings, it is an integrated structure.

Take particular note of the blending of the under structure. You will see how the planking is not terminated at one point, but is staggered into the stringers and longerons, thus progressively distributing the loads along the undersurface.

So let's start construction with the fuselage and get the chores over with first by cutting out the formers. The main formers F1, 2, and 3 can be cut from 1/8-inch light ply, but I prefer the laminated ply/balsa/ply construction, which is lighter and stronger. Now start the fun part of the building.

Select good firm 3/16x3/16-inch balsa for the main longerons. It is important to select four evenly-matched strips of tough, top-grade wood for these main fuselage members.

I used white p.v.a. wood glue for adhesive. It has a degree of give in the joints, which helps distribute shock loads. Cover the plan with plastic film to prevent it from becoming a permanent part of the structure, as the plan's not a good covering material!

Pin the longerons in place over the plan and glue in all spacers, etc. When you have two accurately constructed sides and the glue has thoroughly set, affix the 1/32-inch ply side panels. Using an adhesive that will allow you time to work, stick the panels in place, left and right respectively, with the thinned edges rearmost. While the fuselage sides are drying, they should be set up on the building board to produce a curve by packing up the front ends and weighting down at point F2. See the plan view for curvature.

Allow the sides to cure; remove them from the plan, place them back-to-back, and drill for dowels.

Commence assembly with fast-setting epoxy applied to F2 and F3, placed between the sides, and held together with clamps. Check that it's square while curing. Now sand the inside of the tail ends at an angle, so that when pulled together they will mate with the fin post. Clamp and glue. Pull in the nose clamps and epoxy F1 in place. Pull the top front edge of the cabin sides together with rubber bands to hold F4, and cross-brace in place. When the glue has set, fit the .4 mm ply cabin top, clamping to produce a curve to match the front undersurface of the wing.

Glue in place all 3/16x3/16-inch cross

GAMMA GULL

Finish off this section by adding the top sheeting on the leading edge and center section, followed by the under center section sheeting and top rib cap strips.

Construct the outer wing halves in much the same way. Prior to fitting the sheeting to the leading edge of the wing, sand the top of the front portion of the two outer ribs to progressively blend the lie of the sheeting into the tip outline. When this is done, glue the sheeting in place, then add webs and cap strips.

Finish construction by adding the skid, the front wing fairing and the tow hook. Secure the hooks for the free flight version directly to the right hand (starboard) longeron. A little left trim will compensate on the line and provides some glide turn for F/F.

The original free flight Gull was tissue covered, with a red fuselage/fin and yellow wings with black tissue trim.

On my radio version, I have doped nylon on the open surfaces, which are filled with a dope/talcum powder mix over the sheeted surfaces and then sprayed enamel paint for trim. If you choose to use modern shrink plastic covering, then your choice is varied and just about any of them should be suitable.

Fit the 500-mAh battery with a balsa spacer between it and the nose former F1. This will prevent the battery from wedging itself between the fuselage sides and possibly bursting it, following a heavy nose-on landing. The receiver fits directly behind and is accessible from the wing mounting area, if you choose not to fit a front hatch. Standard size servos go under the wing mounting area on two transverse bearers.

Cable controls are used on the rudder and a ¼-inch square medium balsa pushrod for the elevator. I use 1/16-inch welding rod for wire fittings that are cheap, easy to bend, and adequately strong.

FLYING. Although the tow line and flat field were the method and environment of the original, I lugged my replica in its large-finned, gull-wing layout up to the top of the local slope site for the initial venture into its natural element.

I launched the Gamma Gull into the gentle 5 mph breeze and she climbed steadily away into the clear blue sky. With a couple of notches of down trim, she settled into level flight. What a thrill! There was Gamma Gull flying again after 35 intervening years. After I made the first tentative applications of control inputs, it became apparent that small gentle control movements were the order of the day. This was a sensitive bird.

The large fin/rudder area pushed the nose down in tight turns, requiring corrective amounts of elevator to hold the nose up, but good turns could be made with the progressive application of both controls. The small fin/rudder of Type 2 would obviously be of help here.

Simulation of the original continuous tight thermaling turns could be held with a small application of rudder to start the bank, then progressively applying elevator to hold and tighten the turn to the desired degree.

Loops were easily accomplished following a dive to gain speed from level flight. The landing procedure was to climb up the slope from a low circuit, turn into wind at a height of around 3 feet, and gently "breeze her in."

It took the wit of a cockney to extract from my "civy street" pre-occupation with "Particle Accelerators" and to substitute for my forename the "nickname" that stayed with me throughout my time in the service. T'was then, on my return to the base from that 1949 competition, that my mates planted "Gamma" on the proud wings of the "Gull."

Good Flying! ■

FOUR-CYCLES

(Continued from page 41)

replacement, but the resulting sealing which is better, is well worth it.

You old timers will remember how impressed we were by engines like the Ohlssons!

Edwards Five-Cylinder Radial

I have another no-casting, no-high-production engine to tell you about. Those of you who were at the Las Vegas QSAA Fly-In for the last two or three years have seen it in the hands of designer/builder Forest Edwards*. He has one installed in a Fleet Bipe that he flies as often and as consistently as most of us would fly a Senior Falcon. It is now available in limited quantities from the designer. A four-stroker with overhead exposed rockers and valves, it measures 12 inches in diameter and 8 inches deep. No castings are used in its construction; it is totally machined from bar stock. It uses ball bearings on the crankshaft, roller bearings on the master rod, and rocker arms. The Edwards Five uses dry sump lubrication with duplex gear pumps. A CDI (Capacitive Discharge Ignition) spark ignition system is used,

with a gear-driven distributor, and full shielding on all of the high tension components.

What's it like inside? Well, its of 1.1-inch bore and 1.2-inch stroke, for a total displacement of 5.7 cubic inches—93.4 cubic centimeters for those of you who prefer to think things in metric. Engine weight is 8.5 pounds (3.85 kilos). This engine will turn a Zinger 24x14 propeller at 5,500 rpm, idle at 800 rpm, and the sound has to be heard to be appreciated.

If you agree with those T-shirts that say "Real Pilots Fly Tail-Draggers And Round Engines," then this is the engine for you. It is priced at $3,000 and is available directly from old handle-bar moustache himself!

Four-Cycling In Alaska

Winter flying is almost upon us, and we recently heard from Bob Petro in Anchorage, Alaska, who should know more about that than a transplanted Texan living in California. Since it is impossible for any of us to experience every facet of model flying, I enjoy reading about what others are doing. Bob writes:

"First may I say how much I enjoy your much-needed column. By that you can probably construe that I'm a four-stroker nut. So much so in fact that as far as I'm concerned, the two-cycle should be banned from competition. Strong words I know, but after a pleasant afternoon of four-cycle 'whispering wind' flying, then to suddenly have the bliss shattered by some piped screaming-meemie is jarring.

"The more I use four-cycles and the more I see others use them, the more convinced I am that some day we may see a majority of modelers using them, and fields going to *four-cycle only* status. In fact, it's already happened to one in western Washington. Let's face it, we lived with two-cycle, ear-damaging frequencies because that's all we had. Now we have a choice and common sense dictates that four-cycles are by far the better alternative.

"The four-strokers are quick to recognize that it takes a larger engine to accomplish what the two-cycles are capable of. (That's a debatable point now.) So why can't the same reasoning be applied to two-cycles in order to quiet them down? I've deliberately muffled (with exhaust tube extensions) .40s to run quieter than most well-muffled .25s. I even got a Schnuerle .60 to sound like a four-stroker. Unaware, several modelers wanted to know how I got my .60-size four-stroker to fly so fast! Upon learning that it was my same old .60 Seamaster with more restrictions and a 3-bladed prop, they remarked, 'It really wasn't flying any faster—maybe even slower.' They are conditioned to associate speed with sound! Muffle that two-cycle to get the same pleasant sound levels as four-cycles. If you have to go to a larger displacement because of power loss, do it! The four-cycle following did and you don't hear them griping about it. They accepted it as fact and went on enjoying their hobby.

"I'd like to tell you of my two latest endeavors with four-cycles. One is an E-Z (Hobby Shack) Commander 20 that I set up for my O.S. .40 four-cycle. To compensate for the few extra ounces of engine weight, I made the plane a tail-dragger! Eliminating the nose-wheel, using a Midwest engine mount and a

(Continued on page 115)

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NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to: **Model Airplane News,** Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06829.

The mystery aircraft presented in the November '84 issue of *M.A.N.* was the Anderson-Greenwood AG-14. It was a two-place monoplane that used a 90-hp Continental C90 engine, and had a wingspan of 34 feet and a length of 22 feet, 6 inches. First flown on October 1, 1947, a total of six aircraft were built by the Anderson-Greenwood Company of Houston, Texas.

Congratulations to John W. Schroeder of Bethpage, New York, for correctly identifying our mystery aircraft. Other correct entries were received from Frank Beatty, Gene Corson, and many others.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

FOUR-CYCLES

smaller tank and adding a tailwheel brought the CG dead center. I also bent new landing gear wires to place the wheels under the leading edge (with a little toe-in). It's a joy to fly and it hops off the ground holding full up-elevator and climbs like a STOL (11x6 Rev-Up and Sheldon's four-cycle fuel). It goes through the *biggest* loops you'd care to make on three-quarter-throttle and will knife-edge beautifully on full power.

"Well, I've bent your ear long enough. Our club, the Anchorage Radio Control Society (A.R.C.S.) is one of the most active I've ever seen. By the way, we've discovered that those 2-volt glowplugs really need 2V in the cold weather, so you might pass that along to the frustrated crankers bound to come along this winter. Otherwise, we've resorted to blowtorching, catalytic heaters under warm-up shrouds, and ether. And that's on the warm days! On the cold days, (-10°, -15°), we stay home and rub noses!"

Well, if the rest of the A.R.C.S. are as prolific as Bob, there is little doubt as to their degree of activity. There are some "strong words" there, as Bob freely admits, and much room for discussion. By now, Bob and the rest of you will have read my article in the November '85 *M.A.N.* in which I mentioned the news from one of our major importer/distributors that four-cycle engines now comprise 83% of total sales. Time will tell, in the meantime we'll give equal time to *your* opinions.

Eloy Marez, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829.

**The following are the addresses of the company and person mentioned in this article:*

A.G.C. Engineering Co., Ltd., London Road, Apsley, Hemel, Hempstead, Herts, England.

Forest Edwards, 12645 Amber Lane, Grass Valley, CA 95945. ■

WATTS UP?

(Continued from page 80)

important. The battery pack had to be a maximum of seven 800-mAh cells, while the propeller was limited to mass-produced props no larger than 7 inches diameter by 4 inches pitch. (Balancing of the prop was okay; folding of the re-worked ones was not.) The flight rules were two rounds of "Texaco" (meaning fuel equals battery allotment) style duration. Each round was to be a maximum of 20 minutes during which you could run your motor as often or as long as you wanted, with a second climb-out from low altitude (under 100 feet) required some time between 3 and 15 minutes. Points were 1 point per second up to 20 minutes (equalling 1,200 points) with 2 points deducted for each second over the 20-minute maximum.

Bill Forrey offered numerous reasons for this format, too numerous to be detailed here. But, in general, the Texaco (pulled from Old Timer ½A Texaco) style rule equalizes motor power, for hot-running motors equalize with the slower motors by running out of juice much sooner. This makes the real base for competing one's own flying skill, not the size of one's power source. I can personally vouch for this, as I've been competing to similar rules for over a year. The second climb rule is to keep someone from parking his model in a high altitude thermal for the whole flight—this makes you find at least two batches of lift.

The event for Electric Old Timers was flown by the same general rules, except that no limitation was placed on motor and battery. You could use any motor and any number of cells, up to 1,200-mAh capacity. Here, too, everyone appeared to be equal, except for those who found lift and flew the best in it. Maybe, too, the 1,200-mAh cells were a slight edge, though the extra weight over the 800-mAh cells make things very close to equal. (First and second place winners used 1,200 mAh cells.) Again, as with gliders, the contest was decided mainly in the flying, for I know that the winner, Chuck Hollinger, found thermal lift where no one else really did. This I'm sure of as we were lucky enough to have all the Old Timers on different frequencies, allowing everyone to fly at the same time, with only a 10-second separation at launch.

In general, I think the rules made for a good, comprehensive format. They might not satisfy everyone, but they're a good compromise and are workable. I would certainly like to see more of the same in the future. If any of you should get together and try them, I'd like to hear your results. And don't forget to send some good black and white photos of the event.

Congratulations to all who participated, and many thanks to Bill Forrey, CD Mike Charles, and the event organizer Frank Chastler. Oh, and let's not forget the Harbor Club for hosting and officiating this fine affair.

Bob Sliff, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06829. ■

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