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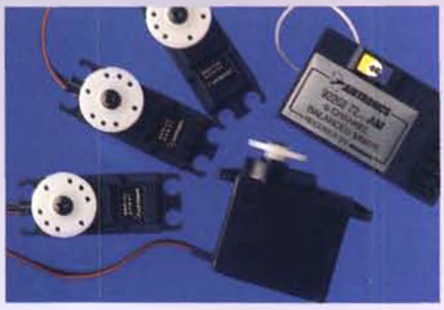

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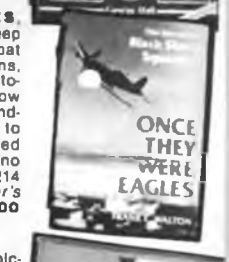

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MODEL BUILDER

APRIL 1988

volume 18, number 195

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FEATURES

THREE-VIEW

CONSTRUCTION

COVER: On September 4, 1931, Jimmy Doolittle, flying the newly built Laird LC-DW 500 Super Solution biplane, powered by a Pratt & Whitney Wasp Jr producing 525 horsepower, won the first Bendix Trophy unlimited cross country race. Leaving Burbank, California, in the predawn darkness, he made fuel stops at Albuquerque and Kansas City, and by flying on instruments through violent thunderstorms, Doolittle beat the competition into Cleveland by a wide margin. Not pausing to rest, or even to learn whether he had indeed won the Bendix, he pushed on to Newark to set a new coast to coast record. The Super Solution was flown back to Cleveland and readied for the Thompson Trophy race which followed, but engine trouble prevented a finish in the money and the Thompson was won by the Gee Bee Z.

Our cover captures the Super Solution in a moment of lonely concentration, climbing out and turning on course following the Kansas City fuel stop. Settling down for the final stretch, Jimmy Doolittle was alone in the sky with no way to know where he stood in the race. The original 22 x 28-inch acrylic painting is available for purchase, and we are pleased to announce as well that beginning this month, custom photo prints of this and several earlier covers are available. Contact Robert Benjamin Aviation Art, 1222 26th Ave., NE, Olympia, Washington 98506, (206)352-2606 for details.

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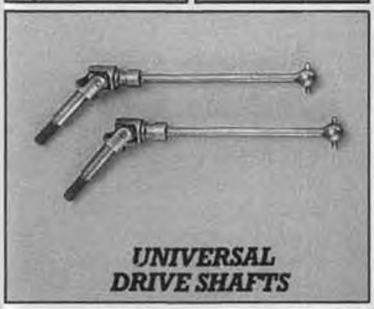
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from Bill Northrop's workbench

IMS ATLANTA O.M.T.

Say what?

IMS ATLANTA O.M.T. . . .One More Time, as in "Big John O.M.T.," which is the name we gave to our redesigned original Big John biplane back in 1967, rather than the much overused term "Mark II." As for IMS Atlanta O.M.T., it refers to some revisions to the plans for this premier annual model hobby show in Atlanta, Georgia, this coming May, 1988, which we first announced in last month's issue. The biggest revision is the date, which is still May, but just barely, as the show dates had to be changed to April 29, 30, and May 1, 1988.

To make a long story short (and that never really happens), we flew to Atlanta soon after the Pasadena show to check out the arrangements we had made by phone, and found that the facility we had reserved was not really suitable for the type of show we like to put on. The ceiling height was so low that some of our exhibitors, especially the airplane types, wouldn't have had enough height to clear their displays!

After much scrambling around and haggling over places and dates, we came up with a confirmed location and date that is actually much better than the first one. The new date gives Toledo exhibitors almost three weeks to ship their displays directly to Atlanta, rather than having to ship them home first and then to Atlanta, in order to avoid considerable storage charges. The new location is outstanding, the Georgia World Congress Center, in downtown Atlanta, just about eight freeway miles from the airport, and amongst all kinds of hotels, motels, restaurants, shopping malls, etc. The facility is totally first class, with carpeted lobbies, huge planters with trees and shrubs, escalators, gift shops, cocktail lounge, a fine restaurant, lots of parking, etc. The exhibit hall itself is one huge open rectangle totalling 89,000 square feet, with a 30-foot ceiling. . . plenty of room for indoor flight demonstrations.

Last month's announcement about the show was written before the Pasadena show, so we really didn't have any idea who would be attending, though preliminary talks with some manufacturers indicated a great deal of interest. Well, the indications were correct. Over fifty exhibitors signed up for Atlanta before they left Pasadena on Sunday! Some of the better known exhibitors coming to Atlanta who signed up in Pasadena include Sig Mfg., Ace R/C, McDaniel R/C, Airtronics, Davey Systems, Polk's, Bolink, Dave Brown, World Engines, Indy R/C, Dumas, Cannon R/C, RPS/Team Losi, CRP, EMS, and Radio Control Models. Registrations are still coming in. We'll try to list as many as lead time will allow. Y'all better plan on coming to see us!

Anyone who does commercial flying with the airlines and has been cross country has certainly stopped over for a flight transfer in Atlanta. In fact there is a strong rumor to the effect that when you die and go to Heaven (or the other direction), you'll undoubtedly stop over in Atlanta on the way! Atlanta is also the "hub" airport for Delta Air Lines, so it was only natural that we should contact Delta in relation to obtaining special rates for exhibitors and spectators who plan to participate in IMS Atlanta. Therefore, we quote a letter from Delta Air Lines, Inc., which reads as follows:

"Delta Air Lines, in cooperation with the International Modeler Hobby Show (that's us!) is offering special fares which afford a 40 percent savings off Delta's unrestricted round trip coach rates within the United States and San Juan. Canadian originating attendees will receive a 35 percent savings. Seven days advance reservations and ticketing are required.

"In addition, provisions have been made to offer a 5 percent discount off most Delta published round trip fares providing all the rules and conditions of the air fares are met. Some promotional fares discounted greater than 75 percent off the normal round trip day coach fares may not be included in this offer.

"To take advantage of all these discounts, follow these simple steps:

1. Call Delta or have your travel agent call 1-800-221-1212.

2. Refer to Special Meetings Network reference file number Q10144.

3. Valid dates for commencement of travel are: April 22 - May 4, 1988.

4. These discounts are available only through Delta's toll free number, so call today!"

HEY KIDS, ANOTHER GOOF!

We sure don't want to give youngsters and/or beginners any wrong steers when introducing them to the joys of model aircraft building and flying, but sometimes the "system" springs a leak. Through no fault of the author and illustrator, Bill Warner and Jim Kaman, the January 1988 episode of "Hey Kid" has a couple of real boners.

Refer to the "Trouble Shooting Chart" on page 52. The second "Problem" concerns a stall, however, the wrong sketch has been inserted. It should show the model nosing up, stopping, then dropping nose-down in a dive, as shown in the third sketch from the top on page 50. Problem Number 4 refers to a spiral dive to the left, however, the illustration is the same as for Problem Number 3, a spiral dive to the right! In Problem 4, the illustration should have been flopped to show a spiral dive to the left. In each case, the small alternate sketch in the center of each illustration should have been omitted.

The Trouble Shooting Chart will be corrected and reprinted as soon as possible. In the meantime, those who intend to copy it, for whatever teaching use, should be sure to make the corrections mentioned above. Speaking of copying, we have had many requests from school teachers and model club officers, asking permission to copy the material from "Hey Kid" for use in school and club teaching programs. We don't object to this, in fact, we encourage it, however, acknowledgement of the source must be included with the reprints, and it must

Some of the first exhibitors to register for the premier annual IMS Atlanta Model Hobby Show, coming up April 29, 30, and May 1, 1988. Photo was taken near the close of the IMS Pasadena show. From left: Bill Northrop(IMS), Bill Cannon(Cannon R/C), Mark Schwing(EMS), Charlie Cannon(Charlie's R/C Goodies), Tom Runge(Ace R/C), Anita Northrop(IMS), Hazel Sig-Hester (Sig Mfg.), Bob McDaniel(McDaniel R/C), Maxey Hester(Sig Mfg.), Ted and June Davey(Davey Systems Corp.). Y'all come!

not be done for the purpose of resale. The latter is a real No-No!

From mail received by the author and the office of the publisher, it is obvious that we are on track. If you have any constructive suggestions or criticisms, please don't hesitate to write.

LETTER FROM A LADY

I have been in the business of supplying merchandise for this sport for 36 years. I have always felt that we, in this sport, have the nicest people in the world. . . ***Until now.***

I have just come away from the Scale Masters contest in Las Vegas and find myself feeling reviled.

Don't misunderstand, or jump to conclusions. . .we found the same great class of contestants as always. But I am compelled to say that I have never attended a banquet before where we all had to sit through a program that I feel would have been thrown out of the lowest bar in the world.

Under the guise of "humor," the audience was treated from the very first speaker to the last (except Norm Goyer), with the crudest jokes and cruelest innuendos I have ever heard.

If the Scale Masters organization continues to "sell their souls to the devil for a mess of pottage" (be that pottage 10 cents or $10,000.00), they will not have the support of me or my company.

I still cannot believe that we sat still for the degradation handed out, not only by the main sponsor of the event, but also the members of the sponsoring club.

Harris Lee and John Haggart came to me the next day and apologized, in private, *for the appalling "humor" of the Pacer representatives* in public *(before about 200 people), but did not seem as concerned about the crudity of the club members on the program.*

Very few of you have heard me express my opinions in public or privately, and this is absolutely the first time I have ever written a "letter to the editor," but I must!

I have been a proponent to preserve our sport by educating the modeler in the very real fact of life that noise *must be our prime target. I have reiterated, "I am NOT impressed by Loud and Fast." Always before I have referred to* airplanes. *This weekend found me adding a phrase: "I am NOT impressed with Loud and Fast. . . Airplanes* or people."

Hazel Sig (Sig Mfg. Co., Inc.)

F/F PLUS R/C

Speaking of letters, we have been getting a bunch of mail as a result of the problems and proposals set forth by Ron St. Jean in our February 1988 "Workbench" column about the declining availability of suitable free flight sites, for fun or competition, throughout the US, and the world, for that matter. Most of it is in agreement that some sort of R/C use may be required in order to continue the hobby of F/F in our ever-compressing environment. However, the amount of R/C permitted in any given official flight seems to have as many variations as the number of letter writers. . .with two exceptions. . .the thought that the less amount of R/C "interference" the better, and certainly not until after the engine cuts.

Heidi Martel wrote to let us know that the P-51 "Dago Red" seen in our coverage of the Byron Giant Scale Fly-In was built by her husband, Rollie. Several magazines managed to mis-identify the builder of this stunning model of the F-1 racer. See this month's Workbench for details.

We'd like to add some more points to consider, and some of these summarize ideas received from readers. First of all, regardless of the amount of R/C used, there can be a tremendous frequency interference problem, if for no other reason than the "flying style" employed in most F/F competition. A good example is the free flight 'Mecca', Taft, California. At a F/F contest, the contestants each stake out a piece of the flying field and set up operations, complete with field box, sometimes an anti-dust tarp, a chase bike or two, oh yes, and a couple of models. The day's activity consists of a multitude of test flights, while keeping a weather eye on lift conditions and checking to see when the "hot shots" begin to light fuses and fire up engines. The

Continued on page 106

ADVICE FOR THE PROPWORN
—By Jake

Dear Jake:

Who belongs to the initials A.R.E. at the bottom of your workshop cartoon, and what institution did he escape from?

Serge in Sacramento

Dear Serge:

The above highly detailed and amazingly accurate depiction of my model shop area is the work of a very talented gentleman by the name of Art Eastman. When we first put the Dear Jake column together, Art was kind enough to use his two-week furlough from the Blunt Implements Wing of the Cross Dominant Artists' Home to create the drawing which has appeared every month. Those of you who enjoy Art's work can look forward to the publication of my book, *The Best of Dear Jake.* Art has agreed to do the cover, provided the restraints have been removed by that time.

Jake

* * *

Dear Jake:

On the plans of my new free flight, the designer shows only half the stabilizer. I can handle that okay, but he also neglected

Continued on page 105

OVER THE COUNTER

All material published in "Over the Counter" is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by MB does not constitute an endorsement of that product, nor any assurance as to its safety or performance by MB.

• Once again our shelves are stocked with tempting products, so without further ado, let's get to this month's offerings.

Robbe Model Sport, 180 Township Line Rd., Belle Mead, New Jersey 08502, is importing a new aerobatic trainer, the Supermax, for a .46 to .60 four-stroke, or a .40 to .40 two-stroke engine. The Supermax has a 54-inch wingspan, and weighs in at 5-1/2 pounds. The kit comes with a prefabricated Plura fuselage, sheeted Siros foam wings with preshaped leading edge, machined balsa tail surfaces, quicklinks, pushrods, rudder horns, hinges, nosewheel assembly, engine mount and fuel tank. The Supermax can easily be built in one weekend.

Also from Robbe is their ASW 24 giant scale glider. This ARF craft has a wingspan of 11-1/2 feet, and a fuselage length of 5 feet. Like the Supermax, the ASW 24 is highly prefabricated, requiring a short building time. No special tools are needed, and the kit comes with a nearly indestructible Plura white fuselage, precut and factory sanded and sheeted Siros foam wings, prefabricated tail and rudder, and all mounting hardware and cockpit interior, including a pilot. The ASW 24 uses the F3B-proven Quabeck HQ-3.0/13-10-13 airfoil, which performs superbly in medium-strong winds. You can find the Supermax and ASW 24 at your nearest Robbe dealer.

* * *

Aerodrome Models, 2623 S. Miller Rd., Saginaw, Michigan 48603, has announced the availability of a new sport trainer, the Aero-Pacer. This new model has a wingspan of 64-1/2 inches, and a wing loading of 19 to 25 ounces at 5-1/2 to 7 pounds. Engines compatible with this model range from a .45 to a .90 four-stroke. The kit includes preformed aluminum main landing gear, coil spring nose gear, hardware, and complete plans and instructions, including exploded views for clarity. A one-piece fiberglass cowl is now available for the Aero-Pacer at extra cost. The Aero-Pacer can be easily converted to a taildragger, complete with flaps. Add a Saito .65 and you have a dandy floatplane. Aerodrome kits are precision hand cut from select balsa and plywood, and are designed primarily for four-stroke, but are easily converted to two-stroke power. Write for more information.

* * *

The new Fantasy 40 from Crenshaw Aero is a sport aerobatic model with a 56-inch wingspan, designed for a .35 to .60 two-stroke, or a .60 four-stroke engine. Kit comes with balsa and plywood parts cut and sanded, hardware, and rolled plans. With a Como .51 using a 11 x 6 Master Air-

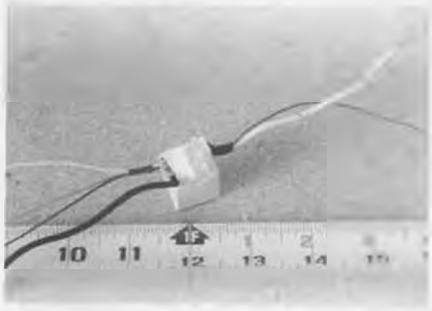
Supermax aerobatic trainer from Robbe Model Sport.

Robbe's big ASW 24 R/C glider.

Kyosho Flash, an electric ARF pattern flyer.

Fantasy 40 from Crenshaw Aero.

New JRA 900 FET Speed Control from Circus.



Benson Hobby Products' MC-1 motor control.

screw prop, test flights were excellent, including outstanding vertical performance. This is a quality kit for the intermediate builder and flier. List price for the Fantasy 40 is $64.95, but right now as an introductory offer, you can get one for $49.95 plus $5.00 postage and handling. Write to: Crenshaw Aero. 423 W. Washington, Shelbyville, Indiana 46176.

* * *

Carl Goldberg Models has introduced an accessory for its Anniversary Edition Piper Cub kit, Super Floats. These 36-inch floats are easy to build, using all balsa and plywood construction. All necessary hardware is included to mount the floats on the Cub, including rear float mount, dual rudders, and pushrods. Even the sub-fin is included to increase stability. All that's needed to complete the floats is a bottle of glue and some covering material. A 20-page illustrated instruction book moves the builder step by step from start to installation and even the how-to of flying off water. Super Floats weigh only 24 ounces, and are designed for 6-1/2 to 9-pound airplanes.

Float kit for the Anniversary Cub by Carl Goldberg Models.

They're available at your hobby shop now.

* * *

New from Kyosho, distributed by Great Planes, is the Kyosho Flash, an electric ARF plane designed by Japanese pattern flier, Tsugutaka Yoshioka. This 47-inch span craft is capable of pattern and aerobatic performance with its semi-symmetrical airfoil and a LeMans 240E motor with gear reduction. The Flash can do inside and outside loops, inverted flight, extremely sharp snap rolls, and hammerheads. With a blow-molded fuselage, and a pre-built balsa wing that comes already covered, the Flash is the state of the art in ARF electric flight. Look for it at your Kyosho/Great Planes dealer.

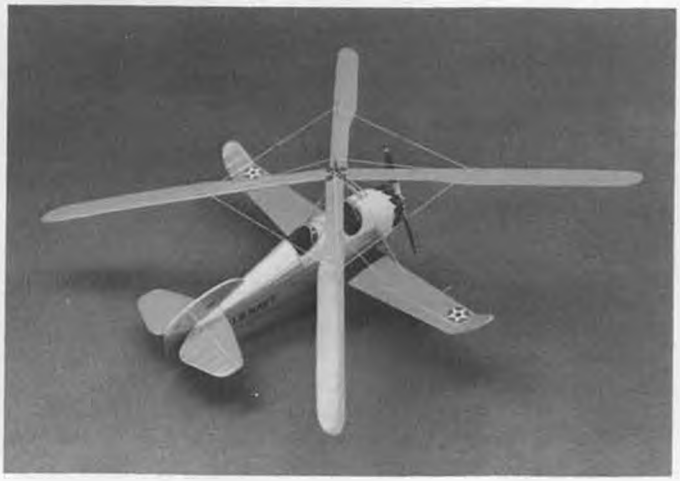
* * *

New books this month include *R/C Ducted Fans*, featuring construction and design techniques, the use of R/C gear, test flying, and advanced flying techniques. This book will give you an introduction to radio-controlled ducted-fan flying, as well as hints on how to choose the model to suit your desires. It contains 150 illustrations in 160 pages, and is available directly from Zenith Aviation Books, Box 2MB, Osceola, Wisconsin 54020, for $12.95. To order direct, call (800)826-6600.

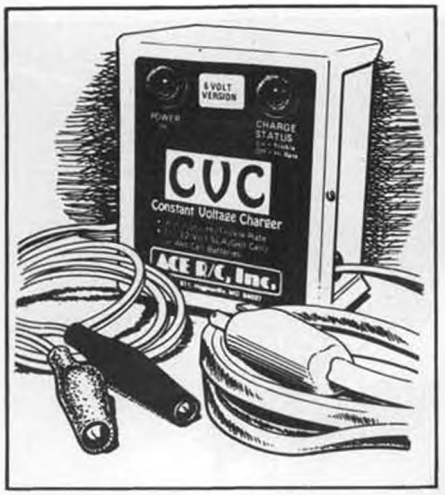
Also from Zenith is the *A-10 Thunderbolt II* from the Modern Combat Aircraft Series of Osprey books. Known as the Warthog for its admittedly ugly appearance, this twin-jet attack aircraft is renowned for its ability to sustain an enormous amount of damage and remain airworthy. The Warthog carries the Avenger 30mm cannon as a backup to

Transmitter Case Kit from SpaceCase.

Aerodrome Models' Aero-Pacer Sport Trainer.



Williams Bros' 1/48-scale PCA-3 Autogiro.



New Constant Voltage Charger from Ace R/C.

its Hughes Maverick missile; the cannon is the largest, heaviest, longest-ranged and most destructive aircraft gun ever. The Maverick uses electro-optical or imaging infrared guidance to home in on its target from one to two miles away. This highly maneuverable aircraft has won praise from all who have flown her, and this book merely adds to its legend, with 140 photos and diagrams.

* * *

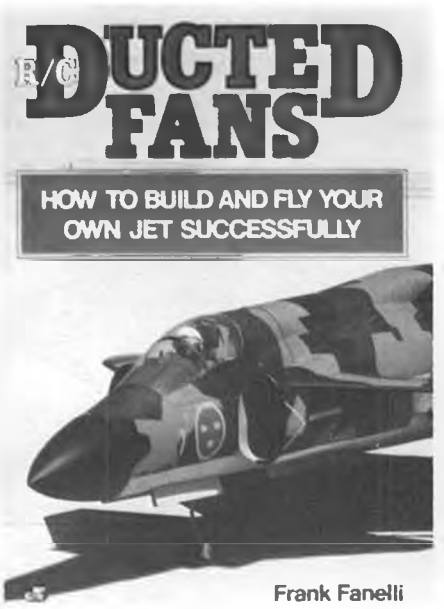
Williams Bros, makers of fine display models and numerous accessory parts for modelers, has released a new 1/48-scale plastic display model of the PCA-3 Autogiro. The kit contains instructions to allow the construction of either the U.S. Navy military version (shown), or the Miss Champion civilian aircraft. This highly detailed kit can give you a stunning model for your desk or shelf, one you'll be proud to show off. It's available at hobby shops everywhere.

* * *

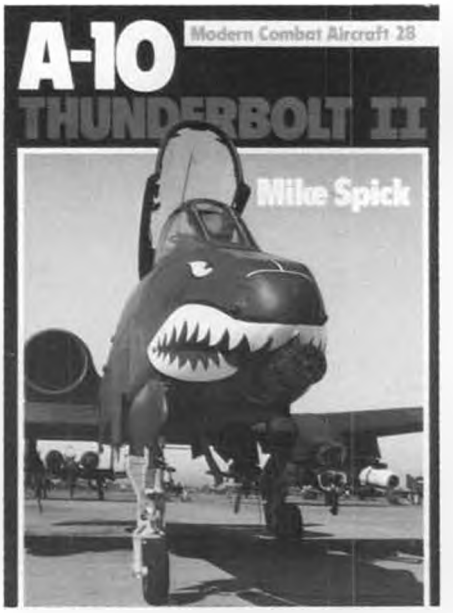
R/Cers, here's a perfect solution to protecting and transporting your expensive transmitter: the new SpaceCase molded modular transmitter case kit. Constructed of tough 1/8-inch black ABS plastic with 1/4-inch foam lining, the SpaceCase will keep your radio safe and secure from home to field and back again. The kit includes all materials and bonding agent for you to easily assemble a case, without tools. Whether you are a serious competitor, or a weekend

Continued on page 99

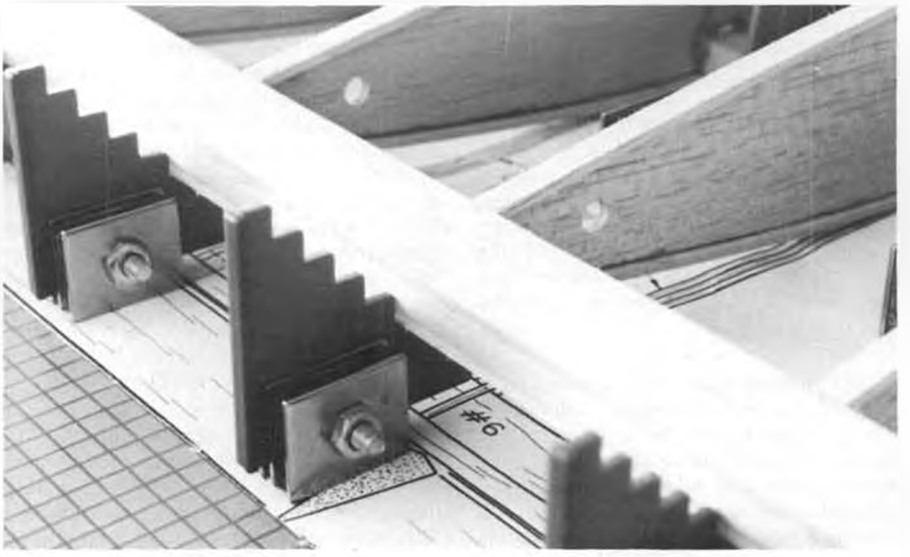
Futaba's S148 servo.



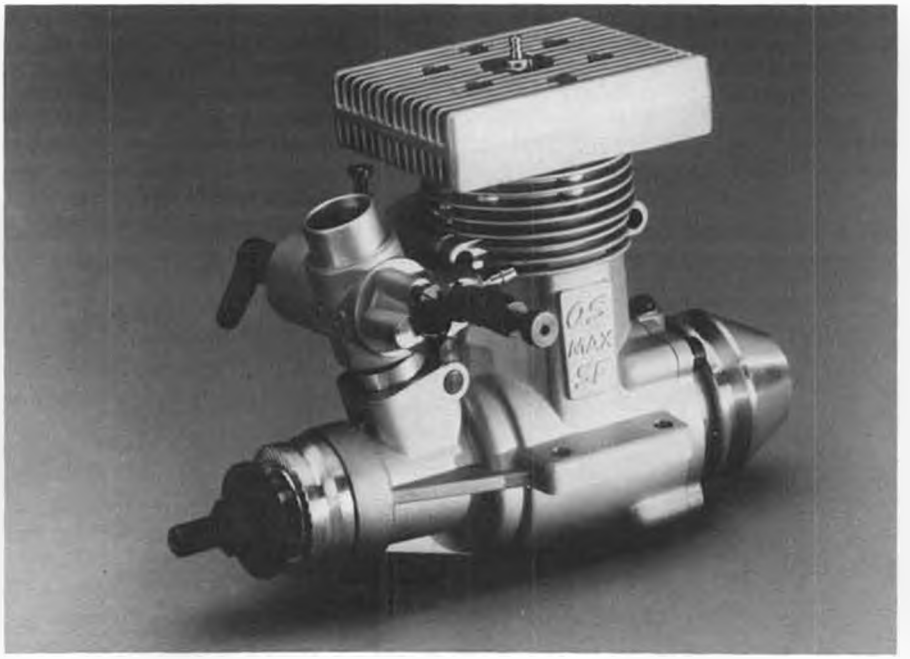
All About Ducted Fans, from Zenith Aviation.



The A-10 Warthog, a Zenith Aviation Book.



Eldon Lind Company's new Steps building aid.



O.S. Max SF helicopter engine from Great Planes.

The R.E.A.L. Fail-Safe System

By ELOY MAREZ. . .Here at last is the answer to a pilot's prayers: a working, foolproof fail safe system that can actually take over an R/C model in flight and safely bring it in when trouble develops! Read on. . . .

• Ever since the early days of radio control flying there has been a need for a Fail Safe system, something that would take over control of the aircraft in the event of failure or interference to the radio system and return it to earth in a safe condition. Such a development has not been seen before now, though many such devices have appeared both in print as add-ons and as features of commercially available controls systems. The latest, prior to what I am indeed honored to be able to introduce to you, have been the so-called Fail-Safe features of the PCM and "Computer" R/C systems. They provide you with one of two options: neutral controls surfaces and low throttle or preset control surfaces and low throttle, either one which will also need your whole season's supply of good luck to get your model down with even minor damage.

Now, thanks to a combination of modern technologies, we finally have a R.E.A.L. Fail-Safe, the *R*eliable *E*mergency *A*irplane *L*anding Fail-Safe System. The R.E.A.L. F/S is a small but powerful "black box" that rides along with your latest pride and joy, usually doing nothing but monitoring that your R/C system is receiving and acting on measured amplitude and continuity. Should this signal either disappear or become distorted as with interference, the R.E.A.L. F/S takes over control of your model, orbits the landing field, lands, taxis to your pit area, and *cuts the engine!* Now, *that* is a R.E.A.L. Fail-Safe, and as pleased as I am to have had a small part in the testing of this device and now being able to share my experiences with you, I am even prouder to tell you that this one did not come from overseas—this one came from right here in the good old US of A—California, to be exact. The R.E.A.L. F/S is the idea and concept of Dr. A. Maximus Nescient (Nesh'i-ent), control and space navigation expert at the Vandenburg Space Center just north of Los Angeles. As you well might guess, Dr. Nescient is just "Max" at the local R/C field, where he flies pattern airplanes, not in competition, but "because I love the way they fly." Dr. N. readily admits that his inspiration to develop the R.E.A.L. F/S came when driving home once after having had an experience that we have all known: picking up the pieces!

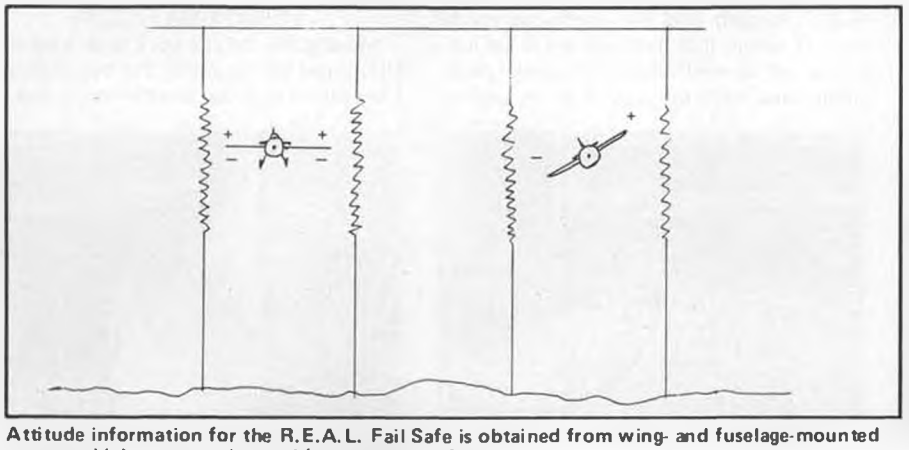
Large sophisticated and expensive models like this are prime candidates for the safety offered by a true working Fail Safe system like the one described here. Oh, yes, that's Barbara!

Now, from my description of the capabilities of the R.E.A.L. F/S, you already know that it is not a simple device. A lot of what I know about it was told to me in confidence, and I cannot talk about it. But I can tell you about the techniques involved, a completely fascinating idea and concept. To begin with, the R.E.A.L. F/S is possible because of the computer microprocessor used in all PCM receivers. And there is the one slight drawback; it must be used with a PCM system. I don't really consider that much of a drawback, as anyone flying an expensive and sophisticated model should be doing so with a PCM system.

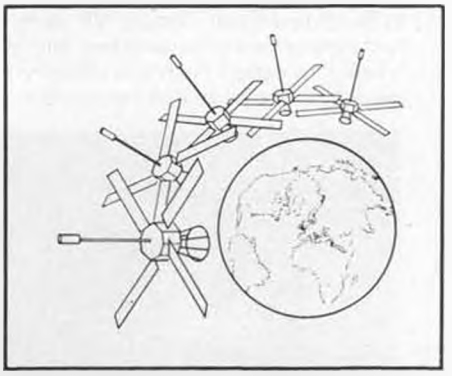
Anyway, as in a computer, the microprocessor in the PCM receiver can be programmed to remember an infinite number of things, and to act on them after interpreting additional input information. That additional information is where the genius starts—more in evidence because it makes use of a number of other existing technologies, adapting them as necessary for this application. Oh, yes, you, the pilot, have a part in this operation also—to help program the system, but more about that later.

Let us review a normal pilot-controlled R/C model landing. Three separate and distinct requirements must be met. First there is orientation, the position of the model relative to the point at which you intend to land. Then there is the attitude of the model, varying at different stages of the approach and including un-commanded attitudes caused by wind and gusts. Finally, of course, there is the altitude to be constantly adjusted and the eventual flare. The

Continued on page 88



Attitude information for the R.E.A.L. Fail Safe is obtained from wing- and fuselage-mounted sensors which measure the earth's electrostatic field.



The R.E.A.L. Fail Safe system obtains position information from the U.S. Transit Navigation System satellites, in the same manner that full-scale planes and ships do.

CHOPPER CHATTER

BY DICK GROSSMAN

• Computers don't scare anybody anymore. At least, they shouldn't. Some people understand what they do, why, and how. Others, like me, are satisfied with just getting them to do what they're supposed to do. Like writing this article, for instance.

The Galaxy Computer 8 PCM radio is made by Japan Remote (JR) and distributed in the US by Circus Hobbies of Las Vegas, Nevada. It looks just like an ordinary radio. In fact, the transmitter case is the same one used for the very popular Century VII radio. As computers go, this one is ridiculously simple. As helicopter radios go, *wow*!

The locations of the switches, levers, and knobs on the Galaxy 8 are similar to the Century VII, except there are fewer of them. Nobody told me, but I think I know why. There are certain control inputs that must be made while the helicopter is in flight. Throttle hold is an obvious one, so is the Inverted Flight switch. A change to High Idle requires an easily accessible switch. On the Galaxy, throttle trim has sufficient range to be effective as a high idle adjustment; or you can actually switch between two completely separate throttle/pitch curves. The collective pitch trim lever moves the entire pitch range—top end, midpoint, or low end—higher or lower. For quick flight adjustments this is a desirable feature. For example, if the engine is overspeeding at full throttle, a flick of the pitch trim lever will add some pitch to slow down the rotor. In the event of an unexpected engine failure—which isn't always recognized immediately, particularly at a noisy flying field—that same pitch lever can give you some extra negative pitch to get enough rotor speed to autorotate.

Individual pitch adjustments to high, hovering point, low stick, or any point in between can be made when the helicopter is on the ground—*and can be done while the engine is running*. But I'm getting ahead of myself. The point is that the transmitter is no more cluttered than it absolutely needs to be. Experienced Century VII users will find most of the knobs, switches, and levers where they expect them to be. For the rest, everything is easy to find on purpose, and

Light, compact, and uncluttered Galaxy transmitter.

hard to hit by accident. The removable antenna with a storage area in the back of the transmitter case is one of the things I have always liked about the Century VII, and this has it, too. On the other hand, the Galaxy has a trainer switch, which I don't like on any helicopter radio.

Now the good part. To make changes in the transmitter program, you don't have to pry off a cover and poke around trying to find tiny trimmer dials with a miniature screwdriver. Located below the gimbals is a liquid crystal display. Next to that is a pressure sensitive key pad like the ones used by all the fast food restaurants. It is impervious to Coke, mustard, and taco sauce—also dirt and oil. When the radio is turned on, the liquid crystal display reads:

11.1 V MODEL 1

This indicates the actual transmitter voltage (fully charged) and the particular model (one of seven) that the program is set for. I can set up seven different helicopters or airplanes and each one will have its own individual program.

I think the best way to convey the feeling of using the Galaxy radio is to give a step-by-step description of an actual adjustment to one of the programs. I'm going to make a change in the throttle setting through the Throttle Curve program. I think I've got a little too much throttle when the blades are at zero pitch because the rotor really speeds up at that point.

On the key pad is the word ENTER, which I press. The radio asks what function I want to change by displaying the word:

FUNCTION ?

The throttle curve is function number 18, so I press the numbers one and eight on the keyboard. The LCD display now reads:

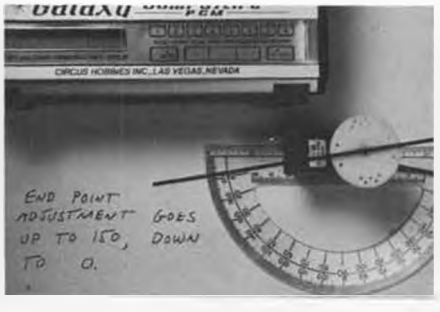
FUNCTION ? 18

I press ENTER once again, and the display reads:

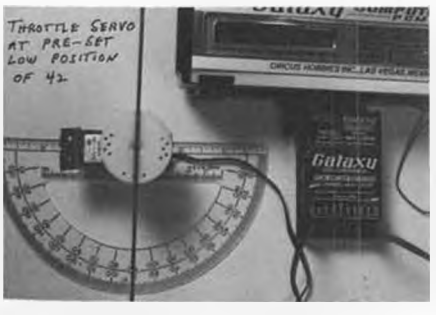
THRO DATA HOLD?

Moving the throttle stick to its lowest position and then pushing the INC button allows me to lock the throttle into a low idle

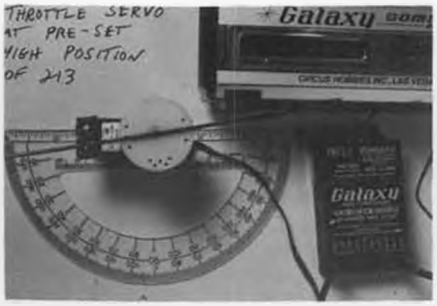
Pitch trim adjusts entire collective range.



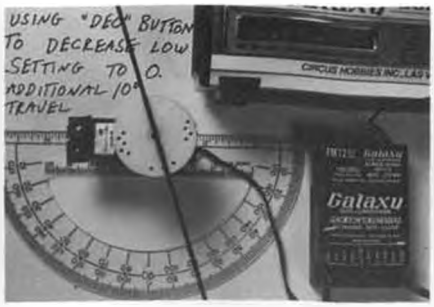
ATV (endpoint adjustment) program allows increase or decrease.



Range of throttle curve program, low stick preset position.



Pre-set high stick position gives 80 degrees of servo throw.



Using program to get additional 10 degrees of low throttle.

Going to maximum 255 results in additional 10 degrees also.

with the clutch disengaged. Now, while I'm fiddling with the radio, the chopper won't suddenly become airborne. The digital display now reads:

THROT N P L 42 ←

That 42 you see is a number indicating the preset low throttle point. The comparable high throttle position point is 213. The amount of servo travel that occurs between 42 and 213 is approximately 80 degrees—just what you'd expect from a normal radio. However, the total range of the throttle curve is 0 through 255, (256 numbers, which happens to be one half of the 512 individual signals that occur in a Pulse Code Modulation, PCM, system). Those 42 digits below the preset low stick point and the 42 digits above the high stick point (255-213=42) create an *additional 40 degrees* of servo travel that you probably never knew

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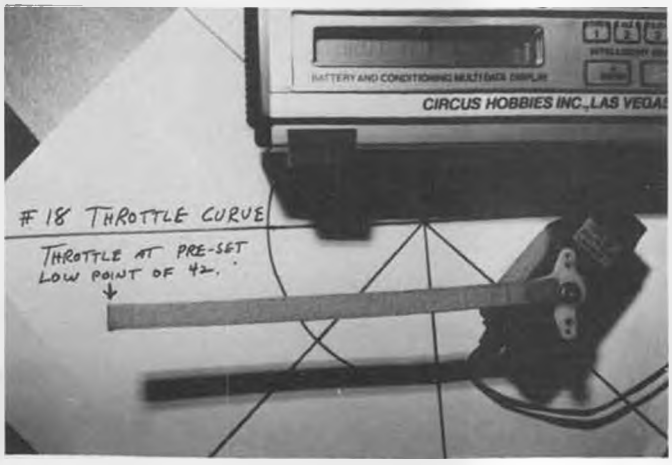
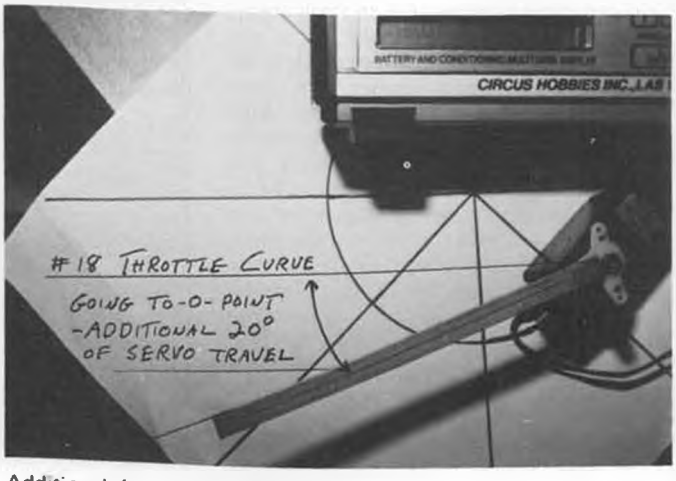
Collective pitch trim lever is easy to find.



Pointer glued on servo arm to measure throw.



Additional throw is almost 50%!

Same experiment with end points on elevator. Display shows 100%.

At 150% same results, additional 20 degrees.

Simply Scale

BY STEVE GRAY

• What's the most popular, yellow, high-wing monoplane named after a baby bear ever kitted? You guessed it, the Piper Cub is probably the most modeled scale airplane in the world. There are many good reasons for this. First and foremost, it is a most reliable and easy-flying model with no bad habits. It is stable and light, and the proportions are classic. For many modelers it will be the first scale model they will build and fly. Another reason for its popularity is its simplicity of construction. The flat-bottomed wing makes building it a snap, and the fuselage is a basic box without any complex curves or difficult planking. The windshield and windows can be made from flat sheets of plastic without forming, and the tail is flat and simple-to-build. There is a nostalgic reason too for the popularity of the Piper Cub; many modelers of the Cub have been past owners or pilots of the full-sized version and will always have a place in their heart for it.

The Cub lends itself well to accommodating the ambitions of the builder. It is possible to detail the model to a very high degree. Documentation is readily available at most municipal airports. There are also endless sources of color schemes and customizations which can be duplicated. For the sport scale enthusiast, the simple application of some cub yellow iron-on covering and black trim sheet can satisfy his desire for a realistic-looking fun-to-fly model. The more ambitious can detail it to the N'th degree if desired with every possible detail within the scale modeler's ability to duplicate.

Kits for the Piper Cub are available from most every major manufacturer of model kits. Balsa U.S.A. makes a good and inexpensive kit for the 1/4-scale version. It is advertised that it will accept any size engine from .60 to 2.2 cubic inches. I think I would stick to the smaller engine sizes for more realistic flying.

Carl Goldberg's Anniversary Cub kit is a new size suitable for anything between a .40 and .60 two-stroke but is a great flyer with a .46 to .80 four-stroke engine. I have seen countless numbers of these built, and they all fly really well. It is not a super scale kit, but it is a good size and an excellent choice for a first scale model. I have also known novices who have successfully learned how to fly on these models. Its interlocking style construction makes it easy to build straight and strong.

Great Planes Model Manufacturers have recently released their new Electric Cub kit. This model is available in both a deluxe kit complete with electric motor, switch, and propeller as well as a standard version suitable for using your own power system or converting to glow operation for a .10 or .15 cubic-inch engine. I have flown the model with the electric motor provided in the kit, and it flies well with it. Modified motors and lighter-weight 800 mA battery packs perk it up considerably though. This one would make a good first electric semi-scale model for the experienced flier wanting to try out electric.

Indy R/C has recently introduced a new 1/4-scale almost-ready-to-fly Clipped-Wing Cub. I have not yet seen one of these kits, but it looks like at last you lazier builders will now be able to fly a Cub without building it. (What is this world coming to?)

Midwest Products has had their Cub kit on the market for several years now. It's a foam almost-ready-to-fly model suitable for a .09- to .15-size engine. This smaller model will get you into the air quickly and could be suitable for an electric conversion.

Sig Manufacturing has four different Cub kits to offer. Their 1/6-Scale Cub and

Cliff Tacie's clipped-wing Cub from the Sig kit, powered realistically by an O.S. Gemini 1.20.

Mike Gretz of Sig Manufacturing readies his original 1/4-scale Cub powered by a 1.20 four-stroke engine.

Bob Nelitz' perfect 1/3-scale Piper Cub. This model, as well as any of Bob's, must be seen up close to be appreciated.

A distant relative of the Cub, a Fleet Canuck (typically Canadian), on skis, by Ralph Bolitsky. This model spans over 10 feet, and is 3-1/2-inch to a foot scale. Quadra 35 powers it nicely. Plans are available for this model from Steve Gray.

Rudi Mayer starts his .90-powered Bud Nosen clipped-wing Cub. The props are hard on cold fingers!

Clipped Wing Cub kits are perhaps the most accurate renditions available in kit form. They span 72 inches and 56 inches respectively. Thousands of these kits have been sold over the years, and I have flown many of them. They are perfect for .25 to .40 cu. in. two-stroke or .40 to .45 cu. in. four-stroke glow engines. Their 1/4-scale versions of the same two planes have equalled the popularity of the smaller ones. They are built strong and will fly well with .60 cu. in. to 2.2 cu. in. two-stroke engines of .90 to 1.60 cu. in. four-stroke engines. A 1.2 cu. in. four-stroke engine seems to be a very lively performer for those of you who want to get the adrenaline flowing. These kits can take it, as they are built strong to take the flight loads that some of our sportier fliers impose on them.

A & A Industries is kitting the Bud Nosen Piper Cub model. This is also a 1/4-scale kit at a very reasonable price for engines sized .60 and up. It builds a very lightweight model and does fly well on the smaller engines recommended.

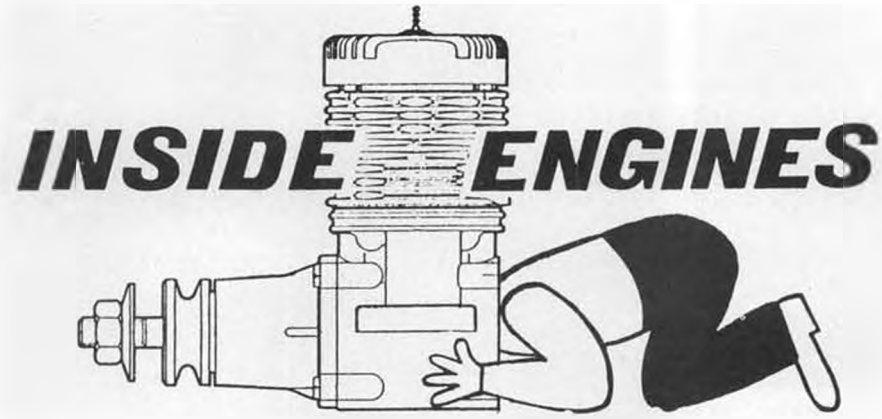
Well, with all the kits, plans, documentation, and full-sized subjects out there, there is no reason anyone could not build and fly a Piper Cub model. Try it for your first scale model, or, if you are already an accomplished scaler, build one for hacking around at the field. You'll be glad you did.

Many modelers ask me for advice about mounting their engines in their models. There are as many good ways to do this are there are models. Each model has its own problems to overcome when it comes to mounting the engine. The old standard hardwood beam mount is perhaps one of the strongest methods used. The engine is bolted to hardwood beams which are glued securely to the forward inside portion of the fuselage running from the nose back to behind the fuel tank. These bearers effectively strengthen the whole front end of the model and really provide a solid place to mount the engine. A hardwood mount is, of course, inexpensive and easy to build into a model. This type of mount can easily provide enough length to accommodate the longer four-stroke engines. The drawbacks of this type of mount are that it takes up space in the fuel compartment and it sometimes makes it difficult to make thrust adjustments to the engine after the model has been built.

A classic Piper Cub, probably one of the most often modeled planes ever built.

Continued on page 76

Bob Nelitz' Piper Cub in 1/3 scale is hard to distinguish from the full-size aircraft. This is a true rendition of the classic Cub.



WITH **STU RICHMOND**

Fox .40 BBRC

• The true measure of usefulness of a model airplane engine for R/C is its speed range. The *only* exception is if the engine is used for all-out racing, as in R/C pylon.

Speed range is the ratio of high speed to reliable idle speed, and it is easily measurable with modern equipment.

Speed range is the actual value of an R/C engine, not its cost, not its horsepower measurements, not its weight or appearance, not its casting glitter or its instruction manual. If an R/C engine reliably idles at 2,000 rpm and then will speed up from that idle to 8,000 rpm, it has a 4:1 speed range. If that same engine idles reliably at 2,000 rpm and then will speed up from that idle to 12,000 rpm, it has a 6:1 speed range.

A 4:1 speed range is barely acceptable for R/C use. A 6:1 speed range is highly desirable, and R/C models powered by such engines will sit still at idle on a paved runway normally. If the speed range is poorer than 4:1, the model is usually difficult to land due to too much airspeed. A speed range near 6:1 enables easy landing approaches as the engine, at idle speed for the approach, windmills its propeller to form a disc-shaped artificial drag inducer which serves as a brake to airspeed. One can argue that propeller parameters effect this disc-shaped drag. I accept this argument. But the paramount fact is that model engines for normal R/C flying that have the broader speed range performance ratio are those most sought by knowledgeable R/Cers!

Factors that influence the speed range are fuel, glow plug, carburetor throat inside diameter, reciprocating mass, internal shape and metrology (dimensions) of the combustion chamber, exhaust (and other) port timing, inside diameter of the muffler's exhaust exit, and the interplay of each of the above factors with the others. Other less obvious factors also influence speed range of our engines. It's virtually useless to show torque curves; they mean that the faster an engine turns the more the internal frictions develop. Even a horsepower chart for an R/C engine is of doubtful value. The best R/C flight performance comes when (usually by trial and error) a *propeller* is matched to the flight performance characteristics of the individual model and we add an engine to make the prop perform. For that reason Inside Engines will report individual engine speed ranges for a group of props suitable for the reviewed engine. This column will supply enough information on the above listed factors to hopefully be interesting reading and the photos should show you the engine's insides so you don't have to take your pride and joy apart to see what ticks. Comparison reading of Inside Engines columns might guide your future engine purchases. Before we start looking inside this month's engine, please let me present some credentials: an ex-machinist, Georgia Tech graduate, race sport R/C pylon, fly sport R/C scale, usually scratchbuild from my original designs, enjoy R/C assist old-timers, fly R/C sailplanes a bit, and I still enjoy rubber power too.

And now, to this month's engine.

FOX .40BBRC W/ LAPPED IRON PISTON 24096

In a recent letter to me, Duke Fox referred to this engine as the "Fox .40 Standard." My quick conclusion after testing this newly introduced engine is that it will become *the standard* of speed range performance that other engine makers will try to match.

When an engine hand starts on the second flip on the test stand, I'm impressed. The engine was choked for five flips, turned over by hand until a "bump" was felt with the glow plug hot, and then it started on the second flip! The tilt-down muffler interfered with the test stand so it was (no-charge) returned for a #90236 tilt-up muffler in less than a week. This engine comes out of the box with the idle and high speed needle valves preset at the factory as a result of actual test running. As the break-in continued, each needle valve was gradually turned in about half a turn over the period. This preset feature is certainly a strong selling point that's sure to attract all R/Cers.

At Toledo one year I asked Duke why he originated the unique rear crankcase cover design that he calls the "high back door." His answer was that it helps in casting, and it facilitates getting tooling inside the casting to perform machining. As you remove the high back door and study the internal intricacies of the crankcase, it is plenty evident that the high back door crankcase cover allows easy internal machining access that translates to lower costs for us, the buyers.

This Fox #24096 has additional manufacturing features. A reverse rotation crankshaft p/n 13928 is made for pusher and twin engine uses. And very unusually available are pistons for this engine that are stepped .0003 inches apart in diameter. So that as normal wear takes place you have the option of replacing a worn piston with a "first-over" or "second-over" sized new piston. With the exception of engines from Taiwan,

Duke Fox calls this engine his "Fox .40 Standard." After testing, the author concludes with the observation that this surely will become the standard of speed range performance that other engine manufacturers will seek to emulate.

Front view of piston/cylinder shows inclined Schnuerle ports through cylinder wall and also the unique method of retaining the wrist pin inside the piston with a tiny steel roll pin.

The Fox features the long-wearing economical match of a Meehanite cast iron piston running in a steel cylinder. High back door has one transfer port cast into it.

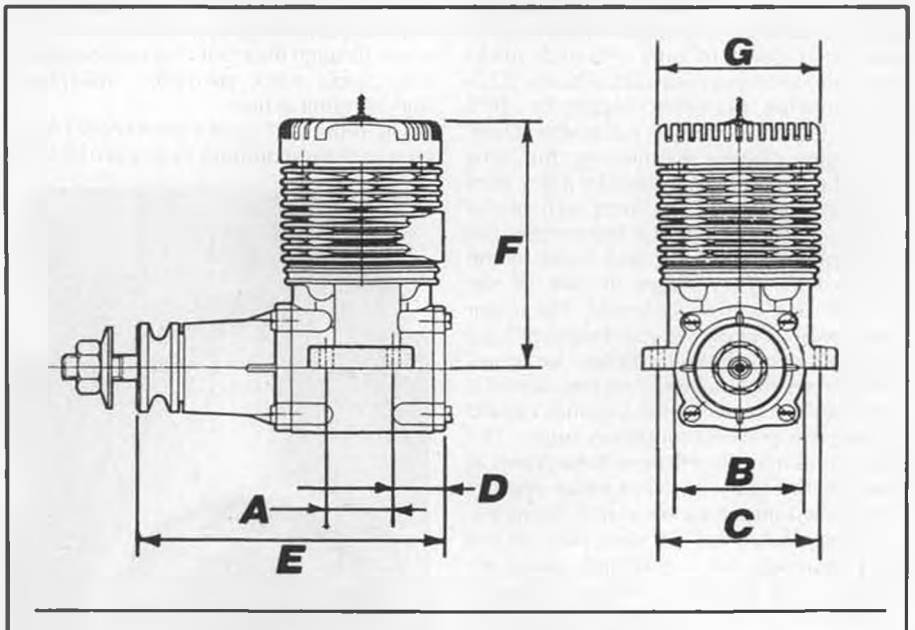
buying replacement parts for overseas-produced engines has gotten so extremely expensive that in many cases it is more cost-effective to simply buy a whole new engine. Not so with Fox. You can call (501)646-1656 direct to the USA factory and order replacement parts for current and many past engines. But please remember the Fox model engines have been produced for 45 years! Please be reasonable and don't expect to find parts available for antiques!

The instruction sheet mentions that one carburetor (like the series 6 with this engine) may not handle all variable conditions and contains data on how to tailor the low speed needle to unique needs. I found no such unique needs. My engine came with the new "Miracle" or four-cycle Fox plug that seems to work better in all engines and has five coils in the element. When a new model engine comes without a glow plug, I liken it to buying a new automobile without spark plugs and then going to my local auto parts store to complete my purchase. This engine's exhaust timing is 145 degrees. Fox is to build a sport pylon engine, and slightly higher exhaust timing would surely respond to a tuned pipe.

The high back door, when removed, shows one transfer port is cast into it. Air-fuel mixture travels up the port and turns horizontally to enter the combustion chamber flowing *away* from the exhaust port. A mirror image transfer port is cast inside the case itself. The cylinder's matching intake windows are taper-machined to further point gas flow away from the exhaust. Modern Schnuerle design. The Series 6 carb is of modern two-needle (Webra calls it TN) design. The idle needle is nickel-plated, is on the engine's exhaust side, and was open eight turns as received. The black needle (the two needle valves are not identical in shape) is the high speed adjustment and was open 4-1/4 turns as received. Inside diameter of the carburetor's throat measures a modest .285 inches; same as the also new Super Tigre G-40 Sport engine from Italy. The Fox muffler outlet inside diameter measure .350 inches. The G-40 Sport measures .295 inches.

Removing the six-cylinder head bolts released the cylinder head fin section which clamps down the cylinder head button. The fully machined aluminum button holds the glow plug and forms the top of the engine's combustion chamber. The lower side of the button has a .375-inch diameter single bubble bowl that is .125 inches tall. The miracle plug's threads just match the button's internal threads. But this glow plug has a .050-inch snoot or lower non-threaded section which extends *below* the threads. This snoot, with the glow plug wire conventionally attached, actually fits down into the combustion bowl. The net effect is the bottom of the glow plug's catalytic action wire element is almost in the geometric center of the combustion bowl. I usually lower (by bending) the bottom two or three coils of the element of the glow plug for pylon racing. Other bend lower the coils of a Glo Bee. I've seen others race with K&B idle bar plugs and snip off the idle bar to better expose the coils, all in attempts to get better combustion. It seems Fox has, in effect, already done the same by design!

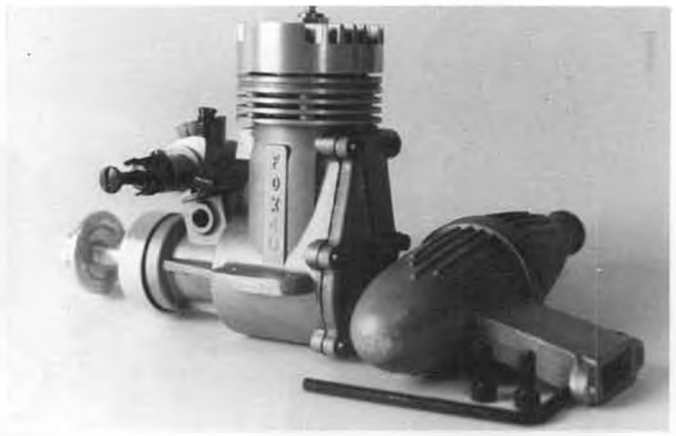
The deck height or distance from the bottom of the squish band down to the top of the piston (at top dead center) measures .040 inches. The Fox Standard uses no head



A = 5/8"	F = 2-9/16"	Bore = .835"
B = 1-5/16"	G = 1-7/16"	Stroke = .710"
C = 1-5/8"		Displacement = .389cu. in.
D = 7/16"		Engine weight = 10 oz.
E = 2-3/4"		Muffler weight = 1-3/4 oz.

Measurements of the Fox 40BBRC with lapped iron piston (also called the Fox 40 Standard). Generic engine illustration shown above.

Carburetor's barrel features over 1/8-inch lateral leaning-mixture movement. Carb body is silicone sealed to the crankcase casting.



Rear crankcase cover is called the high back door. Text tells manufacturing reasons. Tilt-up and tilt-down mufflers, reverse rotation crankshaft and four stepped diameter pistons are available.

gasket; the aluminum button forms its seal easily to the steel cylinder.

A light upwards push slid out the steel cylinder liner. Its top inside diameter measured .835 inches, and the wall thickness is a modest .035 inches. Fox also makes a .36-size engine in this case with a heavier cylinder wall. The small .150-inch diameter hole under the exhaust port is for jigging/positioning in manufacture and is common with other brands of engines. Slight honing taper exists in the cast iron piston and the steel cylinder. This choice of materials with their hot expansions contribute much to the frequent one-flip and two-flip hot restarts experienced on the test stand.

The reciprocating weight of the piston, connecting rod, wrist pin and roll pin assembly totals 16-1/2 grams, which is just under two-thirds of an ounce in this .40-size engine. This isn't very heavy when you consider the massive strength in the rod and its lower bushing and consider the fact the piston is cast iron. The piston's lower skirt is machined down to only .015-inch thickness. The wrist pin measures a husky .220-inch outside diameter; bigger by .005 inches than the crankpin's diameter. Duke Fox enjoys creative engineering; the wrist pin is held in place uniquely by a tiny steel roll pin that enters the front wall of the piston, passes through the front end of the wrist pin to capture it, and locks in the piston wall. This shows in one of the photos. This is truly foolproof. The upper and lower connecting rod bearings have their lubrication holes in "better" locations. The greatest normal force on the conrod is compression between the bearings caused during the power/combustion stroke. The lube holes introduce flow to these points as seen in the photo(s). Most other engines have lube holes in easier-to-drill locations.

The crankshaft is 8620 steel, rides on two ball bearings with .500-inch inner diameters and the shaft's intake window is .415 inches long and .380 inches wide. The flow passageway down the hollow shaft is .310 inches in diameter. A crash-resistant 1/4 x 28 nickel-plated replaceable prop stud threads into the front of the crankshaft. (Only Fox and K&B use this neat feature.) The shiny aluminum prop driver keys onto eight steel mini-studs machined on the shaft's front end. The prop washer and

Smaller cylinder head button is for the Fox .40 Standard and you can see how the miracle plug fits down into the combustion bubble's dome. The larger button is to a Rossi .65 and has a K&B 11 plug in place.

matching nut are also bright nickel-plated.

A source of many idle aggravations on R/C engines is air leakage where carburetors fit into crankcase castings. Other manufacturers use tapered fits, gaskets, or "O" rings to effect seals between carb and case. Fox wisely uses a simple coating of RTV (room temperature vulcanizing) clear silicone to make a permanent trouble-free seal that should not be disturbed. One Allen set screw through the crankcase casting against the carb's neck provides final locking/clamping action.

On initial start-up of a brand new Fox engine its not uncommon to observe blackish exhaust. Don't be alarmed, as usually its the last of the lapping compound being washed out of the lapped piston/cylinder. I do all static testing with black nylon Master Air Screw props and use 10-percent nitro hobby shop fuel to which one ounce of castor oil per gallon is added. Fox advocates castor-lubed fuels for long life. I concur. Two tachometers are used. This Fox 40BBRC Standard was so impressive on test that I chose to mount it and fly it for further verification. The speed range of the engine enhanced the PT 40 test model's flying and 12 total flights over four different days have been made. Neither needle valve was changed during flight testing. The four-ounce fuel tank averages seven-minute flights. Vibration level was judged extremely low and throttle response and related speed ranges make this an engine for competitors to copy. I fly with a slightly different fuel, and the five-pound model with a 10-6 is capable of sustained vertical flight! Landings are extremely slow. I found no need for a pressure line from the muffler to the fuel tank's inlet.

The only fault I've been able to find with

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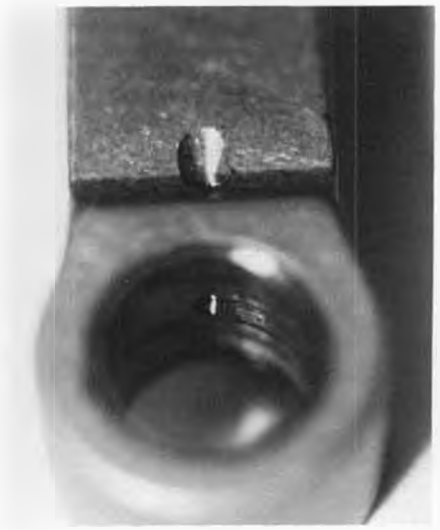
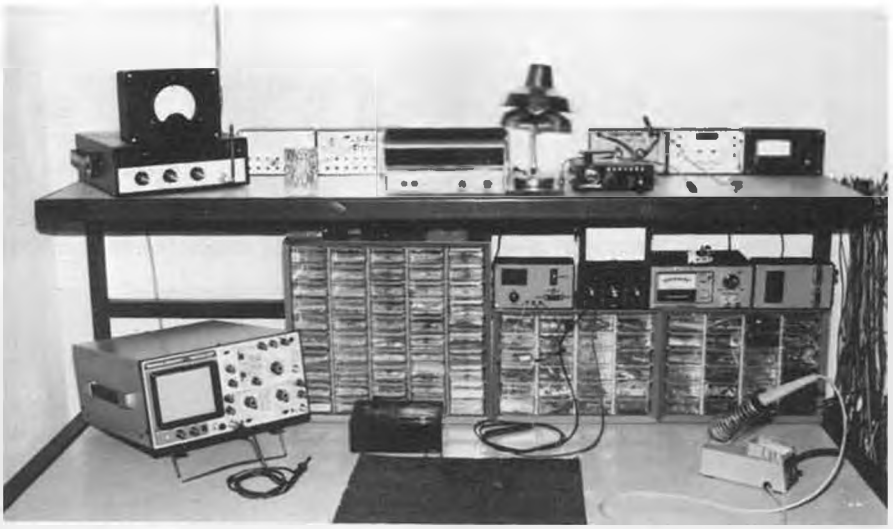
A look through the high back door shows the front transfer Schnuerle port and how fuel flow is directed away from the exhaust.



Close-up photo shows how lube hole is drilled in a better location at rod's top and bottom bearing. Purpose of careful oil-rich break-in is to seat these bearings as well as to finish forming the piston/cylinder fit.



Electronics Corner

By ELOY MAREZ

• Life—and my mail box, seems to be full of coincidences. Disregarding the first one for the present, the latter just brought two queries about Mr. L. R. Taylor and his products. First, I had a note from Jim Riggle, Gladstone, Oregon, who wrote:

"Could you please. . .a few years ago I bought an L. R. Taylor Power Pacer. It has been a fine charger. I've especially liked the ability to discharge Ni-Cds and find out approximately their remaining charge. . .I broke it the other day.

"Now I can't seem to find an address for L. R. Taylor or an ad in any magazines. Do you know their address, are they still in business, is there another shop qualified to service my Power Pacer?" Question No. 1: Yes; question No. 2: Yes; and question No. 3: I don't know! Mr. Taylor is still doing business at the same old stand, namely 20831-1/2 Roscoe Blvd., Canoga Park, California 91306, with telephone number (818)341-7690. As for the "I don't know" referring to another shop to service Power Pacers, I guess it is OK to plead ignorance when a more positive answer is no longer required.

The second letter referring to the same subject comes from across the big pond, fortunately in a language somewhat similar to ours which I was able to read without the help of one of my foreign dictionaries! John Bottomley, Hertfordshire, England, wrote:

"Firstly, thanks for writing the most enjoyable Electronics column in the model magazine world. (*Did I ever tell you what a great place England is? em*) Secondly, thanks for your help several years ago when your column discussed Hall Effect Transistors. The info in that column enabled a colleague of mine to sort out a temperature stability problem on a U.K. manufactured gyro.

"While living and working in the USA and Canada, I purchased the Taylor Power Pacer, 110V/60 Hz. Now that I am back in the U.K. I want to continue to use it. Via a step-down transformer I am able to convert 240/50 Hz to 110V/50 Hz. However, a frequency change to 60 Hz is not as practical. The unit works on 110V/60 Hz, but I'm not sure if the clocks which are calibrated in mAh are reading correctly. So my question is: do I need to multiply the clock reading by 60/50 or 50/60 to get the correct capacities for my batteries? It may be that the clocks are DC driven by the discharging batteries, but I don't know." John, thanks for the kind words, and I am serious about England, having spent many pleasant times there, both in some of your cities and as a guest of the RAF at a number of its bases. I guess more than a little bit of Merrie Olde Englande wore off on me—I now wear a "London Fog" jacket and with dinner I have to have my "cuppa'!

Anyway, back to the Taylor Power Pacer. All such timing devices, as did all electric clocks in the pre-digital days, work with an AC synchronous motor. This is a type of motor in which the rotor speed is directly related to the frequency of the power source, actually running at some multiple, and is always constant. For example, a motor designed for 60 Hz will have a shaft speed of 3600 rpm. The same motor, operated on 50 Hz will run at 3000 rpm.

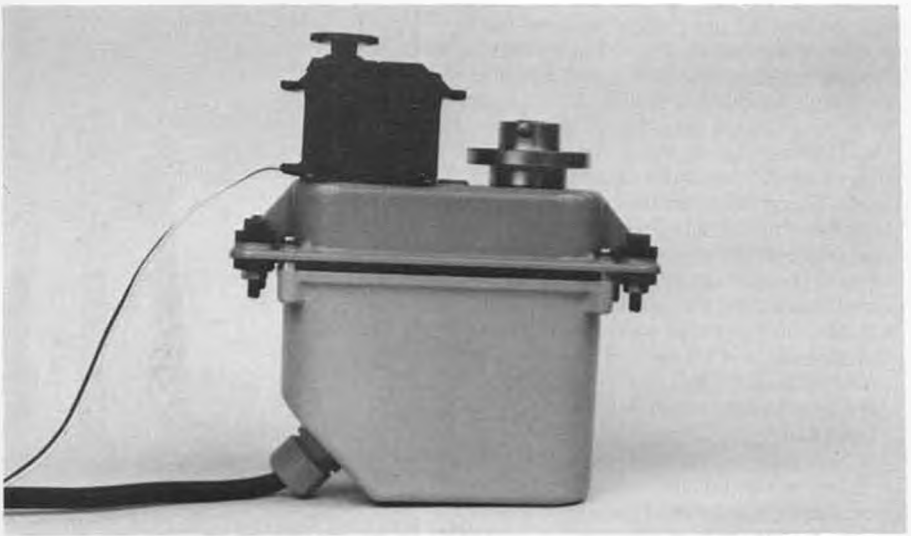
With that as a beginning, it is then only a matter of mathematics and gear ratios to come up with an instrument that will turn the final output shaft at any desired speed. Using time as one part of a formula, an instrument can be designed and calibrated to read and indicate any value which can be converted to an electrical signal, such as in your case, battery capacity in milliampere hours.

Being made for operation in this country, the Taylor units do all their conversion based on 60 Hertz, which will keep that motor spinning merrily at a certain design rate. The same motor, operated at 50 Hz will still run just as steadily but at 50/60th of the original speed. If it were a clock, after one hour's running, the hands would have advanced only 50 minutes.

I'm sure you can take it from there—your Power Pacer, operating on 50 Hz, will be doing everything else correctly, but it will be running slow by 10/60. To obtain the correct mAH figure, it will be necessary to multiply the one indicated by 1.20.

Incidentally, in reference to your idea that the motors might be powered by the battery being discharged, it probably comes from another bit of disinformation that started somewhere along the way. That being that units like the Power Pacer discharge batteries through a resistor, and that similarly, accurate capacity tests can be made using a resistor or light bulb, voltmeter, and a

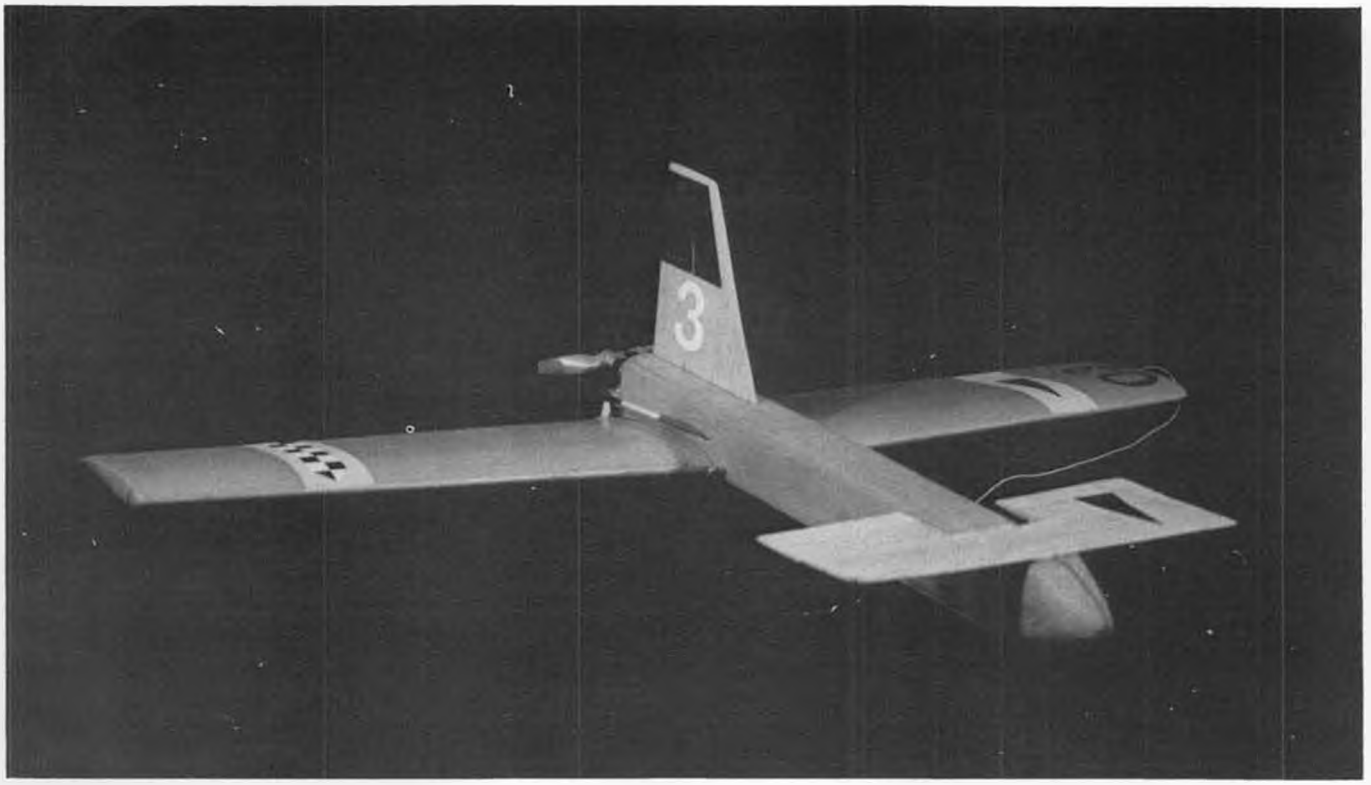
Continued on page 91



Anyone for a Quarter Scale 747? The servos are available! The SSPS-105 shown here has a rated output of 889 ounce/inches, speed of 0.0 seconds for 90 degrees, and operates from 12VDC. Input is normal R/C values: 1.51 millisecond positive pulse. Weight: 28 oz; size: 5.12x2.17x4.37 inches. That is a Futaba S-128 perched on top. Info from Condor R/C, 1733-G Monrovia Ave., Costa Mesa, California 92627, (714) 642-8020.

Boxy-Z

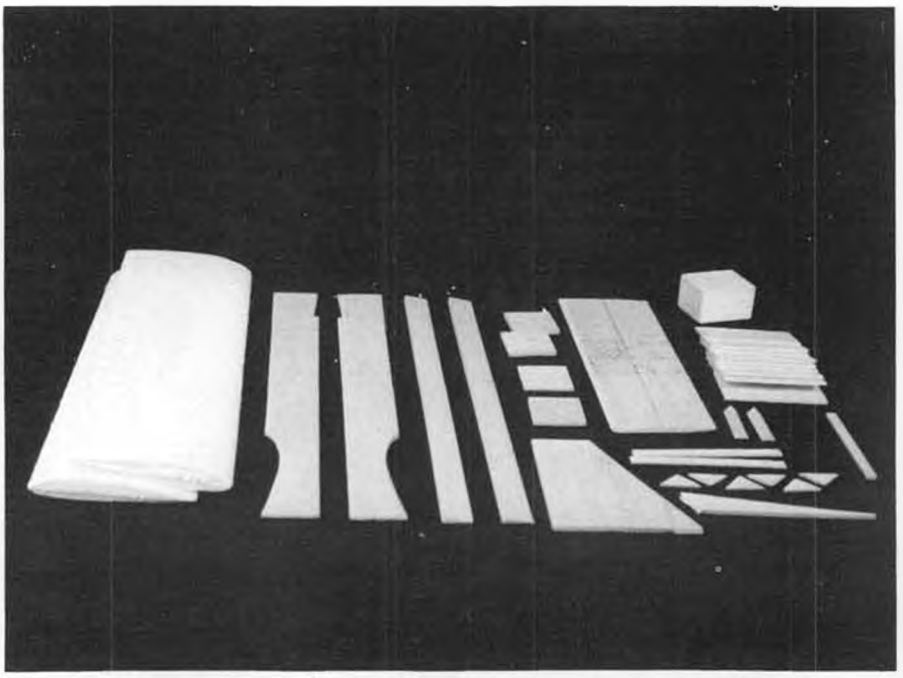
By GLEN WEBER. . .An extremely simple 1/2A R/C canard, the Boxy was inspired by Col. Bob Thacker's .60-size Shinden. Trial and error, along with ready-made foam wings, have produced this configuration.



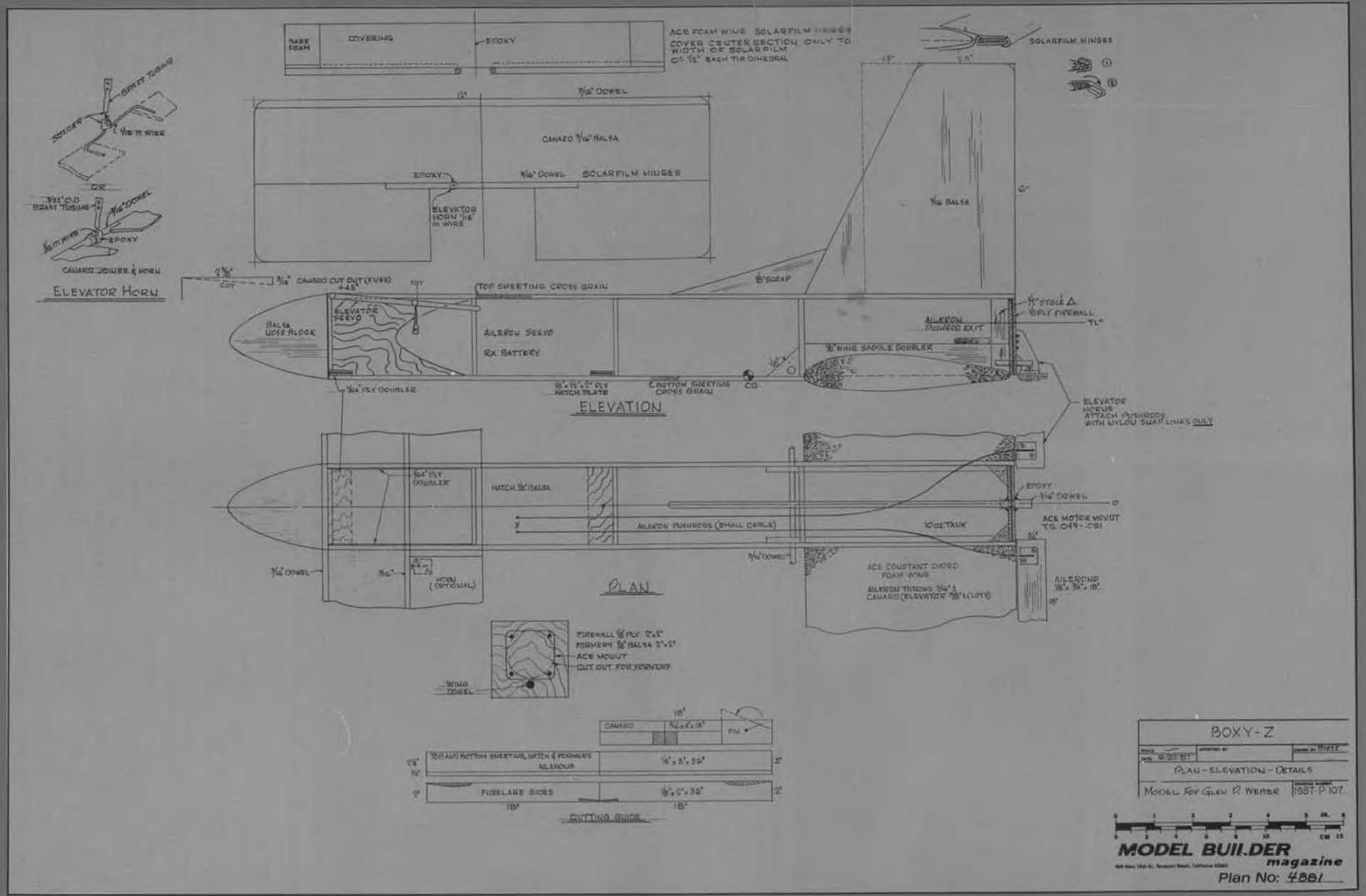
• The Boxy-Z is your basic 1/2A canard that is simple to build and maintain, economical, aerobatic, and practically bulletproof. Its design originally started out as a 1/2A scale Shinden, reduced in size from Col. Bob Thacker's .60-sized model (*MB* August 1984). After two prototypes and many crashes, all the bugs got worked out. It performed well but was difficult to build and to repair. Along comes Bruce Tharpe and his "Weekend Wonders" (*MB* April 1984) and a challenge to build a simple 1/2A canard. With his research into "boxy" designs and the Shinden's great flying measurements, the "Boxy-Z" was born (excuse the pun, Burt). This model can be constructed in a minimal amount of time with little expense and will provide unbelievably rugged and versatile performance. The Boxy-Z's flying capabilities are comparable to its brother canards, and it can perform any maneuver that aileron and elevator will permit. Impressive landings are possible because of its gentle stall characteristics.

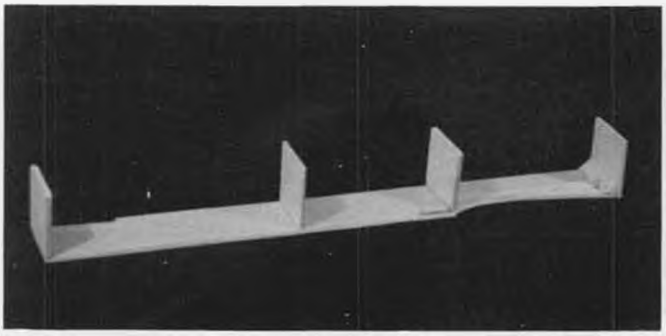
FUSELAGE

If this appears too complicated for you, maybe you should take up pottery. It's just a box, hence the name. First, cut a sheet of 1/8 x 2 x 36-inch medium balsa in half, make the cutouts for the wing saddle and canard, glue in the doublers, and that's it! Simple, huh? The formers are 1/8 x 2 x 2-inch balsa, and the firewall is the same size plywood. Glue the formers 90 degrees to the sides where shown. Add the firewall (epoxy) and nose block, cross grain top and bottom sheeting and hatch parts. Make sure everything is square before the glue dries. Sand, shape, and cover with your favorite covering, remembering to keep it light! Now glue in the wing hold-down dowels.

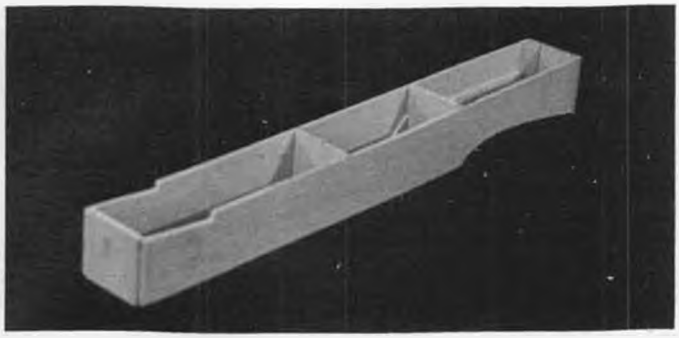


Easiest way to build the Boxy-Z is to cut out parts to make your kit, then proceed. The foam wings are from Ace R/C, and can be either constant chord or tapered, to suit your desires.

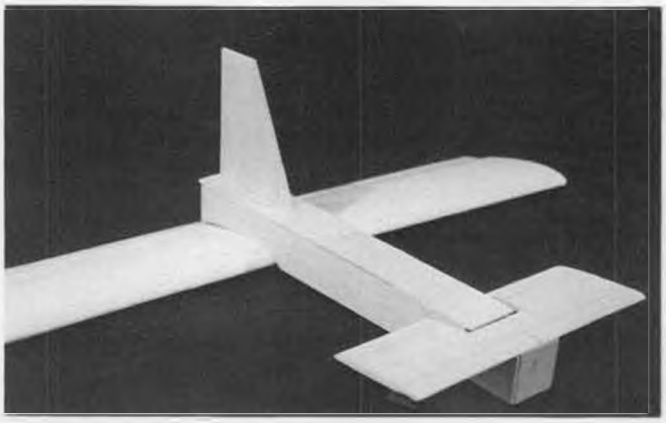

BARE FOAM
COVERING
EPOXY
ACE FOAM WING SOLARFILM HINGES
COVER CENTER SECTION ONLY TO WIDTH OF SOLARFILM
OR ½" EACH TIP DIHEDRAL
SOLARFILM HINGES
SOLDER
BRASS TUBING
1/16 m WIRE
OR
3/32" O.D BRASS TUBING
1/16 DOWEL
1/16 m WIRE
EPOXY
CANARD SOLDER & HORN
ELEVATOR HORN
3/16" DOWEL
CANARD 1/16" BALSA
EPOXY
1/16" DOWEL
SOLARFILM HINGES
ELEVATOR HORN 1/16" m WIRE
2 3/8" CUT
3/16" CANARD CUT OUT (FUSE) +45°
CUT
TOP SHEETING CROSS GRAIN
1/8" SCRAP
1/16 BALSA
1/4" stock △ PLY FIREWALL
TL"
AILERON PUSHROD EXIT
BALSA LOAF BLOCK
ELEVATOR SERVO
AILERON SERVO
RX. BATTERY
"B" WING SADDLE DOUBLER
1/64" PLY DOUBLER
1/8" x 1 1/2" x 2" PLY HATCH PLATE
BOTTOM SHEETING CROSS GRAIN
CG
ELEVATION
ELEVATOR HORNS ATTACH PUSHRODS WITH NYLON SNAP LINKS ONLY
1/64" PLY DOUBLER
HATCH 1/8" BALSA
EPOXY
3/16" DOWEL
AILERON PUSHRODS (SMALL CABLE)
10oz TANK
ACE MOTOR MOUNT TO .049 - .061
3/16" DOWEL
1/16"
HORN (OPTIONAL)
ACE CONSTANT CHORD FOAM WING
AILERON TRIDWG 3/16" & CANARD (ELEVATOR 1/8" (LOTS)
AILERONS 1/8" x 3" x 18"
PLAN
FIREWALL 1/8 PLY 2"x5"
FORMERS 1/8" BALSA 2"x2"
ACE MOUNT
CUT OUT FOR FORMERS
WING DOWEL
18"
CANARD
3/16 x 4" x 18"
FIN
TOP & BOTTOM SHEETING, HATCH & FORMERS AILERONS
1/16" x 3" x 36"
FUSELAGE SIDES
1/8" x 5" x 36"
18"
18"
CUTTING GUIDE
BOXY-Z
PLAN - ELEVATION - DETAILS
MODEL FOR GLEN P WEBER
1987-P 107
MODEL BUILDER magazine
Plan No: 4881



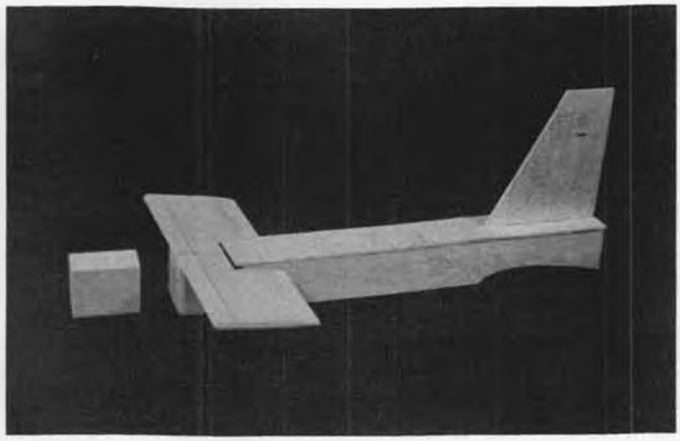
Fuselage is simple box construction from a sheet of 1/8-inch balsa. Formers are 1/8 inch, as is plywood firewall.



Nearly completed fuselage with sides in place. Note cutouts for the wing saddle and canard.

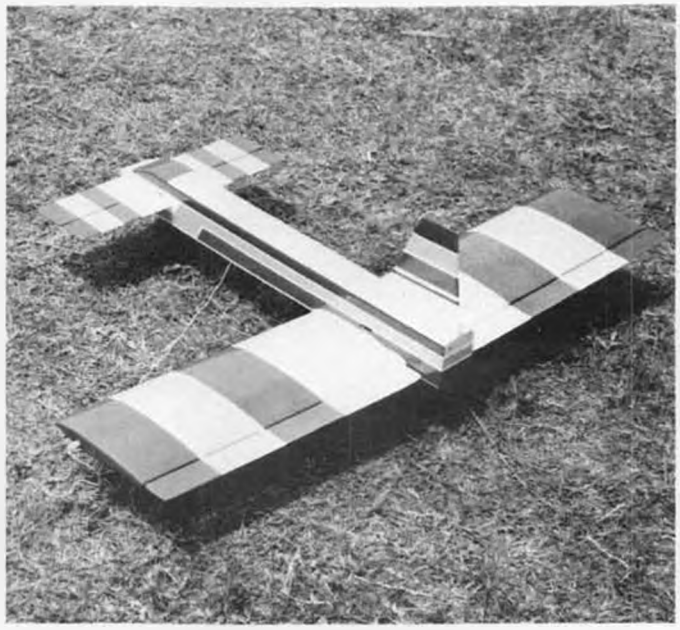


Test-fit of components before final assembly and addition of radio equipment and engine.



Solid balsa nose block is glued in place before shaping.

A trio of Boxy-Zs and their owners: Kenny Bonura, his son, and Vic "The Seaman."



Finished Boxy sans engine. This design has been successfully flown using cobalt 02 and 035 electric motors as well as 1/2A gas.

CANARD AND FIN

Cut the canard and vertical fin from a sheet of 3/16 x 4 x 18-inch medium balsa as indicated. Glue a 3/16-inch dowel (or bamboo skewer) onto the leading edge of the canard. Sand and cover. Join the elevators as shown on the plans or use your own creation. Glue to fuselage accurately.

WING

The wing is a constant chord Ace foam wing (or tapered). Follow the instructions that come with the Ace wing. We like 1/2-inch dihedral under each tip, but perfectly flat is okay. Attach the ailerons (firm balsa) with the covering material (shown on plans or consult "Weekend Wonders" *MB* April 1984) or use your own type of hinges. To save time and covering material, just cover the center of the wing as wide as the material comes. The tips survive very well just being foam (just like the Voyager). The ailerons are attached to the servo by nylon pushrods and snap-links, and regular elevator horns on the ailerons.

EQUIPMENT

Mount the tank and motor. Install the radio equipment (micro systems work best as far as weight is concerned) so the plane will balance (dry) no farther aft than shown. Check everything, remember up is down and down is up on a canard. Don't fudge on the balance, now!

FLYING

Hand launch, level, into the wind and enjoy flying backwards. Try some loops, inside and outside, rolls, and low passes over the field. With a hot Tee Dee on pressure, this bird will keep up with most 1/2A "racers." Many Boxy-Zs have been built by OFBs in the area, and all are amazed at how fun and rugged a plane can be. Have fun and fly safely!

P.S. Boxy-Zs have now been flown very successfully using cobalt .02 and .35s. You electric guys know what I mean! •

ALL ABOUT ARFS

By ART STEINBERG

• November 22, 1987, was a real milestone in the annals of ARF models. For the first time such models were not only allowed to compete against the finest in hand-built scale aircraft, but they were actually encouraged to enter the competition! The affair was called a Fun Scale Contest and was hosted by the Scale Squadron of Southern California at Mile Square Park in Fountain Valley. To quote from the handout given to all contestants: "This is the next thing to a fun-fly. It is a contest where, *you*, Mr. and Ms., if you will, Average Modeler, can have fun flying your FUN Almost Ready to Fly scale aircraft *or* any scale plane you have. There is no limitation as long as your aircraft can be recognized as being nearly like its full scale counterpart. Come join us in a great experiment." The objectives of the contest were listed as follows: "To acquaint new members of our hobby, and those "fun-fly"-type pilots, with the mechanics of scale model competition in a less stressful atmosphere, and encourage them to try it. It should also enable those who choose to fly aircraft they have purchased, or swapped, to compete; or even those builders who wish to have a friend fly their aircraft, to enter a real contest. The static and documentation requirement is included in order to acquaint the new contestant with a very simplified form of the static judging he will encounter, should he move up to Scale Masters, AMA Scale, or FAI World Scale Competition." Without going into a great deal of contest rule details, suffice it to say that no attention was paid to color schemes or markings, wire bracing, tail bracing, wheel pants, retractable gear leg covers, cockpit details, and scale points. All that was required was that the plane be generally recognizable as its full-scale counterpart. However, if the full-scale aircraft had retracts, flaps, wing struts, see-through windows, they were required on the model or points were deducted. To quote directly from the contest rules: "Contestant must state, on the entry form, which full-scale aircraft his plane is modeled after, and he must further identify his entry by giving the full-scale manufacturer's name and aircraft number. Example: Cessna 152, Cessna 177, Piper Warrior, Piper J3, Piper PA28, etc. All models start with a score of 100 points. To retain the 100 points, a contestant's aircraft must have the same structural and control functions as its full-scale counterpart. Five points will be deducted from the contestant's score for each component missing on the model which is present on the full-scale plane. Example: A Cessna 152 model lost 15 points in Static because three of the components present on the full-scale Cessna 152 (struts, see-through windows, and flaps) were not present on the model, and it started its flight sequence with 85 points. Example: A P-51 Mustang lost 10 points because the model didn't have the flaps and retractable gear which are on the full-scale plane, and began its flight phase with only 90 points." Of a total of 28 entries, eight were ARFs. Competition was stiff, as many of the built-up models were fine examples of top-quality craftsmanship. However, the way the rules were formulated served to shift a great deal of the emphasis to flying,

Continued on page 78

Larry McDougle and his smooth-flying 1/3-scale EZ Bud Laser.

Jerry Kitchen, top prize winner in the first Fun Scale contest with his Christen Eagle ARF.

Robert Moore, who placed in his first contest ever with his Top Flite Cessna ARF.

Hobby Shack's new ARF Ryan PT-19 being shown for the first time by John Greenshields.

BIG BIRDS

By AL ALMAN

• I like to build and love to fly, but the devil made me hate to do any finishing. There's also another reason for my mediocre-looking airplanes: I'm a Gemini, and although we're dynamite at starting projects, we usually don't finish with the same fervor. However, since I am a staunch advocate of the Way Stand-Off Scale Concept (like 50 feet or more), there's no feeling of guilt associated with rushing through a finish.

Unfortunately I just outdid myself and came mighty close to ruining the looks of the Byron Glasair TD I mentioned last month.

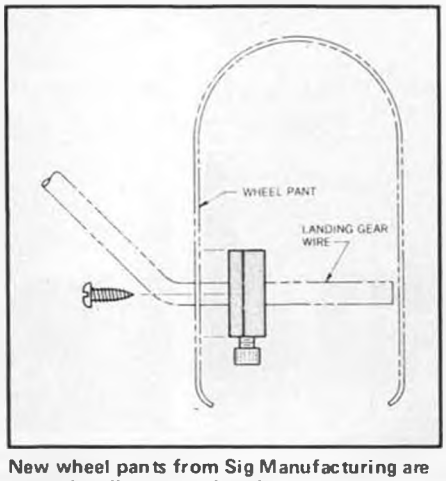
To begin with, I wasn't used to working with fiberglass and foam, which is what the Byron kits are made of. Virtually all my birds have been built with balsa, ply, and spruce, and my glassing experience had been limited to cowls and pants and fuelproofing the engine and tank compartments. So working with unfamiliar materials slowed me down somewhat.

But worst of all, this turned out to be the project that everything bad happened to. I think that every modeler has at least one airplane like this that for some reason so many things go wrong that you begin to seriously consider taking up stamp collecting.

Unfortunately, I didn't realize what my real problem was until I'd botched up the finish on this birdie. Y'see, my daily medications had been changed a couple of times, and the doc did mention that my judgment might be impaired a bit during the adjustment period, and I forgot what he'd said.

So the end result was a string of bad or poor decisions being made, mostly in regards to the finish. I didn't (ugh) sand the foam wings, stab, and control surfaces enough; didn't use enough primer; did an unusually bad job of glassing all the foam surfaces; wiped the bird down with an old, dried-out tack-rag which did nothing but spread the dirt and dust around; and then compounded all of this by deciding it'd be quicker and cheaper to use spray cans (the special price seemed attractive) rather than mix up K&B Superpoxy.

And not only did I choose an especially bad color (black really does highlight imperfections), but the Perfect paint I used ran in many places, took a l-o-n-g time to dry, remained tacky in some spots, and is nowhere near as tenacious, durable, or scratchproof as the Superpoxy is.



New wheel pants from Sig Manufacturing are exceptionally easy to install.

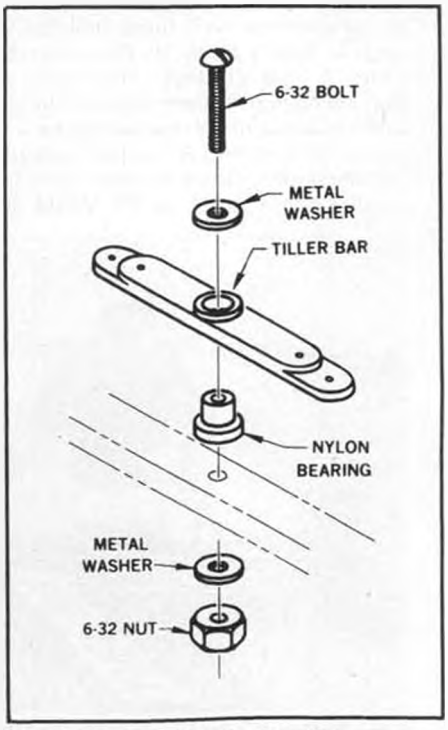
I did, however, luck out when it came to the trim. The broad, angled yellow and orange striping tape looks great against the bird's basic black.

Anyhoo, the point is to be careful about making any decisions and doing things when your old medications are changed or new medications are added to your daily intake. I was lucky that I didn't tangle with a whirling prop or plant one of my birds while I was "seeing things differently." You might not be so lucky!

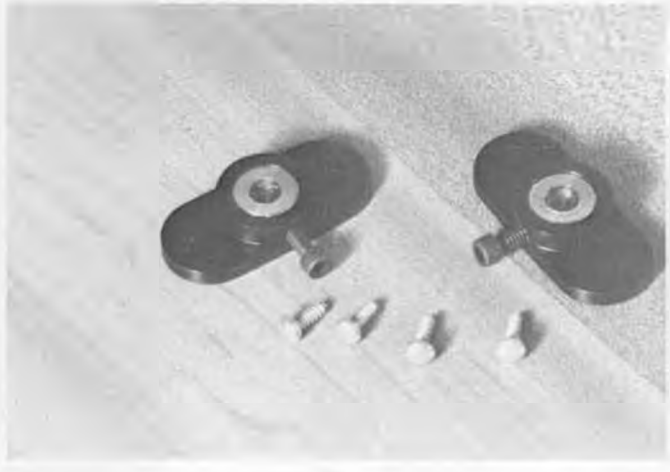
NOISE

It's a problem, a BIG problem for any R/C club. And it doesn't matter whether the planes involved are BIG or small because even though the 20-, 40-, and 60-sized glow engines scream annoyingly when turned their typically small props, there's nothing more raucous than an improperly muffled Quadra 50 or equivalent.

Noise has become a favorite topic lately,



Tiller bar and rudder horn from Sig.



Sig's new wheel pant mount makes a difficult job quite painless. Two sizes are available to fit 3/16- and 1/4-inch wire axles.

Sig's new heavy-duty tiller bar and rudder horn, molded from tough nylon. All three products are in the Sig Skywalker kit.

and rightly so. You'd have to be a hermit not to know that an increasingly large number of flying fields are lost each year because guys insist on getting every last rpm from their engines and don't care how much noise they generate while doing it.

And every month I read about proposed DB levels that AMA is kicking around. Most everybody seems to agree that engine noise must be abated, but DB testing goes on and on, and very little action has been taken so far. To tell the truth, I'm just about fed up with the plethora of DB readings being thrown around.

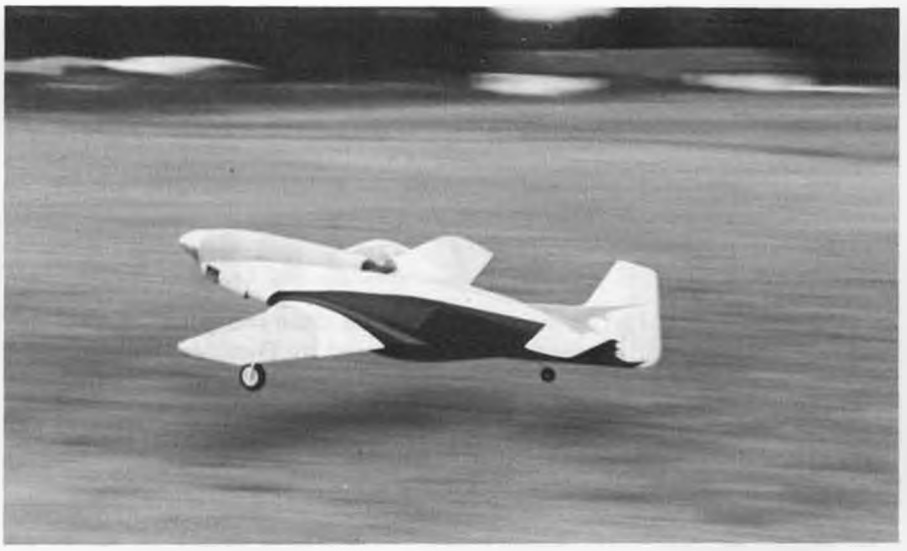
I realize that a standard must be established, and then, of course, must be enforced. But, in the meantime, those who really want to can effectively reduce the noise level at their flying sites without even having a DB meter.

The Puget Sound Rocs (IMAA Chapter # 108) proved this five years ago. We took an aggressive stand in regards to engine noise even before our new field was in operation. Our restrictions are pretty simple: four-strokers are most welcome, but no two-cycle engine under 1.08cid is allowed to operate on glow. However, any sized two-cycle is allowed if run on ignition or as a diesel and every engine must be adequately muffled. Any violation results in immediate expulsion from the club. No ifs, ands, or buts!

When the word first got around that we didn't allow small two-cycle glow operation, many modelers in the area began to badmouth us. These nearsighted idiots claimed that we were hurting, and not helping, model aviation by our unreasonable restrictions.

The fact is that by taking this practical approach to a potentially deadly problem, we've flourished and presently enjoy an extremely fine relationship with the town of Yelm. And all this in spite of the fact that our field is no more than a quarter of a mile from many residential buildings and that we had nary a DB reading to use for guidance.

We did it, and you can do it, too. Eliminating much of the irritating engine noise can, and must, be accomplished if we expect our hobby to have any future. All it takes is the willingness to make the commitment and then act accordingly, that is, if you want to have a place to fly.



Ronnie Kemp's 30-pound Nosen P-51 really moves out with a Sachs 4.2 up front.

RESPIRATORS

Being aware of the respiratory hazards we're exposed to during the building and finishing of our aeroplanes, I've been using the cheapie kind of filter/mask available in some hobby shops and most hardware stores. Since I don't use Imron paint, it seemed that I had all the protection needed.

But I didn't realize how absolutely minimal this protection was until a good friend bugged me into buying a decent respirator; a Willson 500 Series for about 15 bucks.

The Willson 500 respirator is the kind of efficient face mask/filter you need in your shop.

The vast difference between these two face masks ability to effectively filter out dust and mists became apparent when I tried the Willson. First I gave it a Hot Stuff test and was amazed that I couldn't detect any fumes even though both the Hot Stuff and Hot Shot kicker were applied in heavy amounts.

Next came the K&B Primer Test, and again the Willson proved itself to be so superior to the no-name I'd been using that it was like trying to compare a 1988 radio system to what was available back in the fifties.

Why does the Willson offer so much more protection? Because it fits the contour of your face so well that no air can be sucked in anywhere except through the inhalation valve and filter, and you breathe out through an exhalation valve.

Of course, the filter is replaceable; they come two in a pack for about $1.75 and should be available from the same hardware store that sells the Series 500 masks.

What's that? You say that you don't need a mask 'cause you don't use primer or paint and go the iron-on plastic route. Then how about protecting yourself from all the balsa dust generated in that workshop. And don't tell me that you don't use sandpaper be-

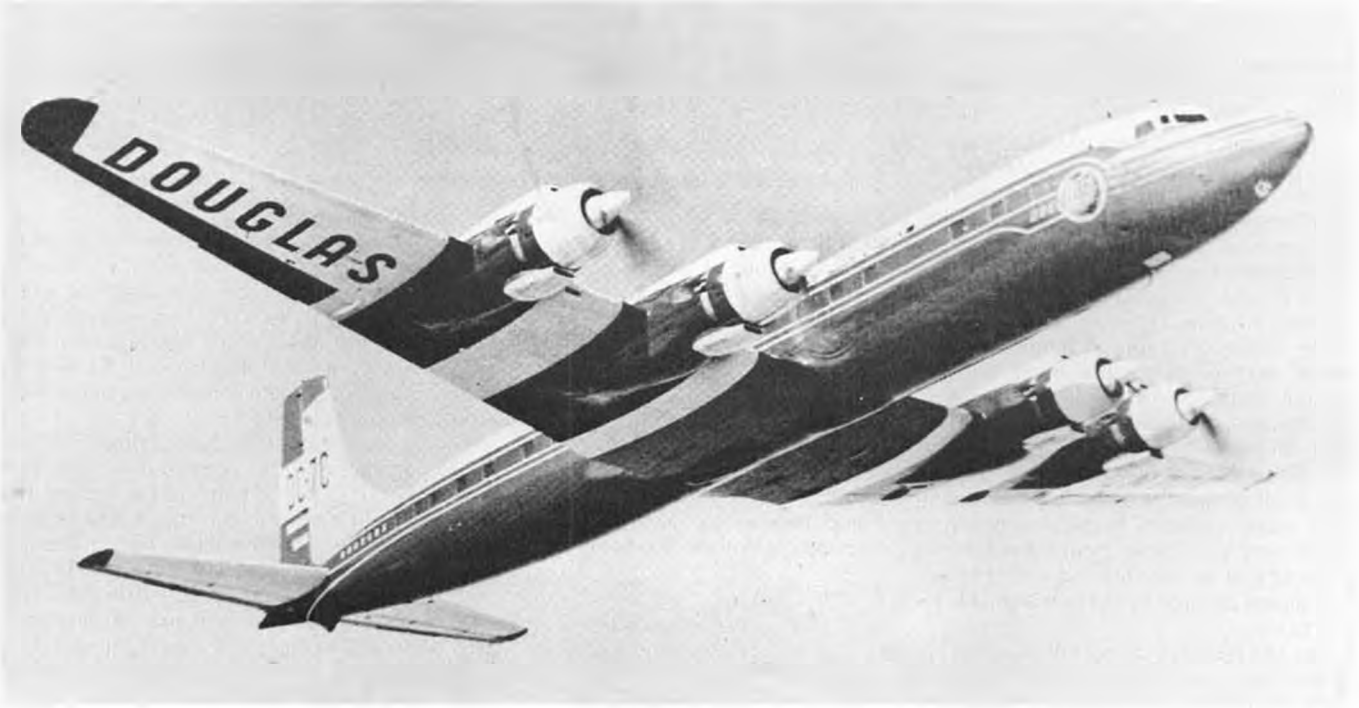
Continued on page 70

Autopsy being conducted on John "Dead Stick, Downwind Turn" Spurling's Sachs-powered RV-3. Keep smiling, John.

George Pringle getting help preflighting his BIG Laser from good buddy Jim Roland.

A Wing-Clipped Airliner

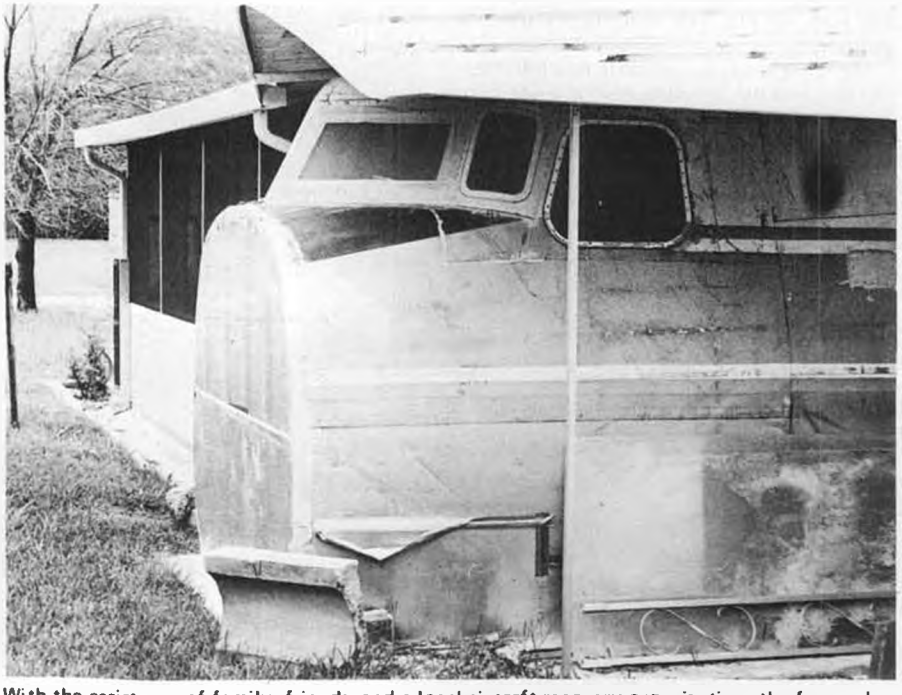
By R.J. SEESE. . .After being abandoned by drug smugglers in Florida, this DC-7B was left to rot in a storage area in Tampa, Florida, where it was acquired by Dick Vosburgh, who is restoring its cockpit in every detail.



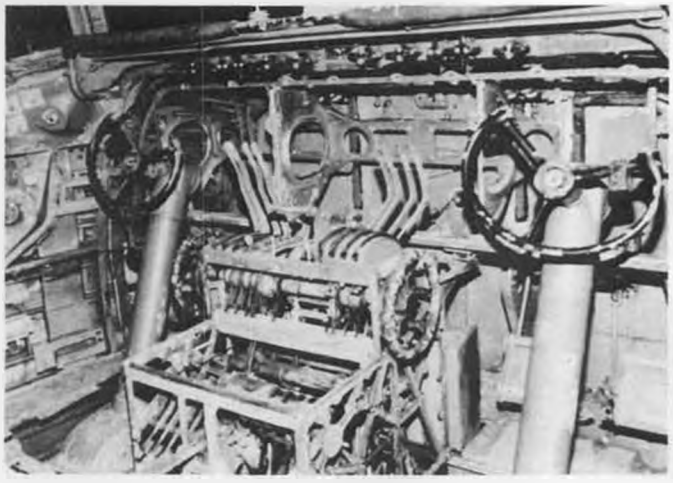
• Donald Wills Douglas, the man destined to design airplanes that would make the fabled flying carpet a reality, was born in Brooklyn on April 2, 1892. Very early he decided on a career at sea, and to his great credit won an appointment to the United States Naval Academy at Annapolis. It was just after entering the academy in 1909, that Douglas watched the Wright Brothers demonstrate their newest airplane for the Army Signal Corps. After that, ships shackled to the seas of the earth ceased to fascinate Donald Douglas, and ships free to travel the limitless skies above the seas became his obsession. He resigned from the academy to study the new science of aeronautics at the Massachusetts Institute of Technology.

After finishing MIT's full engineering course in only two years, Donald went to work for the Connecticut Aircraft Company. It is suggested that one of his early assignments at Connecticut was to assist in building the U.S. Navy's first airship, the DN-1. Hopefully Douglas had little to do with that project because it turned out to be an underpowered, overweight, 175-foot long fiasco that could not even get off the ground until one of its two engines had been removed. The DN-1 finally made a few short flights in April of 1917, and was quietly scrapped a few months later. Not a terribly auspicious beginning for an aspiring aircraft designer.

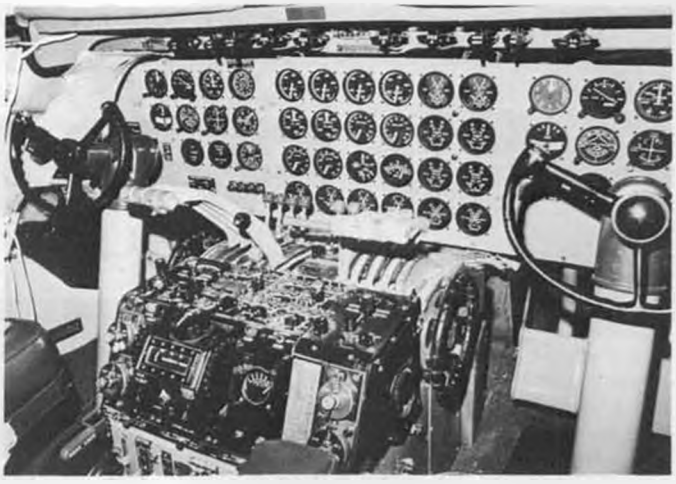
Eventually Connecticut Aircraft did build successful dirigibles, and Donald Douglas moved on to the airplane company of Glenn L. Martin, then to a position as Chief Civilian Aeronautical Engineer for the Army



With the assistance of family, friends, and a local aircraft recovery organization, the forward cabin of the DC-7B has been attached to the Dick Vosburgh home in St. Petersburg, Florida.



The cabin was in extremely poor condition when it arrived. All instruments were missing, as were most of the panels, switches, and trim, as well as hundreds of other parts, big and small.



The reconstructed cockpit has been so expertly restored that any old DC-7 pilot who crawled into the seat would have to study things for a while before realizing he was looking at a replica.

Signal Corps. By that time America was fighting in WWI, and the job given Douglas was to build warplanes that were better than those of the enemy. He probably would have done that, but frustrated by all the military bureaucracy, Donald returned to Martin Aircraft where he spent the next several years working on heavy bomber design.

In 1920, Donald Douglas decided to start his own aircraft company. The first Douglas airplane was constructed in the loft of an old wood mill in Los Angeles. This big wooden-framed biplane Donald called the Cloudster, had the financial backing of millionaire flying enthusiast David R. Davis, who planned to pilot it in the first nonstop flight from coast to coast. However, two young Army lieutenants beat him to the punch by flying a German-made Fokker nonstop from Long Island to San Diego in just under 27 hours. Davis sold the Cloudster to Ryan Aircraft, where it was converted into a closed-cabin 12-passenger airliner.

Douglas, then more interested in military contracts than civilian passenger planes, convinced the Navy to let his company build it three torpedo bombers based on the Cloudster design. He borrowed $15,000, moved Douglas Aircraft into an old movie studio in Santa Monica, and proceeded to build the DT-series torpedo planes that revolutionized naval air-attack techniques. Within a couple more years, in addition to

Dick Vosburgh is accomplishing more than the static preservation of a piece of aviation history. He's putting this DC-7 back into the night skies over the North Atlantic, about to start its descent into London's Heathrow.

advanced models of his torpedo bomber, Douglas was constructing small biplanes for civilian airmail carriers, an observation biplane for the Army Air Corps, and a big single-engined biplane dubbed the Douglas World Cruiser. In 1924, Douglas Aircraft became world-famous when Army aviators used a World Cruiser to make the first round-the-world flight.

Douglas launched the Douglas Commercial Model No. 1 (DC-1) project in 1932. By then the plant in Santa Monica had grown into an eight-acre facility, employing over 900 people. It was in December of the following year that the DC-1, a gleaming silver 200-mph 12-passenger monoplane powered by two 710-hp radial engines, was delivered to Transcontinental & Western Air, Inc. (TWA). There would be only one DC-1 built, as Douglas already had a 14-passenger DC-2 ready for production. No other passenger plane was able to compete with the DC-2 for comfort or speed. TWA ordered 25 at a cost of $65,000 each.

In December of 1935, on the 32nd anniversary of the Wright Brothers' first flight, Douglas introduced a twin-engined transport called the Douglas Sky Sleeper. It was divided into six compartments, much like a railroad Pullman car. Travelers could leave Newark, New Jersey, at 5:10 p.m. and arrive in Glendale, California, at 8:50 a.m., unless the weather or a mechanical problem

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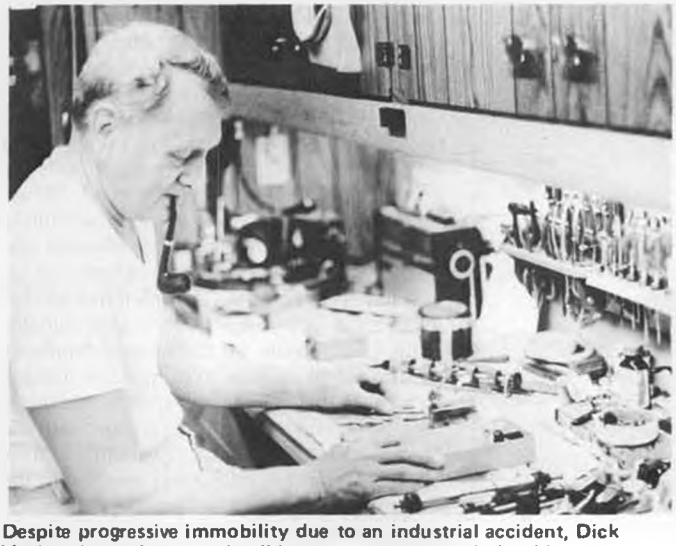


Despite progressive immobility due to an industrial accident, Dick Vosburgh continues to do all he can to preserve aviation history.

The instrument bezel is hand-fabricated from scrap plastic, the instrument face is cut from cardboard, and the clear instrument covers are from old plastic storm windows. Instrument needles are brass paper fasteners.

COX RADIO R/C CONTROL E-Z BEE

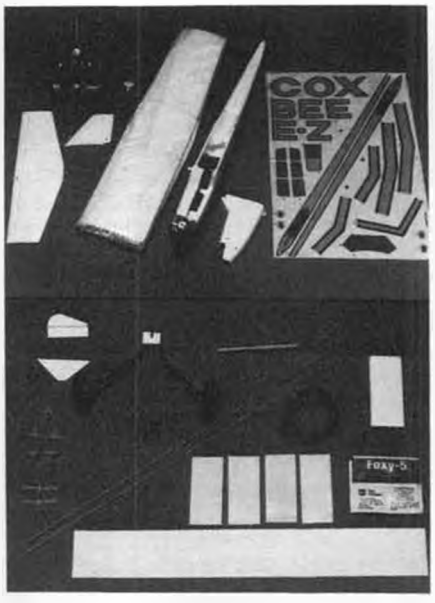
By AL NOVOTNIK

• For many years the name Cox has been popular with many first-time fliers in control line and in R/C. They have had the popular Cessnas, the Ultra Light, etc. But now they have really hit with a true first-time R/C plane. The new kit is really not a kit at all; it's a fast assembly job with very little work to be done before you're ready for the air.

The model is a good-looking all foam and molded plastic model with a high wing (a span of 55 inches) and a famous dependable Cox .049 engine for power.

The assembly instructions are very well done with plenty of photos to cover your progress through the assembly. The kit is very complete with everything you need to complete the model up to the point of flying. (More on that later.)

Everything has been thought out for easy assembly for the beginner. The control horns snap together instead of the familiar plate and screw method. Both elevator and rudder are done in this manner. The foam construction is such that no hinges are needed. A plastic material is sandwiched between the foam to create a very rugged structure. Epoxy is provided for the foam parts that must be epoxied such as the vertical fin to the horizontal stab—the tail skid and the center wing joint. A plastic jig is also provided to align the vertical fin. When the fin and stab are cured, the stab can be epoxied to the fuselage; the fuse has locating plugs in it, and the corresponding stab has pilot holes for location. The epoxy provided is of the five-minute type so curing time is fast.



Parts for the E-Z Bee are few and well-turned out. Radio system comes installed in fuselage.

The cowling section which runs from the leading edge of the wing forward is molded plastic and is held over the foam with screws. This plastic molded portion also secures the firewall in position. The proper side and down thrust of the engine is also built into the plastic molded portion. The landing gear is also located in the plastic portion and held in place with a plastic clip.

Before assembling the two plastic pieces in place, drop the battery pack with four double A batteries into the pocket provided, along with the metal piece that serves as nose weight. Now you can put the shells in place and secure them with the screws provided.

The receiver switch plate and switch are screwed to the side into the hole provided.

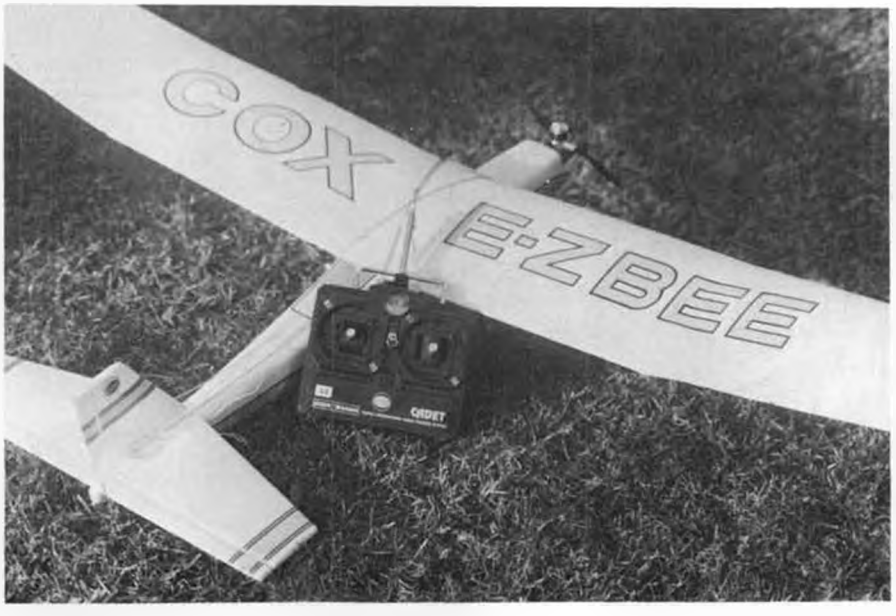
The two wing sections are screwed together with heavy-duty transparent tape, and for added strength, some five-minute epoxy can be used. Make sure here that you have the proper height under each wing tip, in this case five inches above the surface. When dry, install the clear reinforcement guards for the rubber bands.

With all this behind you, you're ready to put the trim on the fuselage and wing. Follow the instruction in the manual and your model will look great!

Your E-Z BEE comes complete with the radio system installed but some work must be done here to complete the job.

First, take the transmitter and install eight new double A alkaline batteries and, as I mentioned before, four in the receiver. Now turn on the transmitter and receiver, make sure the trim tab for the right stick is in the center. This will put the servo in the correct position. Now turn off the receiver and then the transmitter.

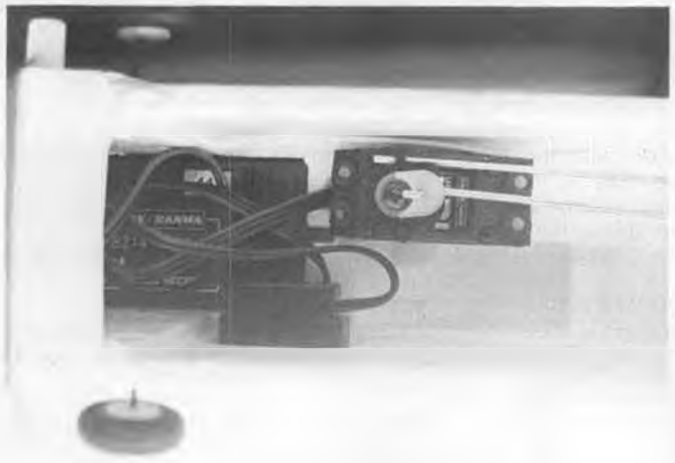
Remove the screw from the center of the servo and remove the output wheel. Insert the pushrod (hook end) from the bottom of wheel so that the push rod runs to rear of fuselage from under the servo wheel. Now put the wheel back on the servo with the push rod on the right side of the servo (looking at fuselage from rear). The output shaft of the servo has grooves in it so you may have to make several attempts to get the correct position. Do not install the screw that holds wheel to servo set. Screw the clevis onto the pushrod approximately six turns; trial fit into the rudder horn. When the rudder looks horizontal with vertical fin, turn the transmitter then the receiver on; if everything looks straight, move the right stick on the transmitter to make sure the rudder turns free at its centered. When satisfied, turn off receiver, then transmitter, and move on to the magical elevator system. When this tiny servo adapter is installed, a request for right or left rudder also applies a little up elevator automatically. This compensate for the normal tendency of the E-Z BEE's nose to drop when making a turn. To install just do the following: Insert the hook end of the other pushrod into the servo pushrod adapter; install screw through adapter, and servo wheel into the servo; screw the clevis onto the pushrod and adjust until the elevator and horizontal stab are exactly in line. Use a straight edge



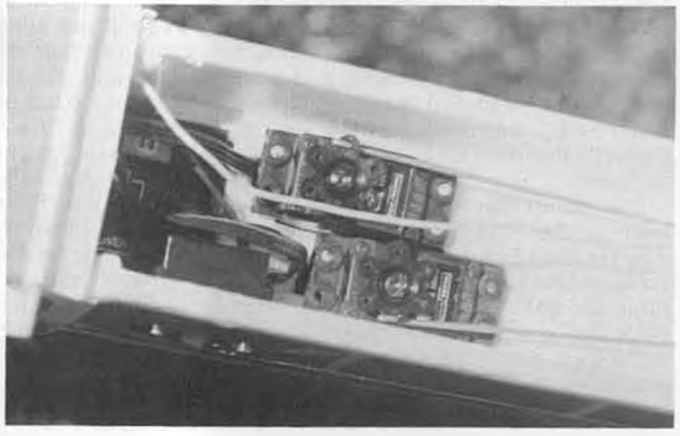
The E-Z Bee with Cox/Sanwa Cadet radio. Digital proportional system offers simultaneous control of two functions when second servo is installed.

Plastic molded nose of the E-Z Bee with Cox .049 ready to go.

On the wing, the E-Z Bee proved to be a good flyer.



Inside, the receiver and servo nestle in the foam fuselage.



With the second servo installed, a bit of right or left rudder control also applies a little up elevator. This compensates for the E-Z's slight tendency for the nose to drop in a turn. Very clever!

to check; this is most important. Turn on the radio system and when you turn the rudder stick right or left you should be getting a little up elevator with each movement. With everything working, turn the radio system off and proceed.

Unravel the antenna wire and lay in the right side trough. Thread end through the horizontal stab clevis and pull slack out of antenna wire. (Do not cut antenna wire or tie knots in it.)

You're now ready for the finishing touches. Install all the decals per instruction and wing hold down dowel through fuselage just behind the rear windows.

Install the wing with the rubber bands provided and your E-Z BEE is complete and ready for the blue skies. Now before going to the local flying field, you'll need a few things. The Cox company has a Cox 400 starter kit containing all you'll need to fly the BEE. It contains a 1-1/2-volt starting battery, a glow plug clip with the battery wires, a 1/2-pint of Cox super power fuel, a filler hose, and a .049 engine wrench. The other supplies you should have would include a modelers knife, small screwdriver both phillips and regular, five-minute epoxy and a few paper towels or rags.

A few words about starting and running your Cox .049 Babe Bee engine. Connect the two wires from the battery clip to the 1-1/2-volt battery. Open needle valve 2-1/2 turns, fill the fuel tank, prime the engine. Rotate muffler spring until the opening on muffler housing is completely exposed. Rotate prop counterclockwise until you feel compression. Hold the E-Z BEE vertically with the tail in the air. Place four or five drops of fuel in cylinder exhaust port and close muffler spring so muffler housing is completely closed. Set the model down and turn prop counterclockwise four times.

Clip the glow plug clip on glow plug.

Turn prop until snap starter catches. After snap starter catches, turn prop clockwise one turn only (more than one turn may break snap starter) then release. When engine starts, it will run slowly; screw the needle valve clockwise to lean mixture and increase rpm. Disconnect glow head clip after engine is running and it will hold top rpm.

Ol' Cowboy Al lassoes a branch in an attempt to free his wayward E-Z Bee from a plane-catching tree. He was ultimately successful, and the E-Z Bee was soon on its way to another fine flight over the Vermont woods.

RADIO

Read your instruction manual for the Cadet radio system. This is a true digital-proportioned system offering simultaneous control of two functions (when second servo is installed). *Never use your transmitter without the proper frequency flag displayed.*

FLIGHT INSTRUCTIONS

The Cox E-Z BEE can be flown successfully by inexperienced radio control fliers. However, R/C flying requires some skill. You may learn to fly faster if an experienced R/C flier provides instruction during your first flight. Should it be necessary to teach yourself the skill of R/C flying, read the fol-

Continued on page 72

PLUG SPARKS

By JOHN POND

• As this column is being written it is January when the cold starts hitting. Although this column will not appear until spring, this writer is reminded of the activities of that very energetic Canadian club, SAM 86, which operates out of Ottawa, Ontario.

Led by that irrepressible spark plug, Dan McLeod of 1275 Hanbury Ct., Ottawa, Ontario K2C 2M1, the newsletter *SAM 86 Speaks* literally sparkles with Dan's wit and articles.

The newsletter is quite diversified as it contains many features found in *Model Builder.* One item that many newsletters could use is listing of what is in the issue at the top of the letterhead. This is really great for reference.

Dan reports that he came across an old plane in the local hobby shop built and flown in 1940. Being one of a kind, McLeod borrowed the model and promptly hung it up in the SAM 86 Rec Room. Talk about coincidence, one of the members brought along John Barry, the guy who designed and built it in 1940.

As can be seen in Photo No. 1, Barry is holding the long-forgotten model. The model is no slouch, having a 48-inch wing span, 6-inch chord, and 32-inch long fuselage. Initially powered by a Bantam 19 (turned out underpowered), John switched to a Forster 29.

The design is based on a series of articles in *Model Airplane News* written by Charles H. Grant, editor in 1940. The "Clockwise" (the way it flies) was developed from the free flight design known as the High Performance Contest Gas Model. The resemblance is a little hard to spot, as John Barry changed the design extensively.

SAM 86 are also heavily involved with the parent club, the Ottawa Remote Control Club (ORCC). As can be seen in Photo No. 2, the clubs are trying to get the younger fliers into flying. Bruce Mathews is seen at the SAM 86 Work Shop at the National Museum of Science and Technology in Ottawa.

We would be remiss if we didn't acknowledge the work of Hal Bothan, Youth Chairman for MAAC, and Assistant Zone Director, Dan McLeod. Their work is reflected in the display at the National Museum. Photo No. 3 is an excellent shot of how many models can be displayed when a club is dedicated enough.

Quite a few issues back we ran photos of the SAM 86 Fun-Fly in the winter. Now we present Photo No. 4 showing the Field Club House in the summer. No worries about winter now that the club house has been insulated and heaters installed.

One of the features in their newsletter is the "Foolish Questions" as compiled by SAM 86 in conjunction with the local hobby dealer. In some respects, this may seem like the "Dear Jake" column as originated by Bill Northrop. If you, the reader, like this little section, McLeod says he has a million of them.

"FOOLISH QUESTIONS"

The following list of questions was compiled over the years by the employees of Joe's Hobby Centers. They are actual accounts of some of the questions asked by real customers. Also included are some examples of foolish things these customers have said and done, as well as some of the strangest requests ever heard.

Q How many volts is a 7.2V battery?
Q Do you have R/C *Planes*?
A Yes.
Q How much is *it*?
Q How much are they?
A $2.16 a pair.
Q How many do you get in a pair?
Telephone call at 7:57 p.m.:
Q What time do you close?
A 8:00.
Q I'll be right down.
40-year-old customer:
Q Can you put the tail on my kite? I think its too hard for me.
Q Do you carry AM 'n' FM radios?
A Yes.
Q Do any of them come with headphones?
Q Do you have any R/C cars?
A Yes.
Q . . .with propeller in the back?
Q What comes with this radio?
A A receiver, transmitter, battery, and three servos.
Q How about the speakers?
Q Do you take food stamps?
Q What have you got for $8 that moves or flies?

ACTION IN THE NORTHWEST

The latest report from the Northwest is due in no small part to Bob Stalick, who re-

1.John Barry and his control line design, Clockwise, built back in 1940. This is the SAM 86 recreation room.

2. SAM 86 member Bruce Mathews shows the youngsters how in the annual SAM workshop.

3. A display of old timers by SAM 86 at the Ottawa Museum of Science and Technology. Great exposure for model aviation!

4. In the summertime, the SAM 86 clubhouse is used extensively. It's insulated for wintertime use too.

5. Clarence Bull's winning 1/2A Texaco Lanzo Bomber. Uses a Cox Medallion .049.

6. Beauty Event winner by Bruce Augustus. A pink and yellow Shulman Tambe. Elfin 2.4 diesel engine.

ports on the Silents Please & O/T Contest held at the Parker Field, September 12 and 13. The flying field is a large rye grass field surrounded by more rye grass. The fields are crisscrossed by roads spaced 1/2 mile. A few farm houses are occasionally found.

This meet enjoyed the best turnout yet. How could you miss with absolutely beautiful flying weather with winds of two to three mph. Temperatures in the seventies didn't hurt the meet one bit.

Some good humor was generated by Clarence Bull with his small Civy Boy for the Nostalgia Event. The first flight was a picture perfect "max," but the second was something else. The model described a sideways loop into the ground.

That did it! Clarence then ripped the engine from the little yellow and green ship. He then began to stomp, crunch, and otherwise shred the model into little bits. This noise was all accompanied by some rakish invective. This finally cumulated in a small fire.

As the fire died down, *panic*! What happened to the Tatone Timer? An intensive search was of no avail. One of the local wags suggested Clarence look into his muddy heel. Nope, not embedded there. About this time, Bill Giffen came up with his first annual "Clog-Dancing Award" for Bull. Watch out! You could be the recipient next year.

Just to show that Clarence does fly and win, Photo No. 5 shows a rather large Lanzo Bomber powered by a Cox Medallion .049 engine that won first in the 1/2A Texaco event. It only took one flight to make a score of 1133. As can also be seen by the assigned number, Bull's model was entered in the Beauty event.

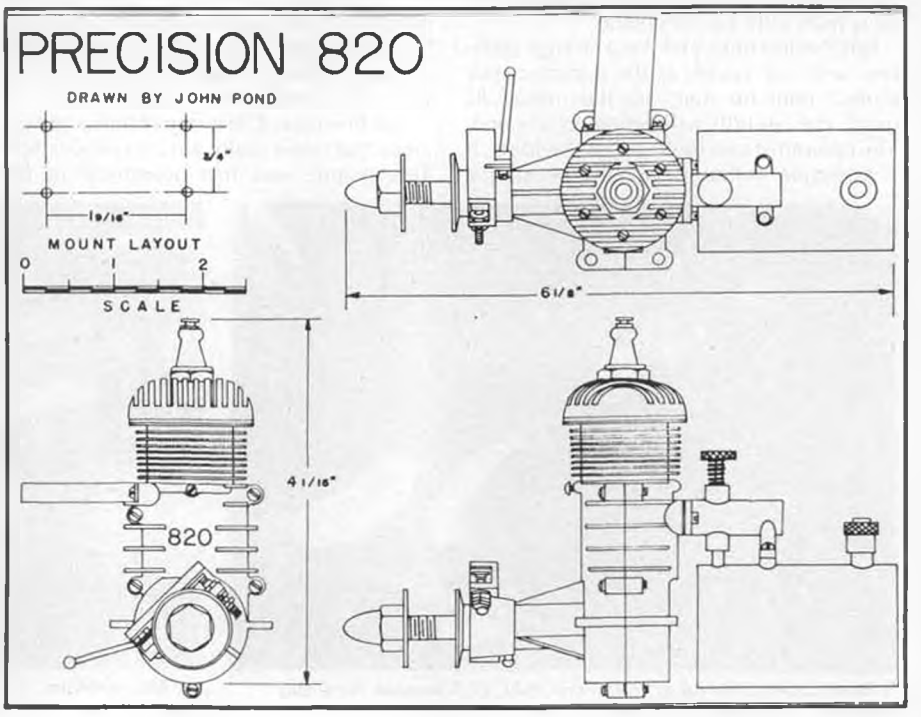
Speaking of the Beauty event (they call it Concours de Elegance up north), Photo No. 6 depicts the Beauty winner, a Shulman "Tambe" done up with a fluorescent pink wing and tail along with yellow silk fuselage. The model was powered by an English Elfin 2.49 cc diesel. This makes several times Bruce Augustus has won.

One other model that failed to win the Beauty event was Jimmy Dean's Jim Allen Racer, as seen in Photo No. 7. No reports on how it performed.

Rather than publish a very lengthy list of winners (24 events!), we offer Photo No. 8 showing the second place winner of the Commercial Rubber Event. George Moul from Vancouver, B.C., Canada, placed with a Dietrich Convertible. This event is annually sponsored by John Lenderman and Dick Williamson at the Old Timer Championships.

7. Another Beauty entrant by Jimmy Dean, a Jimmy Allen Racer.

Just about the time we wrapped this report up, a letter arrived from Bill Darkow,



7603 Greenridge Loop S.W., Olympia, Washington 98502, with a photo of his flying wing mentioned in Bob Stalick's contest notes.

Bill built a Hank Cole "Wing Ding" from *Flying Models*, August 1948. As can be seen in the Beauty event lineup, Photo No. 9, he did a fine job. Performance was mediocre, Bill sez, but it was an attraction and a crowd pleaser.

Bill's main point is that flying wing designs are a challenge, lotsa fun, fascinating, and deserve serious consideration as a separate SAM event. Darkow says his view is biased, but he feels if enough modelers see this type fly, they will become intrigued. (*Ed. Note: California has the lead in this type model. We try to feature photos wherever possible.*)

SAM 8

The Pacific Northwest has been ably represented by Ted Katsanis, newsletter editor of SAM 8. Most all meetings are held at Ray Chalkers Engineering offices in Tacoma. Ted serves with two hats in this chapter, President and Editor.

He reports the Autumn Thrash was great this year with calm weather and no wind. (*Ed. Note: Now I know where all the great weather in California went.*) Their most interesting event is FF 1/2A Texaco with no max flight! As Ted says, make your fuse a foot long and get to chasing! No faint hearts need to apply here.

Another fun event staged by SAM 8 is the time target event with the closest contestant to two minutes being judged the winner. Imagine the tension of Gene Evenson in scoring a *one*! The actual stop watch reading was 1:59.8, off two tenths of a second!

Well, we wouldn't quit until we tell of the new method of customizing transmitter antennae. If Ted doesn't like the length, he simply puts it in a revolving prop. Sure fire trimming job devised by Ted Katsanis!

Ted must have been running with Joe B*&!K's black cloud as he narrowly missed getting hit by an engine that parted company from John Kalma's plane.

Bill Preston thinks he has a strange problem with his model, as the controls work perfect until he starts up the motor. As usual, the controls will deflect to one end. The columnist says look at your shielding, it is as simple as that. Generally speaking, a

8. Second in the Commercial Rubber Event, George Moul, with a Dietrich Convertible.

10K ohm resistor in the high tension lead will eliminate this trouble.

ENGINE OF THE MONTH

This month's engine, the Precision 820, is truly a rare bird, and we are extremely indebted to Leroy Sabbatini, 4688 West Dakota, Fresno, California 93711, for his generosity in allowing us to copy same. At this time, we might mention we are most grateful to any of the MECA members who are willing to lend their engine(s) for recopying. This writer is quite concerned he may be running out of time to put down on paper a record of all the old ignition engines. Your cooperation is solicited.

The Precision 820 is one of those rare engines that never really got into production. This engine was first advertised in the March 1937 issue of *Model Airplane News*. The introductory price was $17.50 postpaid and sent COD. Whether this style of postal delivery was any improvement is moot; however, it did give the buyer a chance to inspect and reject it if so desired.

The Precision engine was sort of a conglomeration of the successful engines on the West Coast. The immediate size stamps it of Baby Cyclone origin while the unconventional split crankcase reminds one of the early Ohlsson engines with all the split manifolds it featured. The machined head looked very much like the early Bunch engines. Intake system and tank was very reminiscent of the Brown Jr. arrangement. The engine was one of the few early types that were painted green enamel. An option was allowed to pick color desired, a feature Hank Orwick picked up later in various shades of green.

Displacement was .387 cu. in. (similar to Baby Cyclone at .375), using a stroke of 3/4 in. and bore of 13/16 in. Bare weight of the engine was 10-3/4 ounces. Also supplied was a standard Smith coil mounted a wooden mount a la Brown Jr.

The alloy steel cylinder featured integrally machined cooling fins while the long aluminum crankcase was cast with fins. Horse power rating was 1/5 hp with manufacturers specifications of 1,000 to 8,000 rpm.

Manufactured by the Aero Precision Machine Works of 2250 E. Colorado, Pasadena, California, the engine was produced in very small quantities. One can only guess the problems involved with good seals and alignment of the vertically split crankcase gave more than its share of headaches. Competition from good reliable engines was just too tough.

ENGINE CORRECTION

The engine collector is a tough character to deal with when it comes to details. Every so often, this writer will make an unsubstantiated statement based on hearsay, and boy, does he ever catch it!

The furor over the FROG 175 engines being advertised as a glow engine is not finished yet. Peter Cornfoot, 12340 152C Avenue, Edmonton, Alberta T5X 1Z2, Canada, writes to submit Xerox copies from the Ron Warring book, *Miniature Aero Motors* and D. J. Laidlaw-Dickson *Model*

9. Beauty Event lineup at Willamette MAC O/T Annual. Note Bill Darkow's Wing-Ding flying wing design.

10. Marvin Miller, SAM 21, seen with rare Al Pardocci Air Warden. Beautiful paint job! Photo: Dowling.

Diesels book.

Peter says the series of FROG engines appears to have been introduced as follows: 1947 FROG 175 (Spark Ignition); 1947 FROG 100 (Diesel); 1948 FROG 100, 160, AND 180 (All redesigned diesels); 1948 FROG 160 Red Glow.

Pete concludes by saying he hopes this clears up the chronology of FROG engines, while not in the forefront of engine design, were cheap and fun to use. After 40 years, the memory fades a little, but I don't remember the FROG 175 ever being advertised as a glow engine.

SPECIAL ANNOUNCEMENT

Bob Larsh, Contest Manager of the upcoming 1988 SAM Champs being held by SAM 57 at the Mid-America Air Center, Lawrenceville, Illinois, is proud to announce the first stand-alone NFFS Nostalgia Champs which are to be held at the same locations as the SAM Champs, Tuesday, July 19, and Wednesday, July 20.

Events will be Classes 1/4A, B, and C on Tuesday and Classes 1/2A, B, and a special ignition-only event on Wednesday.

For information and entry blanks, write to NFFS Nostalgia Champs Manager, RR #1, Box 296, New Palestine, Indiana 46163, or better yet, call Mose Whittemore at (317)861-4266.

1939 WAKEFIELD REVISITED

Joe Dashko, 251 Laurel Place, East Rutherford, New Jersey 07073, writes to identify those people who appeared in Photo No. 11 of Korda, McFadden, and Polk. One of the people in the background has been identified by Joe as Al Casano in the center wearing the pith helmet. Al, incidentally, timed Korda's long flight.

The young lad on the left was named Fisher. Joe, and his brother Al, instantly recognized the two on the left but are not sure of the people on the right. They seem to think that Louis Garami is on the far right. Any more guesses out there?

Dashko goes on to say that he and Al, along with Casano, were: "members of the Stratosphere Club of Passaic, New Jersey. Casano was president and meetings were held in the cellar of my parents home. Talk about informal meetings! The meeting room featured low ceiling, low-slung pipes, one little electric bulb, and no chairs! If I recall correctly, our club emblem was a sphere with horizontal and vertical grid lines together with Saturn-type rings.

"Our contests were held in the Delawanna section of Clifton at a large slightly hollowed field and no trees! At one contest one smart guy brought in a full-size Cub and later flew it out. Needless to say, it was illegal then.

"Another member was Barney Kernoff (since checked out at Barnet's home at 1930 Edgewood, Palo Alto, California) who recalls most of the fellows. Other members were Pete Secors, George DeBlock, Rick Kittan, Vic Marino and son, Red Laffler, and Vince Bonnema.

"After the war, like a lot of others, we drifted away from flying but still built a few models. In the late sixties we started in with U-control, went to HLG and .020 Replica, Stick rubber, going to some contests in New Jersey, Pennsylvania, Connecticut (SAM 7), and Westover and dabbled with R/C flying. Had my son interested for a few years, but he dropped out. I personally know the old lament of 'we're losing the fine art of model building, and who's to follow us and keep up this grand hobby.' My brother and I now fly at Galesville almost every weekend we can, weather and other reasons permitting. It's over an hour's ride for us, and mostly windy, and the field is mostly covered with hole-poking brambles bushes. But as the old saying goes, 'It's better than nothing.'

"We've made some good friends there, Bob Reinhard and his wife May, Art Phillips, Dave Hicks, and Tom Fennell and his son. We're not too contest-oriented but like building and flying, the old pure free-flight and having fun! As you always say, 'that's the name of the game.' We've also gotten reacquainted with an ex-club member, Red Laffler. I guess we've really went full cycle!"

CLASSIFYING MODEL BUILDERS

Received the most entertaining write-up from Jeff Raskin, newsletter editor of the San Francisco Vultures, who has compiled the following list to help you to distinguish between the "hacker" and "master" model builders.

1. Look at the control horns first.

Hacker: They have the little bumps where they used to be attached to the plastic runner.

Builder: Those little bumps have been neatly cut off.

Expert: The horns are scratchmade from aircraft ply.

Master: The horns are scratchmade from

11. Graham Podd and Karl Hatrak compare Jaguar models.

12. Harvey Steadman and Dick Korda in 1941 with a couple of CL models.

13. Another Cleveland Balsa Butcher member, Milan Kasenda, with a very scale-looking control line model.

15. Nels-Olov Gistavsson with a 1938 Magnusson Wakefield design.

14. Fred Wolfe, SAM 29, with his new Scientific Mercury.

polished T2024 aircraft aluminum, coated for corrosion protection, and anodized to match the finish of the aircraft.

2. Trailing edges are a giveaway.

Hacker: They are square and over 1/8-inch thick.

Builder: Nicely rounded.

Expert: Feather edge.

Master: Uses the trailing edge to shave.

3. How is the covering applied?

Hacker: Looks like the entire Eighth Army has slept on it for a week.

Builder: Looks like it's been slept with one night.

Expert: Looks like a freshly made bed.

Master: Looks like a bed made up by a drill sergeant at boot camp.

4. How good is the finish?

Hacker: Raw wood.

Builder: Model airplane dope, two coats, sanded.

Expert: Sanding sealer, five coats of urethane paint, each coat sanded. Hours of work with rubbing compound and wax.

Master: Impossible to tell how it was done, but it looks like it was carved from a block of solid plastic.

5. Study the framework carefully:

Hacker: Hard to tell it's an airplane.

Builder: Reasonably straight and true.

Expert: Joints have no gaps, no warps, corners gusseted, looks like it was carved from a single piece of balsa.

Master: It *was* carved from a single piece of balsa.

6. Ask what shop equipment they have:

Hacker: One old knife.

Builder: Knife, supply of blades, Dremel tool, small tool box of other stuff.

Expert: 1.4 acres of shop, drill press, lathe, milling machine, walnut machinist's tool chest full of precision measuring devices, eight knives of different sizes with every blade ever made, three roll-about tool chests of miscellaneous tools.

Master: One old knife *and* a sharpening stone.

7. What do they model?

Hacker: It's hard to tell just what it is.

Builder: WWI biplanes.

Expert: Anything with elaborate detail or impossible surface finish and markings, scale operating engines, retracts, and windshield wipers. All instruments work.

Continued on page 82

16. Roy Hutchinson, Vancouver, shown here with his excellent-flying Buzzard Bombshell or floats.

Old Timer of the Month

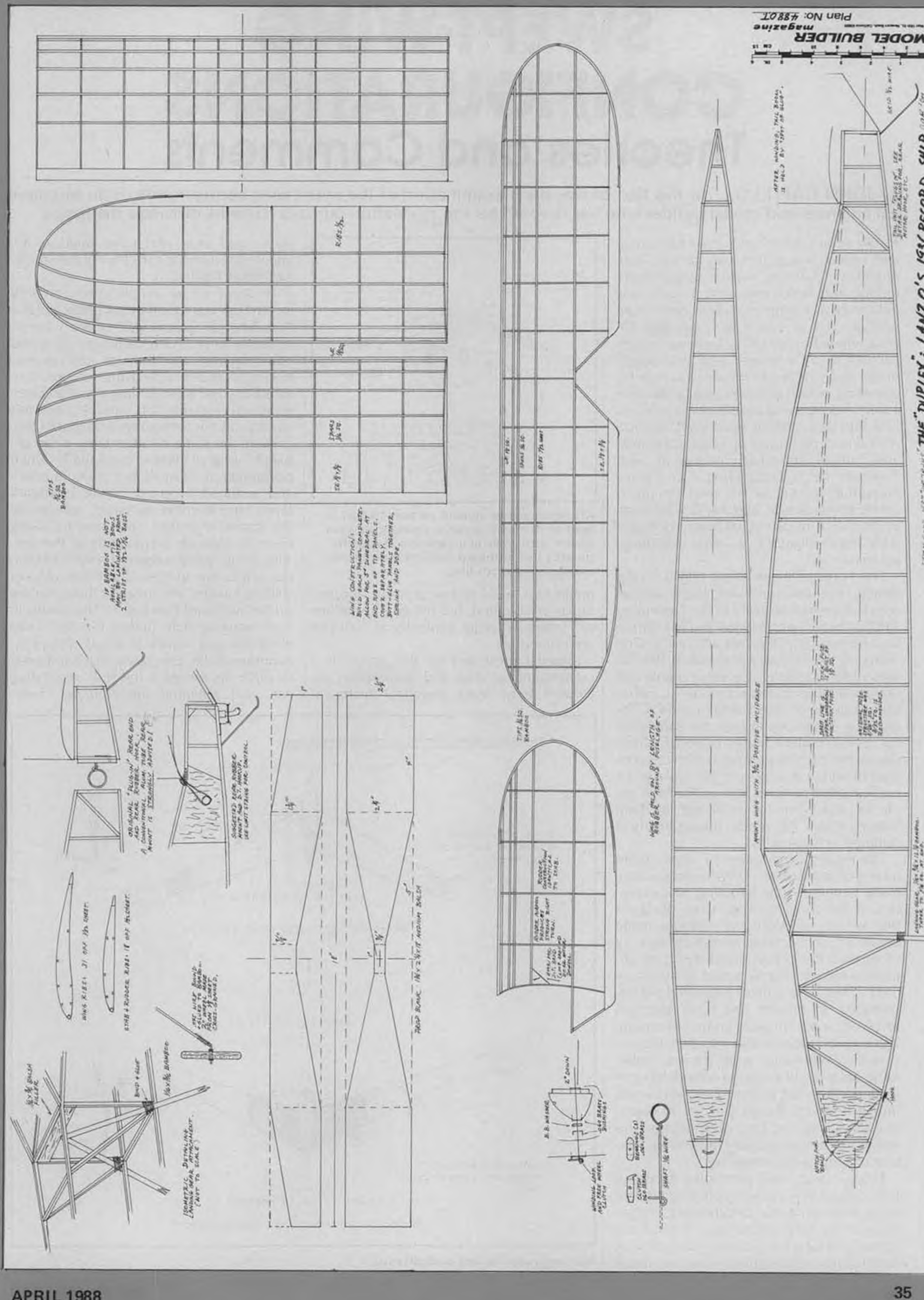
The Duplex

Design by: Chet Lanzo
Plan by: John Blair
Text by: Bill Northrop

• The "Duplex" was a featured construction article in the September 1937 *Air Trails* magazine. The model was designed by Chet Lanzo for the 1936 weight rules (one ounce per 50 sq. in.). Fuselage construction was 5/64 inch (!) square balsa. The construction article recommends (and I concur) that the model be built to the 1937 rules (three ounces per 100 sq. in.). This is accomplished by using 3/32 hard balsa for the fuselage construction, adding wing ribs, and adding rubber. . . up to 36 strands of 1/8 in. . . to bring flying weight to six ounces. Of course, we wouldn't try to use that much of today's hotter rubber; would we?

Under the 1936 rules, the "Duplex" held two National records: 48 minutes, 45 seconds as a fuselage model and 18 minutes, 10 seconds as a stick model.

Editor's Note: Is there doubt in anyone's mind, that Chet Lanzo's designs were the inspiration for some famous competition models that came from the same area of the country several years later? •


THE "DUPLEX": LANZO'S 1936 RECORD SHIP
MODEL BUILDER magazine
Plan No: 4880T

SWEPT-WING CONFIGURATIONS
Theories and Comments

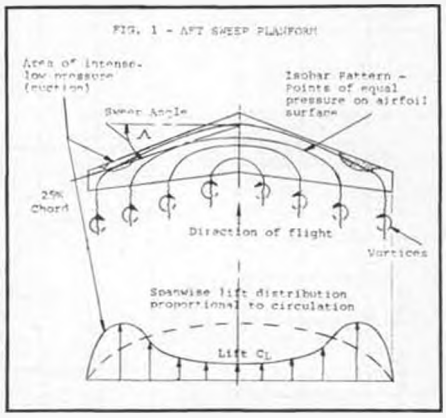
By JOHN RAPILLO. . .In this first of two parts examination of the swept-wing configuration, is an aeronautical engineer and model builder who has devoted his life to aviation pursuits. Here he discusses the basics.

• *The author, John Rapillo, has had a long and varied association with aircraft, both model and full-size, including free flight, indoor, and radio-controlled models, and has served as a judge in Scale Masters' competitions. He is retired from Douglas Aircraft, where he spent 41 years in various capacities as an engineer and in management. Today he is part-owner of Lancer Engineering, which provides general aviation airplane design and modification services. John flies the company Beechcraft Bonanza A36 almost daily, and he is an instrument and multi-engine-rated commercial pilot. Presently he is completing a two-place homebuilt aircraft of his own design. It seems redundant to add John's final comment: "All of my career has been associated with and dedicated to aviation and things aeronautical."*

The Forward-Swept Wing (FSW) model design, construction, and flight articles which appeared recently in the December 1987 issue of *Flying Models* by Dick Sarpolus and similarly, the two articles by Don Sobbe in the February and March 1987 issues of *R/C Modeler*, are very notable and commendable approaches to a rather unique phase of model design and R/C flying. It is interesting to note the somewhat successful results achieved by both builders during the initial experiments with this configured wing concept, and particularly the maneuvering performance in the high angle of attack modes exhibited by Don Sobbe's FSW-3 R/C model during flights as outlined in his articles.

The related experiences of further flight testing of Don Sobbe's FSW model disclose many benefits in the handling characteristics of the forward-swept wing planform that we, as modelers, are seldom made aware of or become knowledgeable of other than the conventional designed airplane we have long accepted as the "standard." The above articles prompted the opportunity to present the basic precepts involved, and to provide an understanding and appreciation of the complexities associated with swept wing design. Hopefully, this text will assist those modelers and readers who want primarily to gain insight into the model design process involved, and to expand and help promote their interests towards developing the new generation of swept-wing modeling.

Modern text book principles regarding forward and aft swept-wing planforms relate some interesting and enlightening evaluations on the hows and whys of this subject matter, and for what it's worth an analysis of swept wing configurations is noteworthy of mention. Use of technical terms and formulas are omitted, but rather, illustrations are presented quite generally to facilitate understanding.



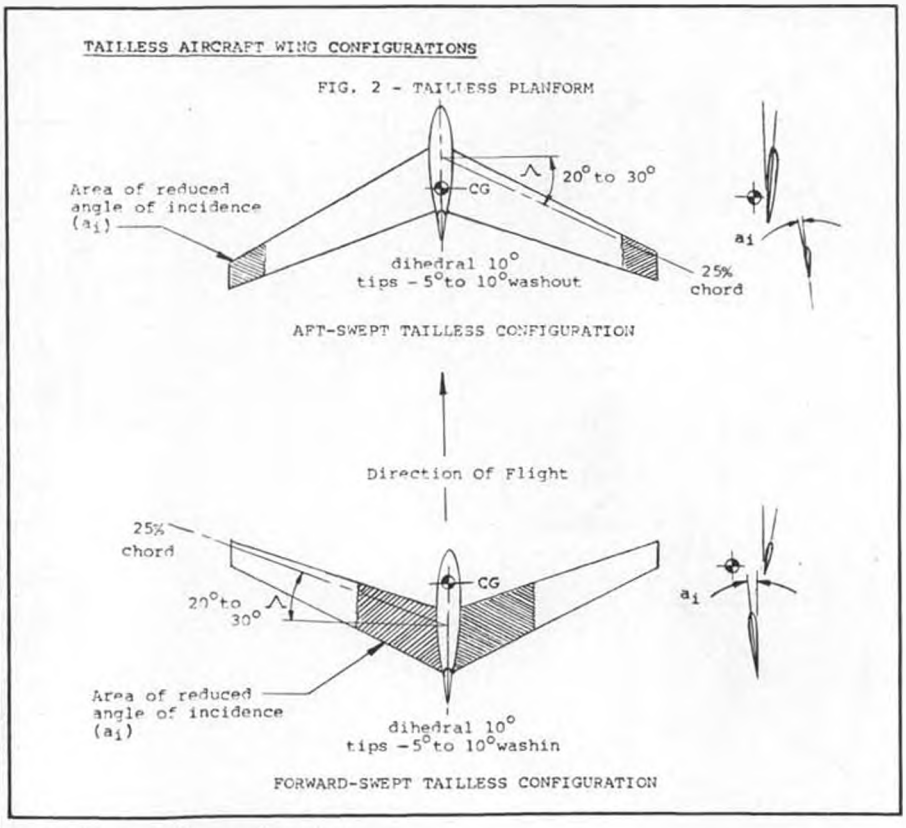
Aft sweep causes inboard vortices to trail ahead of outboard vortices, creating up-wash toward tips; angle of attack and lift coefficient(C_L) of outboard sections is increased causing tips to stall first.

Material presented for this article is a compilation of data and information excerpted from many excellent technical books and texts which are listed as acknowledgements at the close of the article.

AFT-SWEPT WING

Aft-swept wings are designed primarily to: Arrange the CG of the airplane and the Aerodynamic Center (AC) of the wing to coincide more closely, improve high speed characteristics on full-size high-performance airplanes by delaying compressibility effects, and provide directional and longitudinal stability of tailless airplanes (configurations with no separate stabilizer).

There are some disadvantages of an aft-swept wing planform, particularly when positioned at an increased angle of attack and reduced airspeed. Wing boundary layers tend to move outboard, assisted by the spanwise airflow component causing them to separate prematurely at the tips. Also, wing sweep staggers the vortices trailing across the span so that those vortices trailing inboard are ahead of those trailing further outboard (See Fig. 1). This results in early wing tip stalls (before the root stalls) while the root, which is ahead of the CG, continues to lift. Effectively, this is followed by pitch up, forcing a full stall, rapid drag rise, and potential pitch/roll/yaw diver-



Forward-swept tailless configuration.

gence. On full-scale aircraft, a degradation of control effectiveness and/or control reversal may occur. Additionally, if geometric sweep angle at the leading edge is excessive, this may cause the wing to twist (aeroelasticity) under aerodynamic loading, thus reducing the angle of attack at the tips (Refer to section on Forward-Swept Wing).

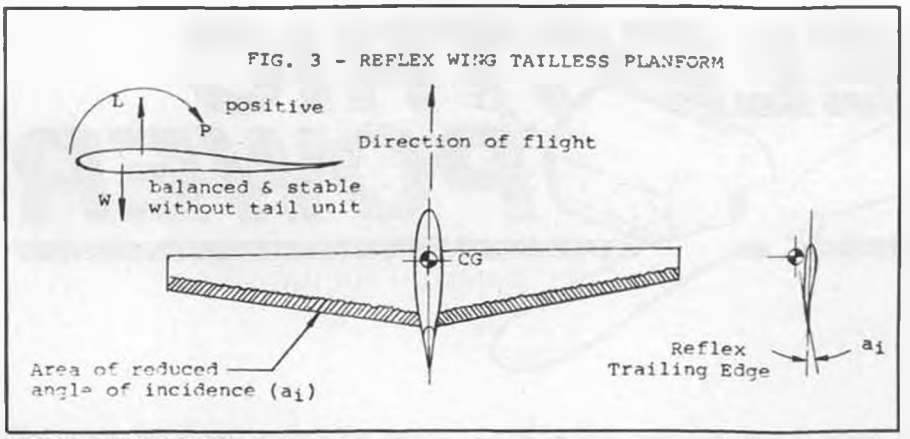
Flow characteristics shown in Fig. 1 are approximate pattern lines on the upper surface with wings at an angle of attack α of approximately 21 degrees; a positive sweep angle Λ of 45 degrees; and an aspect ratio (A) of 6.

Swept-wing theory is based on the principle that the velocities which generate the lift and drag forces are produced by the component perpendicular to the leading edge, or more specifically, to the 25-percent chord line of the wing. It is reasoned that by changing the sweep of the wing the relationship between the speed of the aircraft and the wing velocity can be changed. The principle is to place the aircraft in the transonic range and have its wing think it is back in the subsonic region.

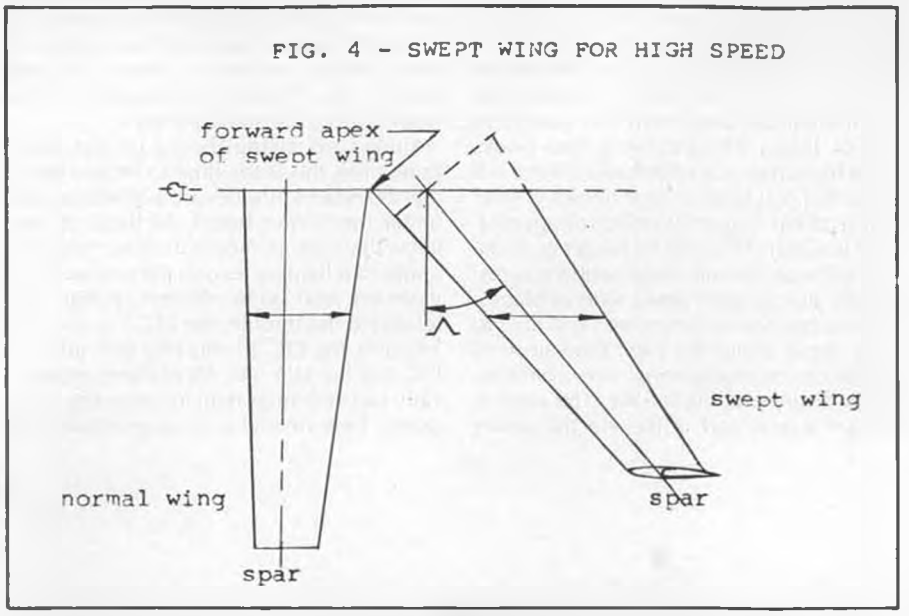
The inboard regions of the aft-swept wing are much closer to the nose of the aircraft than are the tips, and as the airplane continues to develop lift "up front" after the aft end (that portion further from the nose) ceases to "cooperate," the aircraft is likely to nose up and approach a stall. Now, because of the complexities surrounding aircraft design and all that which is associated with aviation-related development, we resort to the "compromises" made available and essential to resolve and/or alleviate such conceptual design barricades. Enter the devices, such as wash out of the tip, slats, wing fences, vortex generators, Kruger flapped, drooped leading edges, and outboard leading edge extensions, all of which serve to reduce the cross-flow and delay pitch up—the sudden and dangerous nose up movement.

Modelers delving into scale model swept-wing jet aircraft designs may find similar devices essential to the stability and controllability of the model, which undoubtedly will provide more docile performance during the high angle of attack and flare out during landing modes.

For the most part, shallow portions of sweep-back or sweep-forward do not significantly affect the lift distribution. For most models there is minimal benefit derived from such wing planforms. As mentioned earlier, in full-scale aircraft a principle design practice applying wing sweep is for the purpose of balance and stability.



Reflex wing tailless planform.



The aerodynamic chord of a wing is lengthened as shown by projection and the airfoil section is given greater fineness(chord length/maximum thickness) by sweep reducing geometrically the thickness/chord. Maximum chord thickness lies along the spar line.

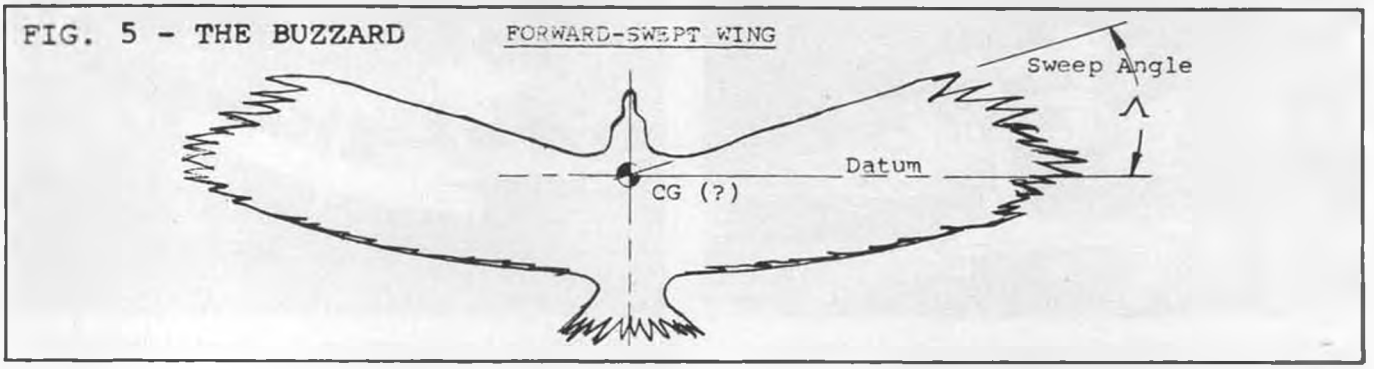
This is the reason why tailless aircraft have generous sweep-back and/or sweep-forward wing planforms (see Fig. 2).

For those anticipating swept-wing model design, building, and flying, particularly in the area of model jet aircraft, a suggested approach to getting started would be taking advantage of the pioneering and expertise provided by the many manufacturers currently marketing scale jet aircraft kits. Their product lines stem from the Sabre Jet F-86 through the "Top Gun" series F-14, F-15, F-16, and F-18 aircraft.

The technology and kit engineering combined with the manufacturer's time-tested flying, hardly makes it worthwhile to initiate a project of such complex undertaking. The experience in building from a kit will serve as a baseline to further your design development in the field of swept-wing models.

As shown in Fig. 2, longitudinal stability is obtained by incorporating decalage into the wing so that the angle of incidence (a_i) of the surface behind the center of gravity (CG) is less than the a_i of the surface forward of the CG. With this arrangement, a nose-up moment is generated equal and

Continued on page 103



ELECTRIC POWER

By MITCH POLING

• Some of you may have noticed that I missed the March column, every once in a while that happens, in this case it was the press of holiday business plus my daughter fell from the bars at school and broke her arm. She is fine now, but it certainly took the momentum away from this parent! In one of James Herriot's very fine books about his career as a veterinarian, there is a quote that you have to have nerves of steel to be a parent. I agree! Victoria's disappointment was that she could no longer go to the car track with me and "help" with the races! Usually this column deals with airplanes, not cars, but one of these days I will go into some detail about the cars; they are very fine pieces of engineering, very challenging, and very exciting to race. The electric cars are a neat part of the electric power scene, and I enjoy seeing the vitality and youth of those involved. It would be great to see that in airplanes too, but what is needed is something that has the appeal of the cars and is simple, inexpensive, ready to fly, and easy to fly. Probably impossible? I sure would like to see someone do it.

Since I am talking about cars and at the same time, this is the time to let you know that the Adams throttles are available again, under the Robart brand. As those of you know that have an Adams throttle, they have a superb reliability record, are very well engineered, and quite efficient. Robart has relabeled the throttle, the ETC-1 is now the HQ-500, the ETC-2 is the HQ 505, and the ETC-3 is the HQ 510. All of these are optically isolated (important for reducing radio noise), have neutral and range adjust, and are using the latest MOSFET technology. Typical voltage loss is .070 volts at 10 amps. The 510 is intended for up to 9.6 volts (cars, 05 planes) and will handle 70 amps at stall. The 505 has brakes (this can be dialed out) and will handle up to 48 volts, and 120 amps at stall. The 500 is the same, but no brakes. Robart says you don't need a fuse, the controller will not burn out even at stall (however, I think they are assuming no more than seven cells), but I personally prefer a fuse, a 30-amp fuse is cheap insurance. The controller may not burn out, but the motor might! The famous Adams connector pins and the 16 and 12-gauge high-flex low-loss wire will also be back on the market. Les Adams has always represented the very best quality, and his products will certainly boost the hobby. Contact Robart at 310 N. 5th St., P. O. Box 1247, St. Charles, Illinois 60174, for prices (I did not get any) and more details. Glad to see you back, Les!

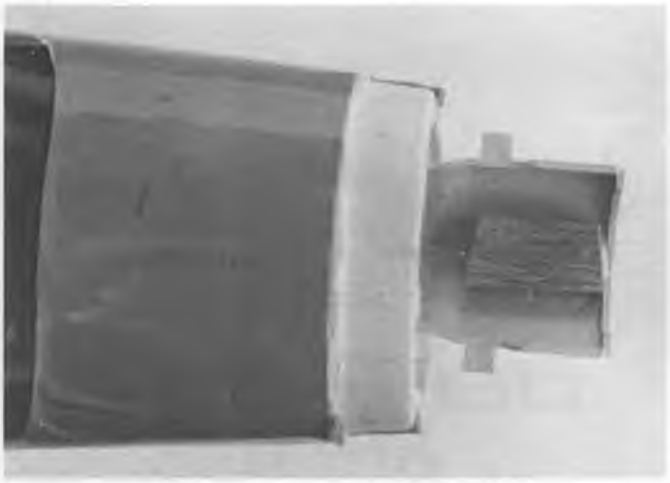
Don Hughes sent some details on his reworking of the Kyosho AP-29. I have been flying this motor lately in the MRC Cessna 172, so I'll add my comments later. Don says the AP-29 weighs a little less than the Astro cobalt 020. The Astro 020 has the edge on rpm in the stock configuration of the motors. When Don rewinds the AP-29 to 20 turns, he can get it to out-turn the cobalt 020! Don's standard approach is to strip the armature, rewind it, and pop out the front Oilite bearing and replace it with a ball bearing from an R/C car store. Don likes this

Action from the Clarence Sailplane Society fun-fly in East Aurora, New York. Above, Ron Kirk and his Viking. Ron won longest flight of the day with his alternate, a Leisure Playboy.

Mike Vitale launches Mike Dezik's award-winning Goldberg Electra. Today was not the day for sailplanes; old timer designs prevailed.

Mike Dezik receives Pilot's Choice award from fun-fly director and club secretary Lyn Perry for his Goldberg Electra.

Clarence Sailplane Society's members with a bunch of electrics that range from old timers to original creations.



Balsa block used to shim AP 29 or 05 motors in MRC's Cessna 172.

LeMans 480 motor (05) installed, ready for the rubber bands.

combination in his Future Shock (original design) and in his 450 Satellite. His latest Class A model is a Mel Schmidt Shocer 400 with a higher aspect ratio wing with an area of 340 sq. in., 22-percent stab, using a 10 x 6 Top Flite nylon folder. The folder sounds like Don's own design; I don't know of any commercial hubs set up for a Top Flight prop. He didn't specify rpm, battery packs, or props, these are free flight and the purpose there is much like that in the FAI; use of all the power in the battery pack in less than a minute. Thanks, Don, for the info!

As said earlier, I have been flying the AP-29 (direct drive) in the MRC Cessna 172, and I like it very much. The Cessna is 44-inch span, 260-sq. in. wing area. The motor likes the Cox 6 x 4 gray prop best and any six-cell pack. The motor on the six-cell 900 mAh SR Batteries pack turns the 6 x 4 Cox gray at 11,650 rpm (direct connection, no wiring harness) and 15-amp draw. The Cessna will fly with five cells and the 6 x 4 prop, but the climb is quite slow. A smaller and lighter plane would fly very well on five cells, I am sure. I fly the 172 with three channels; the third channel is servo-operated toggle on-off. The receiver is the Ace Olympic V, three World Engines S-22 servos, and an SR 175 mAh receiver pack. I fly the 172 with a six-cell 600 mAh Sanyo pack. Flying weight with these are 30 oz., 31 oz., and 34 oz. Flying times are usually about four minutes with the 600 pack, five minutes with the 900 pack, and six minutes or better with the 1200 pack. My feeling is that the 900 pack is the best performance/time combination. The motor is 51mm long, 27mm diameter. This is 1mm wider and 7mm longer than the old ferrite Astro 035. It weighs 4 oz.; the old ferrite 035 weighed 3 oz. It has better performance than the old 035, partly because it has a better design. The brushes are replaceable, with pigtails and the clockspring-type of spring loading. The brush design is identical to that of the popular offroad stock Yokomo, and similar motors (Trinity, Leisure, etc.). However, the brush block is slightly smaller than the 05 brush block, so you can't slip in an 05 offroad brush to replace it. It would be easy though, to sand down the 05 brush with an emery board to fit, so you do have an easy supply of brushes. Such brush reworking is very common for car racers. The shaft is 1/8-inch, just like all the 05 motors, so any 05 prop holder will work on it. This motor shows some engineering thought and expertise.

I did have one problem while I was breaking in the motor, I heard an odd sound and promptly disconnected the motor. A magnet had come loose and dropped onto the rotor! I have never heard of this happening to an AP-29 before, so I'm sure it is rare. I reglued the magnet back with Hot Stuff. I have two AP-29s, so I have been using the other one. I am impressed by how close the tolerance is in this motor, there is barely any clearance between the armature and the magnet. This does increase efficiency.

The bottom line is that I think the AP-29 is the motor that I have been hoping for, an excellent replacement for the Astro ferrite 020 and 035. It is just right for flying 1/2A models (150 to 300 square inches, 20 to 34 ounces), with very good performance. It is nearly a drop-in replacement for the older 020s and 035s, it is well-made, powerful, uses standard 05 parts, and is up to date technologically. The price is right too, at $17.99 (and a $5.00 postage fee!) from Tower Hobbies (P. O. Box 778, Champaign, Illinois 61820), part number TG 1120.

I have reviewed the MRC Cessna 172 in previous columns, but there is always something new to say! I use the MRC Cessna as my standard now whenever I test motors in the 1/2A size. I can scratchbuild a lighter model than the Cessna, but it has such excellent flight characteristics that it

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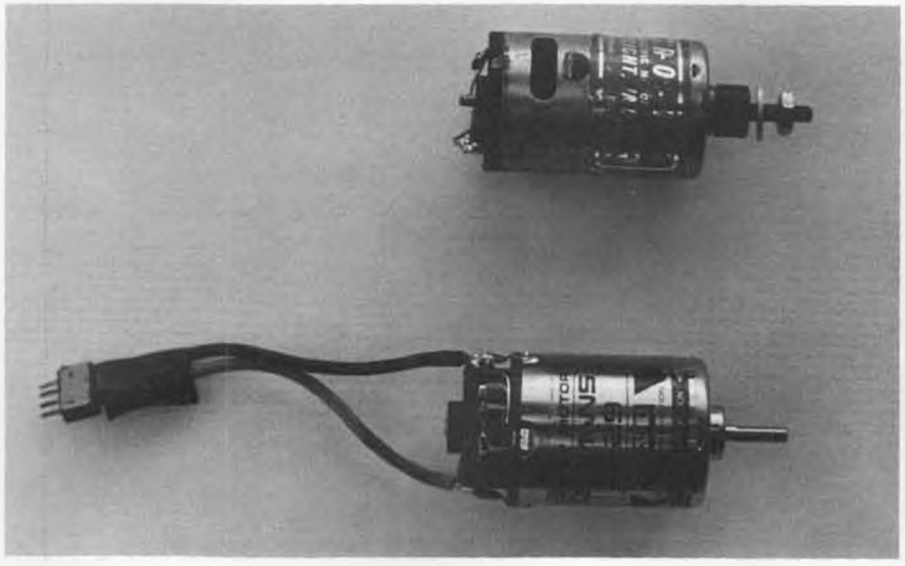
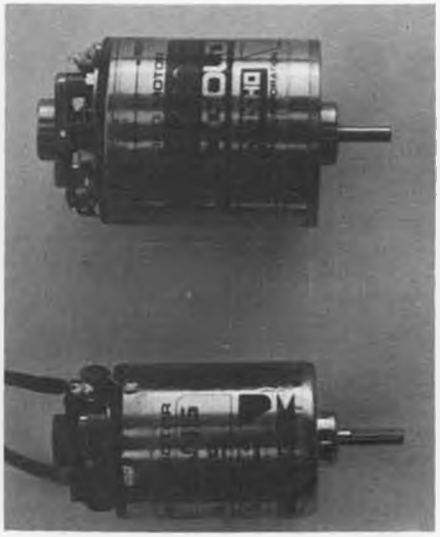


AP 29 and old Astro 035 ferrite. Very similar in size.



AP 29 and LeMans 480 (05). AP 29 is about 30% smaller.

THREE-VIEW COURTESY MODELAR MAGAZINE

Pattern Flying

By DICK HANSON

• One of the hobby magazines recently published an article which consisted chiefly of a forecast of the future of FAI model design. Forecasting can be a very risky business. Especially when it concerns very subjective matters, in this case, the trend of a hobby which constantly is subject to shifting interpretation of rules.

I would like to stick my neck out and make a "forecast of the future of FAI design." 1. The models will be less noisy—period. End of forecast. This "guess" is based on the direction AMA is pursuing plus the course already dictated by governments in other FAI participating countries.

The easiest way to reduce noise is to reduce the speed and weight requirements of a model. (The logical end of this path is a microfilm indoor model which is really not a desirable idea for us clumsy or impatient types.)

While some fliers choose the expensive routes in their quest for the holy grail, others are not so financially blessed and must opt for an economy route—if possible. For them we offer the following advice: 1. Purchase reliable equipment *only*! 2. Don't over-complicate—it only tends to reduce reliability. 3. Learn to understand all your equipment, that is, what are its limitations and its real assets to *you*.

Here are a few suggestions based on our testing which follow these rules:

1. A good, modern side-exhaust engine, muffler equipped, is desirable. Mount it in the model with the cylinder head at 90 degrees to vertical or perhaps slightly below 90 degrees. The exhaust will clear the model, and the engine becomes difficult to flood because the excess fuel drops out the exhaust.

Not a trick photo! We just wanted to show you the range of sizes of good aerobatic models. Both were scratchbuilt by Roger Selander. You guess the sizes!

Use a large prop, the engine noise will be reduced. We suggest the new Super Tigre KS .60 as a good, reliable engine which turns larger props very easily.

I have tested them at 10,000+ rpm on a stock D.W. 12 x 10 propeller using the stock muffler. Some other brands are also comparable in price and performance.

2. Is a complicated radio necessary? No, but a reliable radio is a *must*. Exponential is also very desirable on aileron, elevator, and rudder functions. You can change the "feel" of a model drastically by simply changing the exponential settings. The J.R. Century, the new Airtronics Spectra, and the Futaba PCM 8 all have these features.

The basic Ace is an excellent system. Other mixers and buttons are offered by many manufacturers, but a good, simple model just doesn't need these features for FAI flying.

In some cases, the "mixed" functions can cause weird or bad flying characteristics!

Our tests, for instance, with coupled low-high throttle and rudder resulted in insufficient rudder deflection at crucial moments—especially on takeoff!

Likewise, the flaperon feature, improperly set up, can cause horrible rolling and yawing errors.

3. Don't concern yourself with added features on fancy models and super radios until you *know* how to make a basic model perform as required for FAI. A simple design powered by a good side exhaust .60 and a reliable exponential radio can take you as far to perfection as your learning skills will allow.

Yes, I know that a number of "hot" pilots have advocated very elaborate, super-slippery designs that are usually difficult to build light and generally require a fair amount of assembly at the flying field.

If these setups are your thing, go to it! Don't be surprised, however, if a far less complicated setup in the hands of a good flier performs just as well (or better)!

Perhaps a little clarification is in order. I am not advocating a "return to yesterday" in designs but rather a reevaluation of design requirements. I have been flying since 1970

Gene Rodgers, First in Sportsman at the 1987 Nats. The Hippo's paint job makes it very visible.

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R/C SOARING

By BILL FORREY

• Limiting a trade show report to that which is new or improved is the only way to keep such an account down to a manageable minimum. If one were to be ridiculously thorough and cover everything applicable to R/C soaring at any of the top R/C trade shows in the US, then one might require the space equivalent of an entire magazine and likely bore to tears anyone with a working knowledge of the subject. So, because I have no power over my allotment of space, and because I have no desire to weary the majority of my readers by rehashing the familiar, I am going to be brief, sharing with you only what I saw as new and exciting in our particular branch of the R/C hobby.

I have organized this month's report alphabetically by manufacturer to make it easier for you to reference any particulars now or in the future.

ACE R/C

Latest word on the Scooter three-meter kit reported last February from the Chicago Show report is that the factory is in the midst of a move to larger facilities which will delay the kit's release until later this fall.

AMERICAN SAILPLANE DESIGNS

This new company sprang to existence late in 1987 as the result of one man's inspiration and perception of the need for America's "cottage industry" manufacturers to diversify their marketing and distribution efforts through a mail order house which would specialize in this genre of R/C sailplanes. Gary Anderson is that man, and not only has he succeeded in picking up several lines of merchandise to distribute (many of them well-recognized names, too), he has become a manufacturer in the process.

In light of the fact that this whole company is new and many of the lines carried by this company are relatively new as well, almost everything Gary had in his booth was new. The entire gamut of gliders and accessories in the ASD booth will be impossible to report on in detail, so I will have to refer you to Gary's catalog which is available on request from American Sailplane Designs, 2626 Coronado #89, San Diego, CA 92154, (619)429-8281, for the small sum of three dollars.

In the ASD catalog you will find such brand names as (alphabetically): Advanced Glider Concepts, Astro Flight, Buzz Waltz R/C Designs, Cheetah Models, J.A.D.E., J.M.Glascraft, L.J.M.P., MILO Models (1/3-scale ASW-20 and custom wing bags), Pierce Aero, Sunfair, "Check" Sailplanes, and Whitney Models.

Buzz Waltz's Can Winch high start for $31.95 is both new and a quality piece of equipment. It will handle most gliders.

In Gary's booth at the IMS were two models from his latest line acquisition: the LR-Quantum Designs RAF and LR-3. These models share similar looks but are different in size and function.

Quoting from the brochure I picked up: "The LR-3 is the product of five years of extensive research into unlimited slope racing design. It is intended for the serious pilot looking for a competitive entry into AMA slope classes. The design is rock stable and carries its speed through the turns with a vengeance. The reverse taper ailerons provide variable camber control when mixed, somewhat like flaps except that the LR-3 airfoil sections were designed with camber control in mind. It has also proven to be a competitive thermal ship with good tow characteristics. It is not, however, an aerobatic ship and was never intended for that purpose.

"Construction uses epoxy/glass/Kevlar/graphite composite technology for the fuselage and stabs. The wing is fully sheeted out of the box with a Kevlar reinforced sub-laminate between the core and balsa sheeting. Construction time for the model is approximately 20 hours.

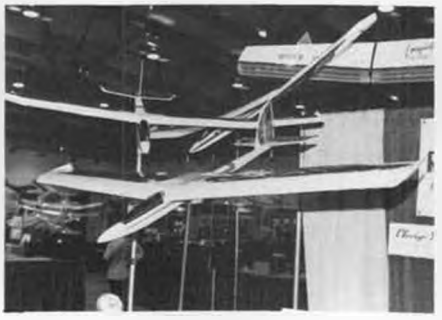
"Four-channel control is recommended with each control surface driven by standard servos. We designed the ship for such common mixing options as elevator/rudder (V-tail mixing), aileron/camber (flaperons), and the intermixing of elevator/camber functions (flaps coupled to elevator). If mixing is not used, a Y-connector between the wing servos and the stab servos will provide a good backup system in the event of a single servo failure." The specs for the LR-3 are: wingspan, 78.5 inches (2 m); wing area, 720

Gary Anderson of American Sailplane Designs holds the RAF, a wingeron-elevator control 1.5m slope design.

Gary again, with the RAF, and the J.A.D.E. Telos canard slope ship in the background.

Arnold Wratchko of AMS Imports holds the Angel 1600 ARF trainer for $99.00. Landmann Modelltechnik Sunrise kit in front.

Bob Boucher of Astro Flight with new Mini-Challenger, a 60-inch version of the successful Challenger. Kit will be available with 035 cobalt motor and switch harness for $99.95.



Buzz Waltz has a new slope trainer called the Predator, as well as his regular lineup.

Larry Pettyjohn holds the latest prototype combat slope glider. Indestructible fuselage and disposable foam/cardboard wings means you don't fear mid-airs or crashes anymore.

Byron Bruce holds the Combat Models F-16. It is an all-high density foam model that looks like it ought to be lots of fun over a steep slope with lots of wind.

The only U.S. made, F3B-ready R/C sailplane is the Flight Concepts Eagle. Secret Selig airfoil, vacuum-molded fiberglass and balsa sandwich hollow wings are state of the art.

square inches; length overall, 42 inches; flying weight, 55 ounces; maximum flying weight ballasted, 72 ounces; minimum wing loading, 11 oz/sq ft; and maximum wing loading, 14.5 oz/sq ft. The price for the LR-3 is $360.

The other new and interesting design from LR-Quantum Designs which was in Gary's booth was the RAF. Again, quoting from the brochure:

"The RAF is an all glass/Kevlar/graphite composite slope ship utilizing wingeron/elevator control with mixing options. The wings, stabs, and fuselage are ready to sand and paint. All hardware is included. Building time is approximately 10 hours. The ship is fully aerobatic and extremely fast. A custom carrying case is available, breaking the ship down into a 8 X 10 X 38-inch package. A (balsa) sheeted foam core wing version is also available." The specs for the RAF are: wingspan, 60 inches (1.52 m); wing area, 340 square inches; length overall, 32 inches; minimum flying weight, 26 ounces; maximum flying weight, 36 ounces; minimum wing loading, 11 oz/sq ft; and maximum wing loading, 15.2 oz/sq ft. The all-glass kit RAF is $189, and the balsa-sheeted version is $169.

The all-white canard design you see in the picture behind Gary is the Telos by

Rainar Wiebalck of High Sky holds the new Thermal Navigator. It acts like a variometer, but controls direction of flight so you can see if you are in lift or sink. See text.

J.A.D.E. No, it isn't new. In fact, I've featured the Telos in this column before. Nevertheless, to many of you it will seem new, so I will review it once again.

Quoting from the J.A.D.E. brochure in the ASD catalog: 'The sudden tip stalls. The violent pitching. The unexplainable dives. The flight time lost when you failed to recover from that last close call. It's your tail; it's in the wrong place. You're flying backwards.

"Introducing the first production R/C sailplane with the unique canard configuration. The high performance Telos. A design revolution for R/C soaring enthusiasts. Its tail is in the right place.

"Telos is fast. It's capable of rapid roll rates, inverted flight, even outside loops. Yet, Telos is also the only R/C sailplane you'd ever attempt sustained level flight while using full aft stick!

"Telos is handcrafted using the latest composite aircraft technology. High-tech materials such as S-2 fiberglass, Kevlar, carbon/graphite fibers, West Systems epoxy, and high density blue foam wing cores are used in the Telos." Specs for the Telos are: wingspan, 51 inches; wing area, 345 square inches; canard span, 26 inches; canard area, 99 square inches; length, 38 inches; flying weight, 27 ounces; average wing loading, 9.4 oz/sq ft (canard and wing are loaded differently); and channels required, two. Servos which fit: Futaba S38/48 (but not S28), S32, S33, JR 501; Airtronics 401

Sophisticated Lady is new and much improved R/C glider based on Electra wing. Comes with a pilot figure for canopy too.

Goldberg Models' new electric power pod for all gliders including Gentle Lady and Sophisticated Lady. It comes without batteries.

Simon Marsh of Flight Concepts holds the Nisus slope or thermal glider. Designed for speed and efficency; comes 90% RTF.

Future Flight's Rollin Klingberg and the Klingberg wing. The only true flying wing kit known. This was a stability test bed for a full-size, rigid wing, foot-launched glider.

GM Precision Products president Gary Moline holds the new Thermal Charger, a V-tail, 05 electric pusher.

Peck-Polymers will soon be kitting the Keith Schwemmer Genesis R/C flying wing HLG. This is the plane that surprised everyone at last year's ISS RCHLG contest.

and 501. A 250 mAh battery pack should be used. Call Gary for price.

AMS IMPORTS

This Reno, Nevada, based import company has a large and thriving mail order business in addition to a retail R/C hobby shop. Proprietor Arnold Wratchko was present at the IMS show with a large booth full of his German and Austrian gliders and power planes. Of special interest here is the wide range of excellent thermal, slope, and trainer gliders in both sport model and scale model configurations.

In the photo you will see where Arnold and I hastily taped together an Angel 1600. I felt this glider was important to shoot because it offers the beginning glider guider an all-balsa, 90-percent ready-to-fly sailplane for $99. I checked the quality of the workmanship and the balsa wood on this particular ship from its factory-sealed poly bags and found both to be excellent. This sailplane has a wing span of 62.5 inches, a wing area of 490 squares, a length of 37 inches, and a radio requirement of only two channels. The wings are balsa-sheeted white foam core which should repair quite easily in the event of a landing mishap or midair collision with only 30-minute epoxy (add a bit of fiberglass tape if you winch launch). Most breaks in the fuselage can be repaired instantly with any cyanoacrylate glue. The airfoil looks like a very forgiving, Clark-Y-ish, flat-bottom section which should handle light slope lift very well.

There is also a two-meter (78.5-inch), 600 square-inch version which would make an excellent thermal or slope trainer. This one costs a bit more (understandably) at $120, but for the extra $21 it would buy a whole lot more performance for those pilots lacking a slope to fly from.

AMS also imports the G. Landmann Modelltechnik line of Austria. In this 18-page full color catalog there are five slick-looking "Quickbuild Kit" gliders, all with epoxy-fiberglass fuselages, balsa-sheeted foam core wings with fiberglass and carbon fiber reinforcements, and balsa rudders and stabs.

The five gliders are: the Sunrise, which is a T-tail, Standard Class (2.4m, 95 in.) glider for rudder-elevator control, Eppler 387 airfoil (which is an excellent light lift section) and would make an excellent trainer: the Hot Fly, which is a conventional tail, rudder-elevator-aileron model of 104-inch span and Eppler 211 airfoil (an excellent multi-task section); the Tornado, which is a swept wing two-meter (actually 1.95m or 77 in.), T-tail, aileron (or flaperon) and elevator control, aerobatic slope ship with Eppler 205 airfoil (which is also a very popular thermal section); the Swing, which is a more advanced development of the Sunrise having 2.5 meter wing (98 in.), Eppler 387 airfoil, T-tail stab, and three-channel control (rudder, elevator, aileron); and the Grob Club IIIb which is a 4.5-meter (177 in.) sailplane of German design. This scale ship weighs 4.8 kilograms (10.6 lbs.), has a transitioning Eppler section (203 at root to 193 at tip) for strength and performance, and features four-channel control (aileron, "landing flaps," elevator, and rudder). On this model the horizontal stab and rudder are also foam core. For these models, prices will vary depending on the exchange rate of US dollars for German marks, so call for a quote. Send $6 for the catalog and price sheet to AMS Imports, 1110 S. Wells Ave., Reno, Nevada 89502, or call toll free to order (800)752-7733.

ASTRO FLIGHT

If electric gliders are your thing, then the latest idea from Bob Boucher should interest you. In the Astro booth was an 035-cobalt size "Mini-Challenger" motorglider. With a wingspan of only 60 inches, an area of 416 square inches, and a flying weight of only 28 ounces, this little sailplane will climb out to a height of 400 feet in 30 seconds not once but four times on five 900 mAh cells. A 7 X 3.5 propeller draws 20 amps through the motor on five cells and 25 amps on six cells (which makes the model climb even faster!). A combo package will be offered for $99.95 which would include the standard "Mini-Challenger" kit and 035 cobalt direct drive motor with switch harness. As you read this, the Mini is still another month away from release.

Having recently flown another 035-powered, 60-inch motorglider at a local school yard, I can vouch for the performance and flying enjoyment these little gliders can bring. They can be flown from even smaller fields than the larger seven-cell 05 electrics, and they cost less. They can be thermalled with about the same

degree of ease as their bigger brothers, and they can fit in most cars without disassembling.

BUZZ WALTZ RC DESIGNS

Buzz Waltz has developed a new aileron slope trainer which he has named the "Predator" and which (of course) he had on display in the booth. It has a span of 78 inches, has a turbulated flat bottom airfoil, and has two- or three-channel control (aileron, elevator, and optional rudder). The direct sales price on this machine-sanded kit is $49.95 which includes hardware. Californians add six-percent sales tax and everyone add $4.00 shipping per kit.

Also new and in very prominent view in the Waltz booth was the "Can Winch" high start. This handy launching device for thermal gliders sells for $31.95 direct and includes 50 feet of Latex rubber tubing, 200 feet of nylon line, a beautifully made parachute, a spike for anchoring the high start, and all the rings you will need. It will launch anything up to a Standard Class glider on a calm day and some Unlimiteds on a breezy day.

CHEETAH MODELS

Larry and Robert Pettyjohn had a new slope combat or aerobatic sloper prototype in their booth which had a semi-delta-shaped wing mounted on a standard Cheetah fuse with nonstandard tapered stabs. The prototype hasn't been flown as of this writing, so any news about its availability would be premature at this stage of the game. Nevertheless, I just thought you'd be interested in seeing what might be coming in the future from this company.

The Cheetah and Super Cheetah are selling very well according to Larry, and combat contests are springing up with greater frequency every month. If you want the closest thing to an indestructible sloper, then you want a Cheetah. Contact Cheetah Models at 14725 Bessemer St. #B, Van Nuys, California 91411, (818)781-4544.

COMBAT MODELS

Byron Bruce has really developed a neat-looking slope "power scale glider" that looks just like an F-16 Falcon. Injection molded from a high density, very tough polystyrene foam, this model is 47 inches long, spans 79.5 inches, and has 434 square inches of wing area. Control functions are ailerons and elevator. The model assembles in very little time, and all hardware is included. The model is unpainted from the box.

Hazel Sig-Hester holds the Mike Pratt-designed Riser 100, a new standard class ship for fun or contest flying. It features some unusual details; see text.

According to Byron, the F-16 will do almost any aerobatic maneuver with uncompromising performance as well as fly quickly or very slowly. The model is available through your local hobby dealer or directly from Combat Models for $69.95 plus shipping and handling. Contact Byron at 2128 48th Court, San Bernardino, California 92407, or call (714)887-2820.

FLIGHT CONCEPTS

Flight Concepts is a newly formed company of four partners: Ed Holder, George Paige, Brian Chan and Simon Marsh. These guys are practically old timers in R/C soaring, and fairly well-known in the industry too. What they have come up with as their first products are the Nisus (pronounced nysus) and Eagle sailplanes.

The Nisus is billed as an "easy to fly"..."new 1.5 meter slope rocket." It has a 1.5 meter (59 in.) wing, weighs 21 ounces ready to fly, has a 7.5 oz/sq ft wing loading, a proprietary (no one else has it) Selig airfoil, and obviously a V-tail empennage.

The kit includes a molded epoxy-fiberglass fuselage, obechi-sheeted foam core wing, preshaped leading edge, precut ailerons, precut and shaped stabs (both outline and NACA 0009 airfoil), all control hardware and parts, and detailed instructions and plans. The price for the Nisus is not yet determined, but expected to be about $140 (give or take), and it is only available directly from Flight Concepts at this time. Their address is 1211 Parkinson Avenue, Palo Alto, California 94301, (415)325-7543.

Performance of the Nisus is reportedly excellent. The Nisus can stay aloft on lift from a five-mph breeze yet penetrate a 40-mph wind without ballasting to a higher wing loading. The Selig airfoil used on the Nisus and Eagle was custom-designed by Michael Selig by modifying the S3010 low Reynolds number section for slope racing speeds. It has the ability to thermal very well, and it seems to have strength in the best L/D department (glide ratio). In fact, the more Mark Allen and Ron Vann experimented with the section, the more they realized that it would be an ideal non-camber-changing F3B airfoil.

It was this experimenting which led Mark Allen and Ron Vann to design and test the Eagle F3B ship. Mark was quite familiar with the findings of Wil Schuemann and his multiple-swept wing tip shapes on full-size gliders, so he put these ideas to work in the

Continued on page 94

Steve Grochowski holds the new Sun Fair Slope Dart. This stubby-looking twin tail job is aerobatic and unique looking too.

Slope Scale's Brian Laird shows three of the four Slope Scale gliders in his line. Partial kits feature polyester-glass fuselages and foam-core wings.

RAMBLIN' AROUND AUSTRALIA

By STU RICHMOND. . .An interview with Les Bollenhagen of Bolly Props of Australia highlights this installment of Rambling. A look at Indoor activity at the Australian Nationals rounds out this month's edition.

• *Model Builder* reader Dave Platt has this famous quote about a real propeller doing *two* things; pulling the plane and cooling the pilot. He's quick to say if you doubt it cools the pilot, just watch the pilot sweat when the prop stops in flight! Dave *is* correct, although I took a ride with Harry in his Grob-*powered* glider at Australia's Waikerie Glider Airport, and when we got to altitude he chopped the ignition, feathered the prop, and we soared for 30 minutes over the famous Murray River. He let me fly the 30 minutes. Sorry, Dave, *no sweat*! At 500 feet Harry unfeathered, started, and flew me back to the Australian Nationals. This bit of airborne ramblin' reminded me of the importance of props, and I went and found one of the world's authorities on *model airplane* props who was a contestant at the Australian Nats and was willing to be interviewed for *Model Builder*. He's Les Bollenhagen and his company is Bolly Props. It went as follows:

MB: "Les, your reputation for model prop making has reached the USA and gone around the world. How did Bolly Props begin?

Les: "I started manufacturing because I couldn't buy products suitable for my use.

MB: "Like what?

Les: "Like glass props. When I started control line team racing and other performance events there were no props available to my liking!

MB: "Why not carve what you wanted out of wood?

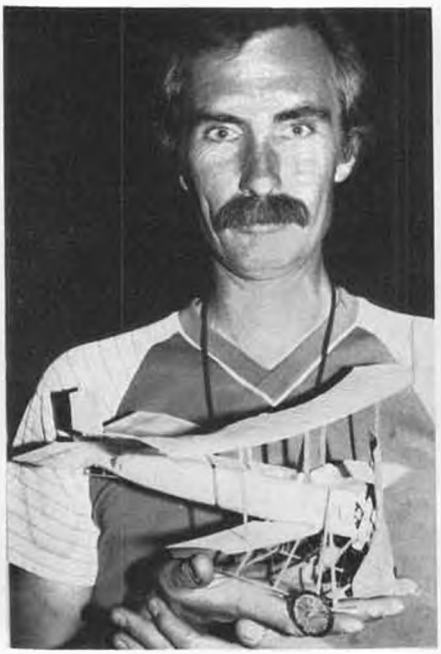
Les: "Well, I was lucky. I had a friend who was very good at making glass props. He showed me the ropes. I've got to hand it to Frank Coombs who got me started. I've developed a lot since then, but Frank had the intelligence to know what was good and what was bad.

MB: "What do you make now in addition to a full line of props?

Les: "We're getting into helicopter rotor blades. They're developing a reputation of being superior to the top blades in Europe. All who've used others are buying Bolly

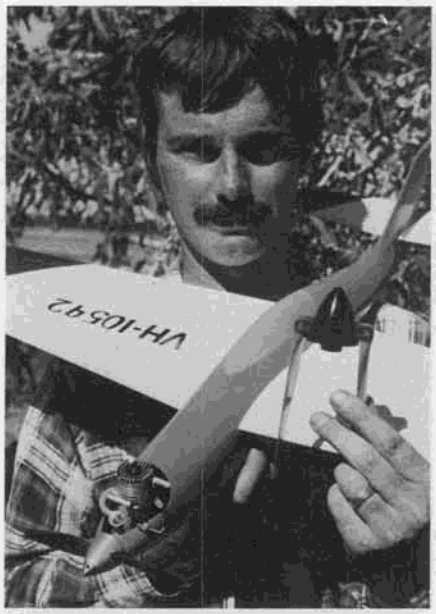
That's Stu in the driver's seat before being towed to 3,000 feet in a Twin Astir by Grob. He also got to ride the powered Grob motor glider too. Such a lucky fellow. . . .

Model Builder's Plug Sparks columnist won a Second Place trophy in Hangar Rat in Oz.

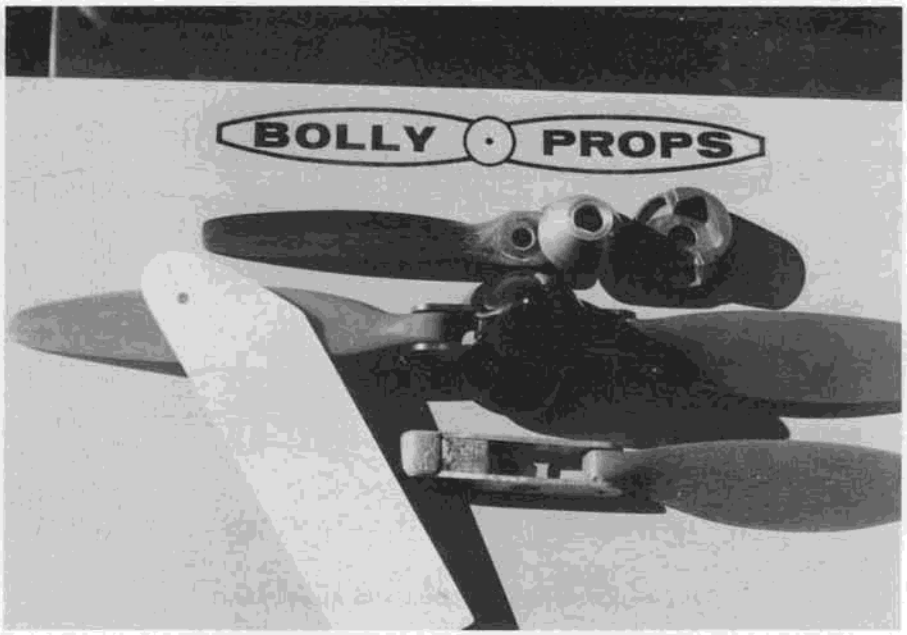


A Bristol Racing Biplane took Fourth for Paul Mitchell. He's an architect, and this is his first-ever Peanut model!

Brian Taylor took First in Peanut Scale at the Australian Nats with this 5.7 gram Piper Cub L-4 built from a Micro-X kit. A jewel!



Les Bollenhagen owns Bolly Props in Oz. The .11-powered 1/2A pylon racer is of his manufacture as is its prop. Les is holding an electric folder as well.



The Bolly Prop line is advertised as the most extensive range of carbon/glass reinforced epoxy props in the world. Some metal work is by Andy Kerr in Sydney, who will be the subject of an upcoming visit by the ol' Rambler in a future issue.

blades now. I'm smiling at that. Also there are fiberglass fuselages and foam wings in the Bolly line now. Bolly made most of the fuselages used by the Australian F3B glider team.

MB: "Do you ever sleep? What's your size range in props?

Les: "Smallest is 5 x 5 inches. Largest is 20 x 8 and 20 x 10 inches.

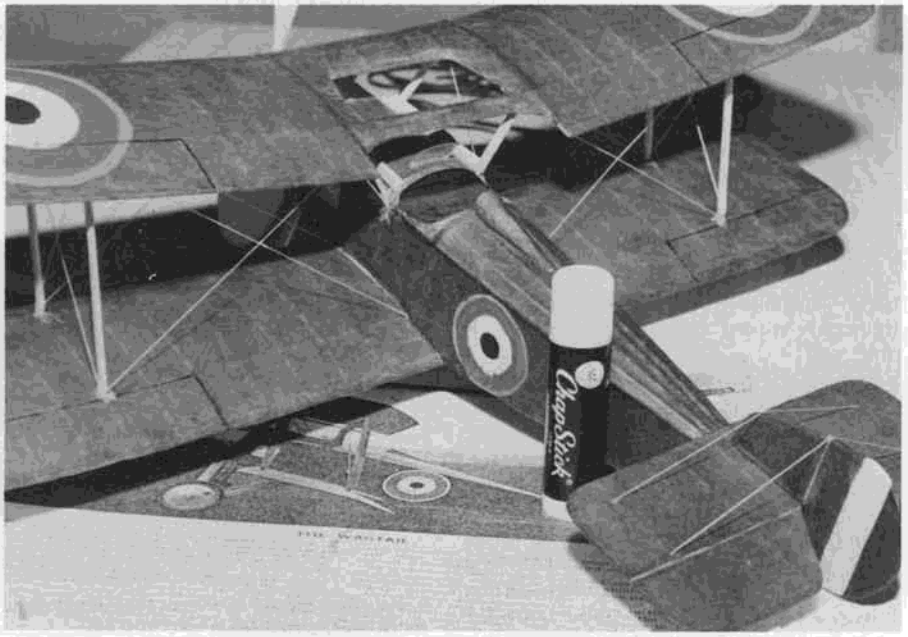
MB: "In the USA when we buy a Bolly prop from Tom Dixon (Suite 401, 1938 Peachtree Road, Atlanta, Georgia 30309) does it comes ready to run?

Les: "We take the prop out of the mold and remove the flashing, but the modeler still needs to balance it as with all other brands. It's just too costly to balance in manufacturing.

MB: "Balancing to me is a very personal pride. I want to do it myself, my way. Les, you make glass as well as carbon fiber. Which do modelers prefer?

Les: "It depends on the modeler and his airplane. It'd be absolutely pointless for a scale modeler using a 20 x 8 to buy carbon.

Continued on page 79



Bob Brown built this Westland Wagtail for indoor Peanut Scale competition.

Max Starrick has done much to promote Hangar Rat flying indoors at the Aussie Nats. His young friend did well in HLG.

Luton Minor and Bristol M/C get a look from the judges at the Nats.

"His work was his recreation, and vice versa. . . ."

Dr. Roald Tweet lofts his 1908 Rotopter reproduction. Additional details in column.

• Our lead-in line this month, referring to aviator/designer Glenn Curtiss, was found in C.R. Rosenberry's book *Pioneer of Flight*.

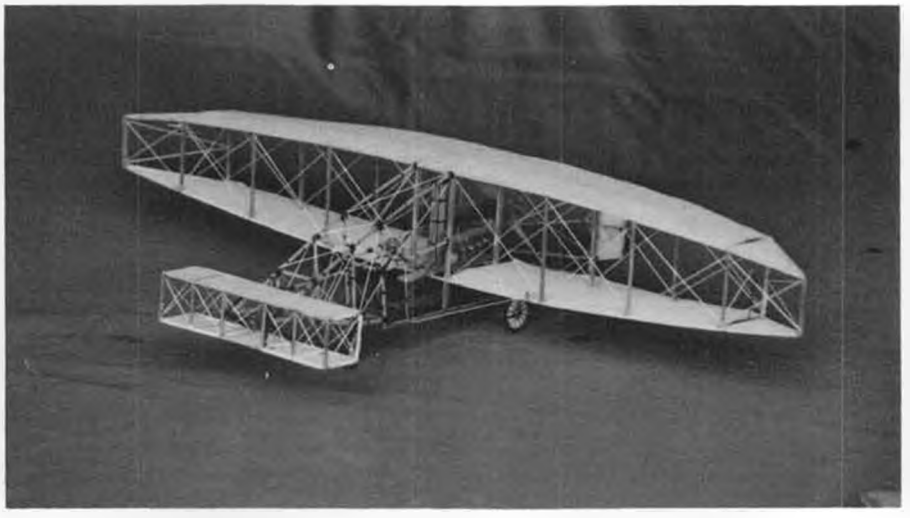
As we begin the year 1988, let's pause for a brief look at aviation during 1908, eighty years ago. Perhaps things have not changed so very much? From *Century Magazine* of that year, via Jim Alaback, we have this quotation from Wilbur Wright: "Having set out with absolute faith in the existing scientific data, we were driven to doubt one thing after another, till finally after two years of experiment, we cast it all aside, and decided to rely entirely upon our own investigations. Truth and error were everywhere so intimately mixed as to be undistinguishable."

ROTOPTER COPTER

Also during 1908, a gentleman by the name of J.A. Udden demonstrated a remarkable flying model helicopter at Augustana College in Rock Island, Illinois. The four-foot tall assemblage dubbed a "Rotopter," featured twin rotors, and its flight direction could be altered by shifting a small weight (actually a wooden sewing-thread spool) along an adjustable outrigger rod. As Udden put it: "On pushing this weight backward a sufficient distance, the model rears and lands behind the place from where it makes its start; by throwing the bar to one side, the flight will deviate in that direction." Referring to helicopters in general (remember no successful man-carrying versions existed at the time) Udden explained: ". . . it can be stopped in its forward flight and made to support itself in the air without forward motion and can be made to alight by going in a vertical direction, gently and slowly, until it reaches the ground. The propellers can readily be made to act as a parachute, and the worst thing that can happen to the aviator is to be let down easy." Udden demonstrated his model to an audience who were so impressed that he "was compelled to repeat the experiment a second and a third time," according to a newspaper report.

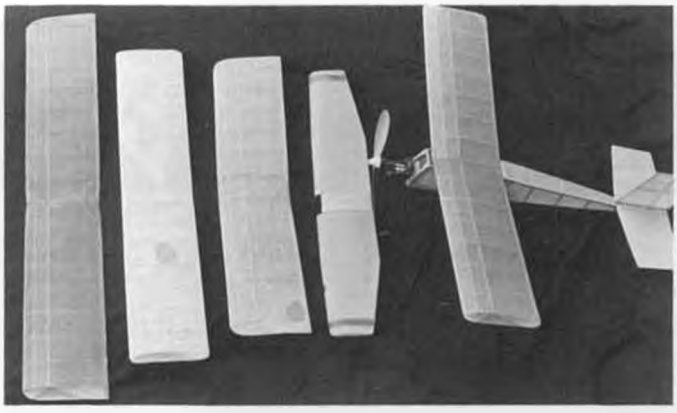
So much for the Rotopter's past. Recently, Dr. Roald Tweet, English Professor at Augustana College and an avid model builder, constructed a reproduction of Udden's helicopter, employing only materials

Spectacular display model of Howard Hughes' racer (short-wing version) by commercial artist Ralph McQuarrie. More info in text.



Recent kit by Easybuilt Models of Canada is this 1908 Silver Dart biplane. Photo: Ian McQueen.

Huge model of a Cierva Autogiro, constructed in England prior to WWII. Photo from David Baker via Ken Sykora, gave no further information. Does anyone know if it flew?



When Fritz Mueller conducts tests, he conducts tests! Note variety of wings tried on his free flight electric sport model.

which might have been available during 1908 (bamboo, birch, string, and tissue paper). Tweet's model was demonstrated during the annual Augustana Historical Society dinner (see our photograph). After the Rotopter successfully rose to the ceiling, the audience responded in exactly the same way as did Udden's 1908 congregation, urging a repeat performance! Truly, history does repeat itself.

AND ALONG THOSE LINES

Yet another claim to pre-Wright brothers flight has been published. This one in Pittsburg, Texas, according to a newspaper account supplied by Al Backstrom. The flying machine reported to have left the ground during 1902 (a year before the Wright Flyer), was the work of one Rev. Burell Cannon, who evidently was biblically inspired to design his "Ezekiel Airship." A $20,000 reproduction of the huge craft is presently on display in a Pittsburgh restaurant, however, unlike the Gustave Whitehead reproduction, no attempt will be made to fly it.

FLYPAPER?

Many if not most modelers harbor at least a passing interest in paper models, whether just simple folded "darts" or more elaborate productions.

A new quarterly publication entitled *Flypaper* is intended to recognize the many facets of paper aeroplaning, and bears the subtitle *The Journal of Folded Paper Flight*. Editor/Publisher Wink Peck expects to examine history, official records, international contests, optimum material selection, origami, noted designers, new designs, and existing commercial productions. *Flypaper* will also welcome reader participation, offering an arena for idea exchange among enthusiasts worldwide. Subscriptions are available for $10 (USA) or $12 (foreign) from: *Flypaper*, P. O. Box 47186, Wichita, Kansas 67201.

THAT BEAUTIFUL HUGHES RACER

One of our photos shows an unusually realistic scale model of the famous Howard Hughes racer. This static display model was constructed by Ralph McQuarrie, a talented commercial artist who has contributed importantly to such motion pictures as *Star Wars, The Empire Strikes Back, Raiders of the Lost Ark, E.T.*, etc.

Starting with the late Paul Matt's drawings, Ralph built his 3/4-scale racer from basswood, and finished it in Duro plating enamel over auto primer. Aluminum foil represents the steel exhaust protection fairing immediately behind the engine cowling. We enjoyed Ralph's description of executing this model: "It was. . .ah. . .difficult!" Obviously, the results justified the effort.

Capt. David Mason, a C-5 Galaxy pilot, won IPMS trophy with this F-18 Hornet, based on a Monogram plastic kit.

Photographer David Barfield discovered this religious painting featuring a model airplane on a Sunday School wall. Believed to date from the 1940s.

THREE-VIEWS AND PHOTOS, ANYONE?

By far the most requests we receive are from scale modelers seeking documentation. In fact, research seems to be a full-fledged second hobby for many.

One of the most comprehensive collections of reference material is managed by Bob Banka, of Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, California 92626. Imagine 3,000 drawings and 50,000 photos all in one location! The subjects range from pioneer types through modern jets, and a complete catalog may be obtained for $3. In addition to three-views and photographs, Bob offers a low-cost search service for unlisted items. If you may care to order a catalog, please mention *Model Builder* sent you.

SPEAKING OF RESEARCH

In addition to contacting commercial sources, you may need to seek information elsewhere, as did Jim Kenney, of Rockledge, Florida. He sent out 33 inquiries while researching his Grumman F3F project, and was astonished to receive over 50 helpful replies! As he put it: "Modelers and aircraft buffs are the greatest people in the world." From Jim's letter to the Williams brothers we have extracted the following excellent suggestions:

"Spread the word (about your project) everywhere: your club, at work, the news media, in casual conversation, relatives (they'll think you're nuts of course, but no matter, ask anyhow), the model press (scale columnists see all, hear all, know all, and will tell all, believe me. They will even help spread the word.), and manufacturers' public relations departments. The more people who know what you are looking for, the better chance you have of finding it.

"Be very specific about what you want or don't want, and expect a lot of redundancy.

"Don't prejudge a possible source. I have received some really good data from what seemed a pretty unlikely source.

"Don't trust every 'authority' that you come across. Verify your info with cross-checks. There's a lot of erroneous stuff out there.

"Always enclose a large, pre-addressed and stamped return envelope with your written inquiry (*Very important—wch*).

"When writing to aircraft manufacturers or museums, know what you want and ask

Continued on page 84

the INSIDERS

INDOOR FLYING REPORT

By DAVE "VTO" LINSTRUM

Doc Martin will run the Gran Prix of Pistachios at the Mini-Dome during the Indoor Championships. The meet follows the F1D Championships. Doc seen here with a WWI Nieuport.

• In 1980, the USA (through the Academy of Model Aeronautics) hosted the Indoor World Championships for Class F1D Microfilm Models at the Northwood Institute Atrium, West Baden, Indiana. This was the seed for Indoor Weeks at that magnificent site in following years; the last of these was in 1983. The hotel with its 100-foot high atrium was sold and became unavailable. The U.S. Indoor Champs, run by the National Free Flight Society, was held at a succession of sites, culminating in the 1987 USIC at the Mini-Dome in Johnson City, Tennessee. Just like an indoor model, what goes around comes around. . . .

We are delighted to announce (and we predicted it last Fall in this column) that Indoor Week will be held May 28 (arrival day—no official flying) through June 4 at the 116-foot Mini-Dome. This has a floor the size of a football field (complete with Astroturf) and a relatively clean arched truss roof that proved *not* to be a model trap last year. As an indoor site, it is paradise on earth and will allow flights approaching 50 minutes by F1D Microfilm models.

Bob Randolph, 1988 USA team manager checks balloon line used for steering F1D near the roof to avoid hangups.

Indoor Week consists of three related events: the FAI Indoor World Champs for F1D models (about 20 countries will compete, and current champ Jim Richmond of Indiana will defend his title won at Cardington, England, in 1986) followed by the U.S. Indoor Champs. The MIAMA Club Gran Prix for Pistachio Scale is also held during the USIC. This will truly be the spectacle of a lifetime.

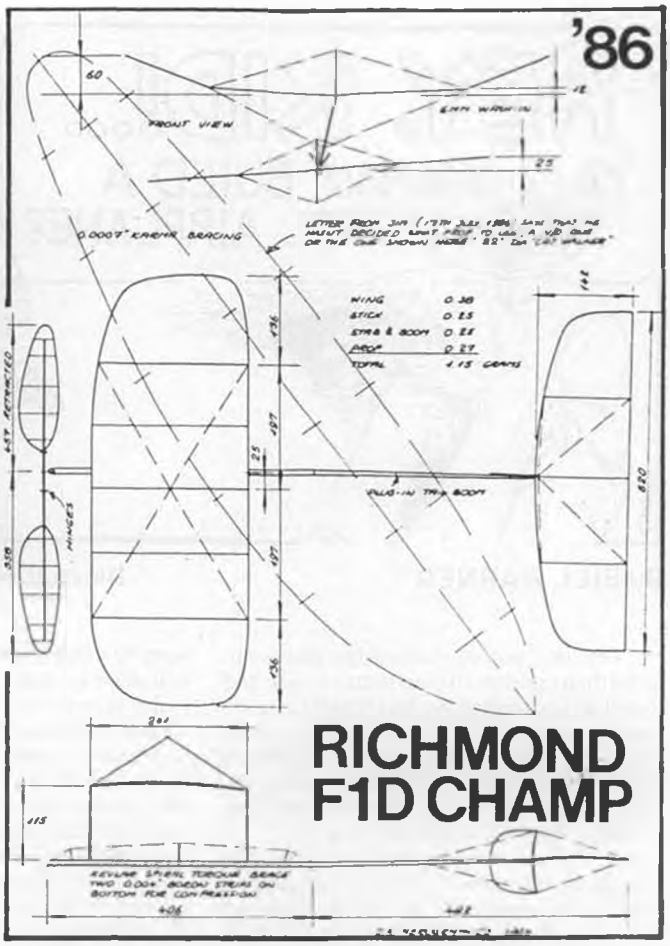
The World Champs is only open to official teams, but timers and helpers are needed. To assist at such a meet is to rub elbows with the greats of aeromodeling from both sides of the Iron Curtain. Glasnost, indeed! Testing will be on Sunday, May 29, and six rounds of fantastic flying will be timed on May 30 and 31. This conflicts with the outdoor USFFC at Taft, but it could not be avoided. The site availability is restricted, as it is at a university with both spring and summer sessions (we fly in the break). An awards banquet will be held on the evening of May 31 to celebrate the winners. We predict that a 50-minute flight will be made by the ultimate champion. Such a flight was made by Jim Richmond with his "Film-Flam" (see three-view by Jorgen Korsgaard) in Cardington to win in 1986.

Back to back with the W/C is the USIC, May 28 through 30, open to anyone who is an AMA member. There will be 27 events held, including such oddities as Rubber Speed and 12-inch Catapult Glider. There will be plenty of scale models, some of them flown by bleary-eyed Pistachio Scalers in the Gran Prix. Doc Martin will be there to time your flights. The F1D flying will also continue with an International Contest in which you can compete against the World's Best. It is truly an extravaganza —not to be missed.

For full details on Indoor Week, send a large (#10) SASE (stamped, self-addressed envelope) to the Chief Honcho, NFFS Presi-

'88 USA team member Bud Romak of California weighs in his F1D microfilm model to verify one-gram weight.

F1D World Champion Jim Richmond seen here with Doc Martin will defend his title at the Mini-Dome in 1988.



A three-view of Champion Jim Richmond's 1986 F1D winner.

dent Tony Italiano, 1655 Revere Drive, Brookfield, Wisconsin 53005. Foreign teams will get details via their respective aeroclubs and AMA.

1988 USA INDOOR TEAM

We mentioned Jim Richmond defending the title of World Champ, but he will be joined on the floor by the All-California USA Team (Manny Radoff, eat your heart out!) of Cezar Banks, Bud Romak, and Steve Brown. Bob Randolph will be team manager. The team was selected at the Santa Ana Blimp Hangar, Tustin, California, over the Labor Day Weekend. We have photos of three of them this month and hope to do an interview (with photo) of newcomer Steve Brown (a protege of Randolph) for future publication.

We hope you will be able to join us at the Mini-Dome to see these guys fly and to toast them at the victory banquet. *Go for the gold, USA!*

HINT OF THE MONTH

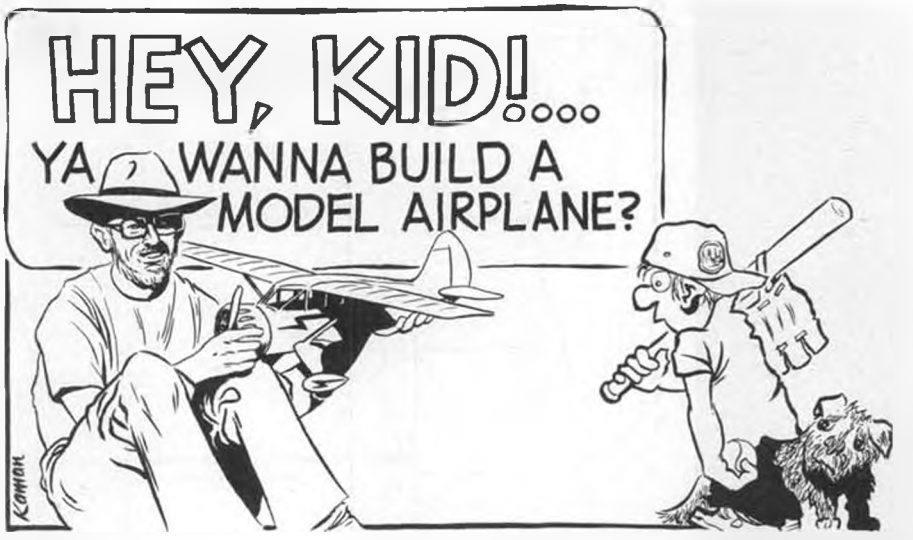
We are going to have to dispense with the usual news items, Obscure Aircraft notes and product reviews, this month due to lack of space. However, we would not want to leave you without a HOTM. This one comes from old Indoor maestro Bud Tenny in a dusty old issue of *Indoor News and Views* (available now from Dick and Melody Doig, 6 Canary Hill Dr., Pontiac, Michigan 48055; send SASE for sample issue) that most of us have forgotten.

The trick is a simple one; use black or navy blue artist's mat board to cut your balsa parts. Go to an art store and buy a full sheet, or scrounge the cutouts from a frame shop (they throw away the "holes" in mats) or artist friend. Use the board in pieces 9 x 12 or so, whatever fits your building board. The white balsa shows up well on the dark background, aiding accurate cutting and assembly. Larger sheets can be used as a backdrop for wire bracing—the wire shines in the light, and you can see each strand.

We welcome reader inputs into "HOTM," "Obscure Aircraft" candidates and "How the Indoor Bug Bit Me" anecdotes. Let's hear from you! Hope to see you at Indoor Week in the Smokey Mountains of Tennessee. •

Team member Cezar Banks from San Diego prepares his F1D model at 1986 Cardington World Champs. Advisor is team manager Romak.

Fliers from over 20 countries will attend 1988 F1D World Championships in Johnson City, Tennessee. Seen here, Bernard Asuett, U.K.



By BILL WARNER

Illustrations by JIM KAMAN

Sky Bunny flies by nice and slow for the camera. Nice proportions and lots of adjustments make the model a cinch to fly.

• Now that you've studied the plans, copied them, gotten all your parts cut out, and lined up your materials, let's build! I assume you remember the basic building setup from the Peck R.O.G. session (February 1988 *MB*)? Flatten your plan on the building board, cover with Saran Wrap, and make sure all the wrinkles are out.

Let's make a notching tool for those little cutout places in the ribs where the spars go on top of the wings. When you cut them out with a knife, they sometimes split and are not too accurate, so we're going to *sand* them in. Take a piece of the hardest balsa you have that is the same size as the notch you need, in this case 3/32-inch, and glue the edge onto a piece of about 100-grit garnet paper. You can glue some finer stuff on the other edge if you want to. As it doesn't take much longer to make six than one, why not make a few extras too? When the glue's dry, trim off the sandpaper even with the sides of the sheet with an old razor blade (it won't be much good after this) and sand the sides of the sheet to bring the edges of the sandpaper even. Use your sanding block for this. Then you will see that you can sand a nice notch just the right size into your ribs! Some modelers glue a strip of balsa on the side of the tool to stop it when it gets just a piece of the 3/32-inch square stringer alongside the business edge of the tool and gluing the stop piece right against it.

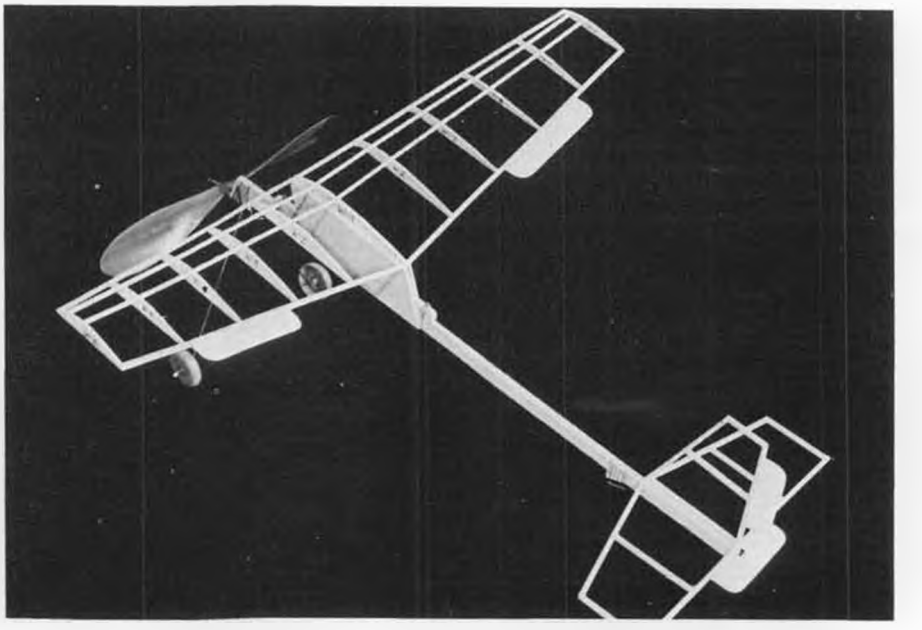
THREE WAYS TO GET THE SPAR NOTCHES LINED UP

Probably the best way to get 'em right is to pin the L.E. down to the plan ("X" the pins, of course), and then to glue the ribs to it in their proper positions. I use one or two pins shoved downward at an angle through the *side* of each rib to hold it in position, though some people "X" pins on them, use little lead hunks of printer's type beside them, or just hope the glue will hold 'em! Then, sight down on the T.E. end of each rib and trim it off even with where the T.E. will go. (You *did* make 'em a little long as I showed on the plan; right?) Glue on the T.E. Now, using the dihedral gauge you glued to some scrap balsa, lean the W-1 root rib inward to match the angle on the gauge. You will need to check this in a few minutes to make sure it has not moved! You can do something else while this is drying. When it is dry, line up a straightedge over the rib-notch locations and mark either the front or back of each notch. Then, saw your notching tool across each location until it is just the right depth to receive the spar. Check with a bit of 3/32-inch square to see that it fits just flush with the top of the rib. Then glue in the spars. They can hang over each end a bit and be trimmed off later.

The second way to make a wing is the one most used over the years by millions of modelers. That way involves making all the notches in the ribs first, and then assembling them, usually all out-of-line, with the spar snaking back and forth to connect them all. This is a rather clumsy way to do it, because then notches have to be lengthened to let the spar lie straight and then the unused part of the notch filled in with scrap.

The third way, which is a variation on the above method is to line all the ribs up on the *spar*, rather than using the L.E. as the guide. Then, the ends of the ribs can be trimmed as necessary to let the L.E. and the T.E. touch each one as you go like. I prefer the first, using the L.E. as a starting place, and a straightedge to line up the notches-to-be.

There are two ways to give up your wing. I prefer to get the glue in between the pieces being assembled. Some guys like to pin it all together and then wipe a little glue fillet (a drop with most of the extra scraped off) at each joint. Both ways work. In any case, use a piece of scrap stick to wipe glue into any small cracks, and always get rid of big gobs of glue; they add weight, look bad, and once they dry, are bears to sand or cut! Before your wing dries, double check to make sure that all the ribs are down flat on the building board, that the L.E. and T.E. are touching each rib, and that the spars are all down in their little notches and not sticking part way up. Before we leave this, check to make sure that you have not bent the L.E. or T.E. out of line to make it fit up against any rib. Never allow bends, as they set up a stress in the wing that may later turn into a



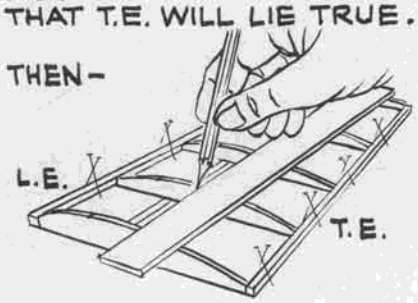
The Sky Bunny R.O.G. was designed just for this series. It features techniques in building and flying that will be useful in later models. Bare bones of the Bunny show relationship of the parts. Normally the wing gets covered in two parts before being joined.

THREE WAYS OF AVOIDING WING WOBBLES

METHOD ONE

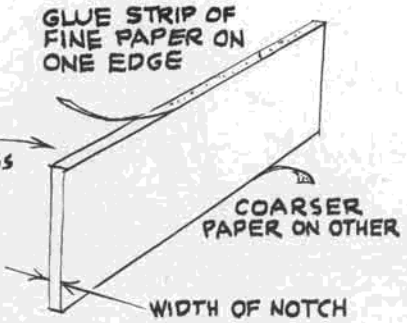
PIN DOWN LEADING EDGE. GLUE UN-NOTCHED RIBS TO L.E. ADJUST T.E. OF EACH RIB, REMOVING OR ADDING WOOD SO THAT T.E. WILL LIE TRUE.

THEN –

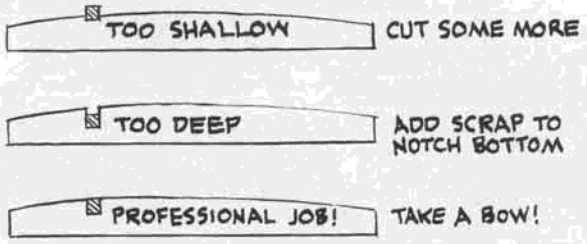


LOOKING STRAIGHT DOWN ON PLAN, MARK SPAR POSITIONS ON EACH RIB USING STRAIGHT-EDGE AS A GUIDE

THEN USE YOUR NOTCHER TO FILE NOTCHES

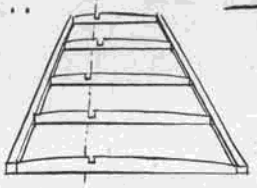


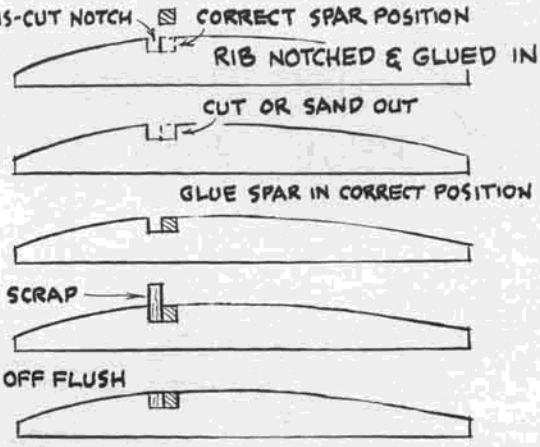
WHEN NOTCHING TRY EACH CUT BY FITTING THE SPAR TO IT. IF NOT PERFECTLY FLUSH, ADJUST CUT.



METHOD TWO

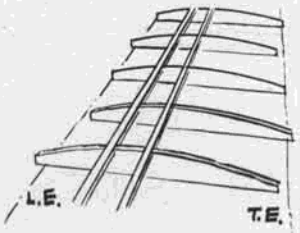
NOTCHING RIBS BEFORE ASSEMBLY ALMOST GUARANTEES POOR ALIGNMENT. TO CURE IT...



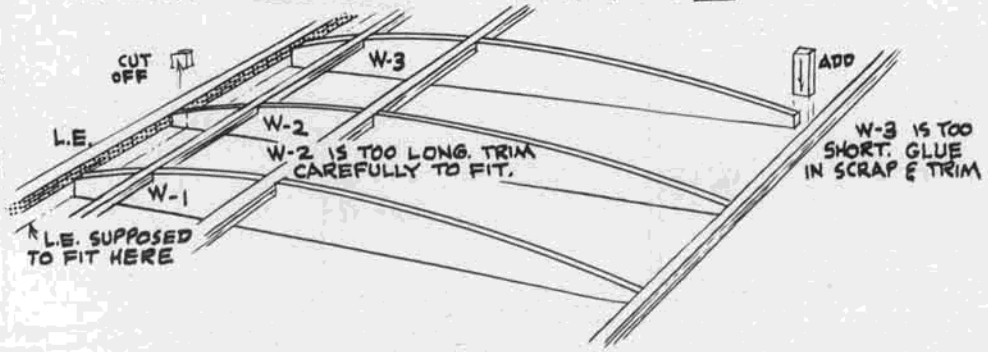


METHOD THREE

NOTCH EACH RIB AND PIN IN PLACE OVER PLAN. RIBS SHOULD BE FREE TO SLIDE BACK & FORTH. LINE UP ALL NOTCHES BY INSERTING SPARS.



FIT L.E. & T.E. TO GOOD STRAIGHT FIT BY SANDING OR CUTTING RIB ENDS. IF GAPS OCCUR, FILL WITH SCRAP. DO NOT FORCE FIT!



GLASS BEAD

PIN HEAD HOLDS RUBBER BAND FOR MOVABLE WING MOUNT

1/16" ALUM. TUBE

BIND WITH THREAD-RUB ON PLENTY OF GLUE!

.031" OR .045" MUSIC WIRE LANDING GEAR

USE 1" DIA. PECK WHEELS

MODEL FLIES ON 7" OR 8" PECK PLASTIC PROP.

PYLON - 1/16" SHEET SIDES OF FUSELAGE. DO GLUE TO FUSELAGE. BOTH NOT

WING

WING MUST BE FREE TO SLIDE FOR ADJUSTMENTS IN FLYING

3/16" X 3/8" MED. BALSA

OPTIONAL SPLICE

3/16" SQ. WING SLIDER-GLUES TO PYLON SIDES - NOT TO FUSELAGE

STAB

COVER TOP 3/32" SQ.

SIDE ONLY BALSA

ELEVATOR TAB

W-6
W-5
W-4
W-3
W-2
W-1

LEAVE EXTRA TO TRIM OFF FOR EXACT FIT

1/16" BALSA SHEET RIBS

THREAD WRAP

SCRAP FILL

BIT OF PAPER CLIP

RUDDER

COVER ONE SIDE ONLY

CARD STOCK

ELEV. TAB

PIN

3/32" SQ. HARD

3/32" SQ.

BALSA

LEFT WING

COVER BOTH SIDES

W-6 W-5 W-4 W-3 W-2 W-1

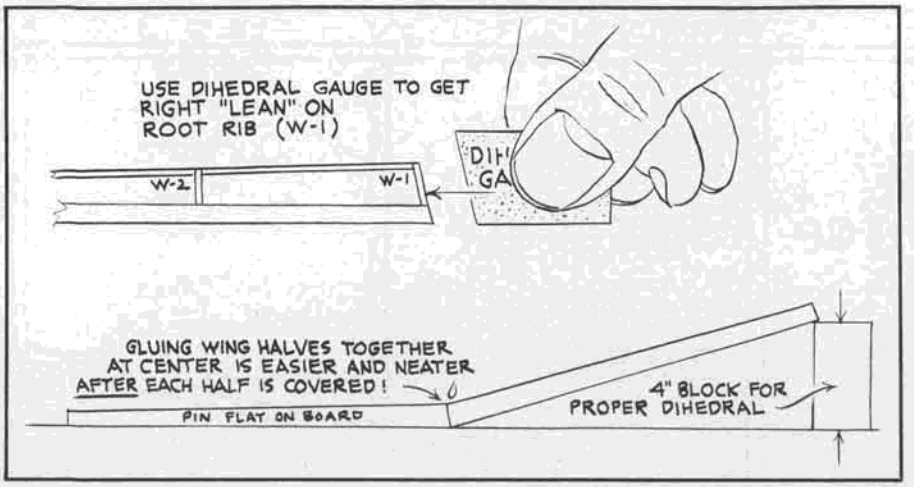
AILERON TAB (2) CARD STOCK

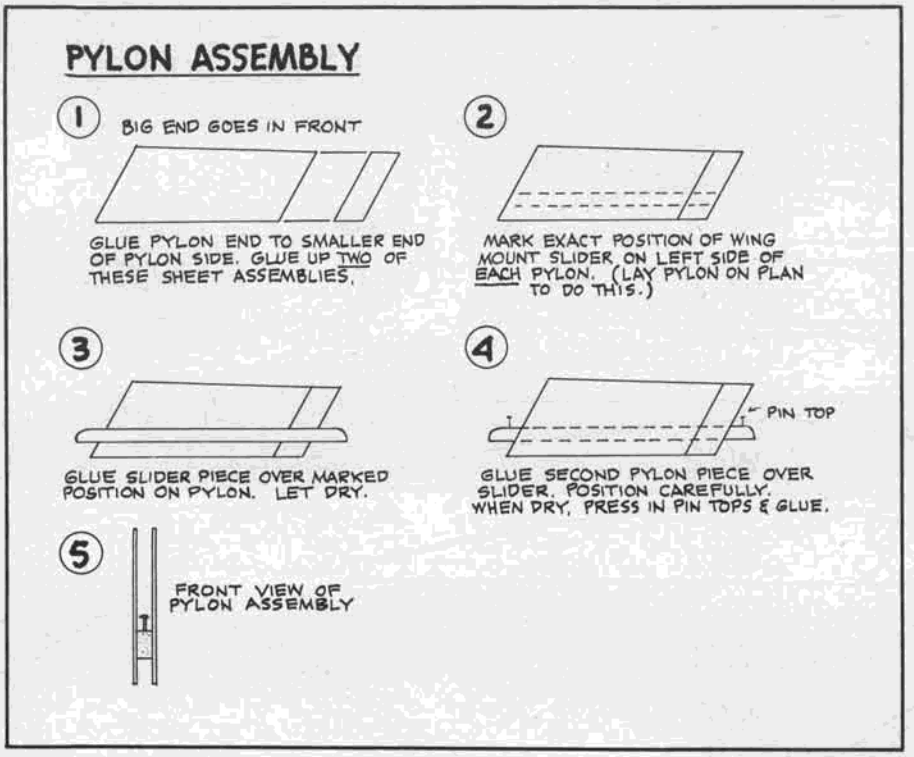
SKY BUNNY

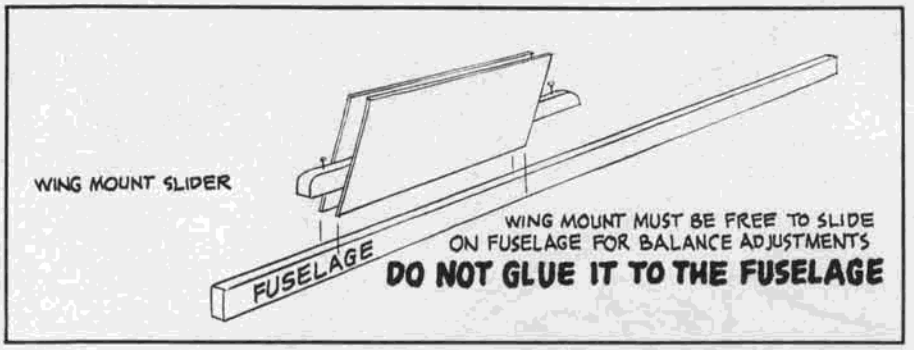
Bill Warner 1988
Model Builder Magazine

SHT. 1 OF 3

SHT. 2 OF 3







warp. Keep the L.E. and T.E. straight, even if it means cutting off that long rib that's pushing it out or filling in the space between it and the rib you cut too short with scrap balsa. Glue alone is not good for filling gaps, though poor craftsmen think it's the way to go!

THE TAIL

After you have made both wings you can do the stab and vertical (rudder). They are made just like the *Peck R.O.G.* (Feb., Mar. 1988 *MB*) and should pose no problem. (Note: As this series started in Nov. 1987, you may want to get some of the back issues by writing *Model Builder.*) Get in the habit of noting how the parts meet each other. The way the L.E. of the stab forms its little "vee," for example, is shown the way it is because a joint on an angle offers more gluing surface, and therefore more strength, than a "butt joint."

THE PYLON AND WING SLIDER ASSEMBLY

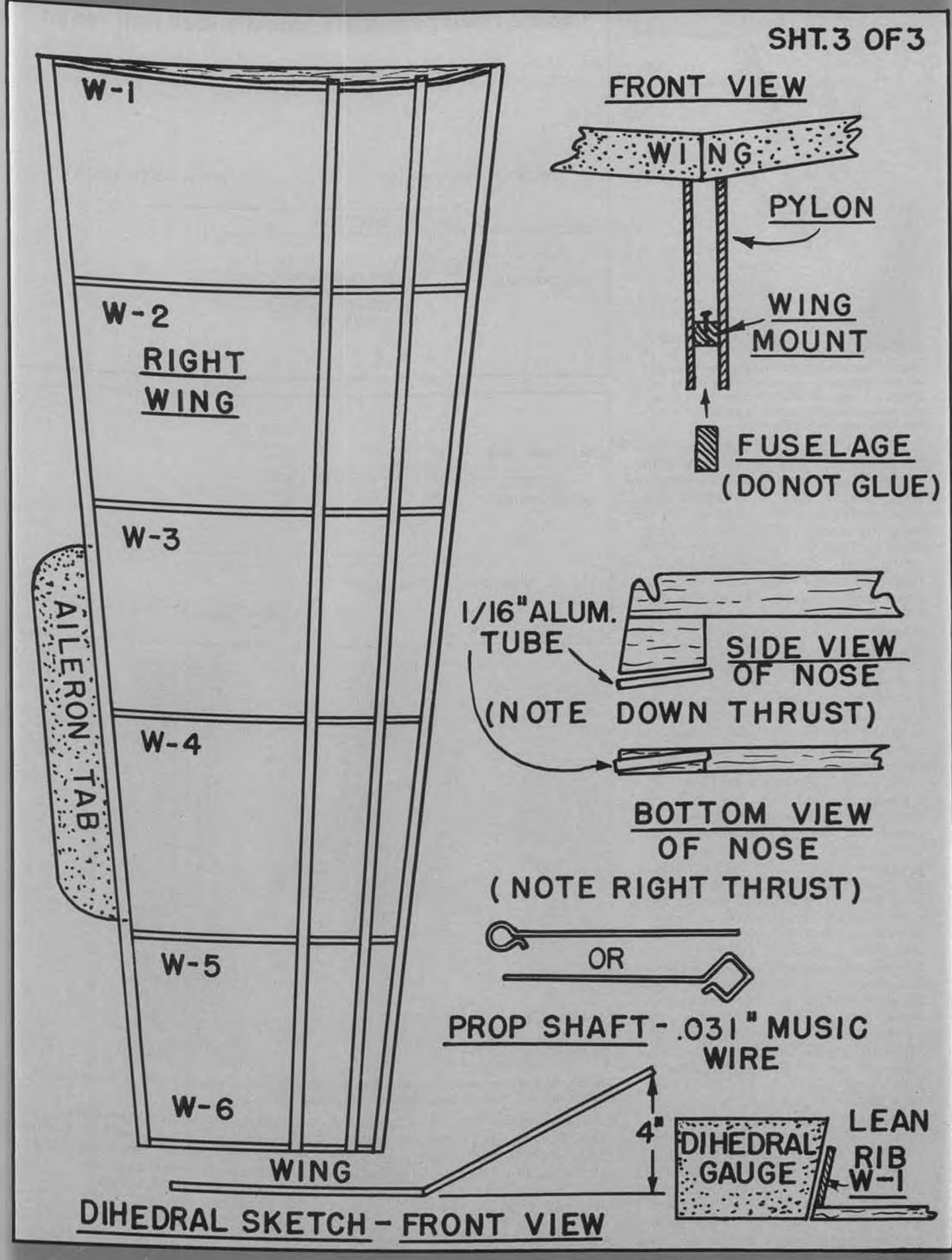
This is the heart of the *Sky Bunny*! It holds the wing at the right angle of attack (front higher than the back), adds some "side area" up front for added stability, helps keep the horizontal stabilizer (stab) out the wing's "wake" a bit, drops the center of gravity (CG) a bit, and also allows you to move the wing forward or aft (rearward) to put the lift of the wing in just the right place in relation to the CG for flight trimming on the field. The main things that you need to be concerned with are making sure that both sides are glued to the slider facing the same way and that when you glue it to the wing that the taller end is in front!

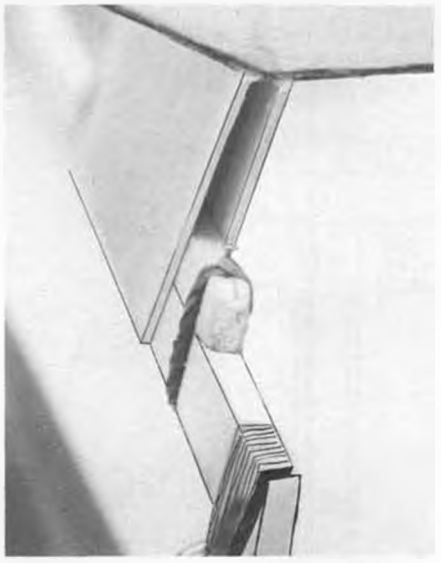
Each pylon side is made of two pieces. The reason for this is so the grain direction can be kept "from-wing-to-fuselage" for maximum strength. I have seen enough kids run the grain on pylons parallel (same direction) to the fuselage to know that it is too weak that way. So, you will have to add the rear to each pylon, hopefully in the right place. I have done it up on the parts layout, so the printing on the side of the large pylon piece will carry over onto the small one. If you copied your parts with the iron-on or thinner methods, you should have no problem assembling these two pieces in the right order. If not, study them when you are fitting them together to make sure everything matches up nicely! Then cut the slider from some fuselage-width balsa and glue it to the inside of the right pylon side, using the dotted lines as a guide. Mark the position front and back by placing the pylon side over the plan if you didn't use the printing transfer methods mentioned above. Then the other pylon side can be added. Test fit the assembly over the fuselage to see if it fits okay, but don't leave it there or it may become permanently attached!

THE NOSE

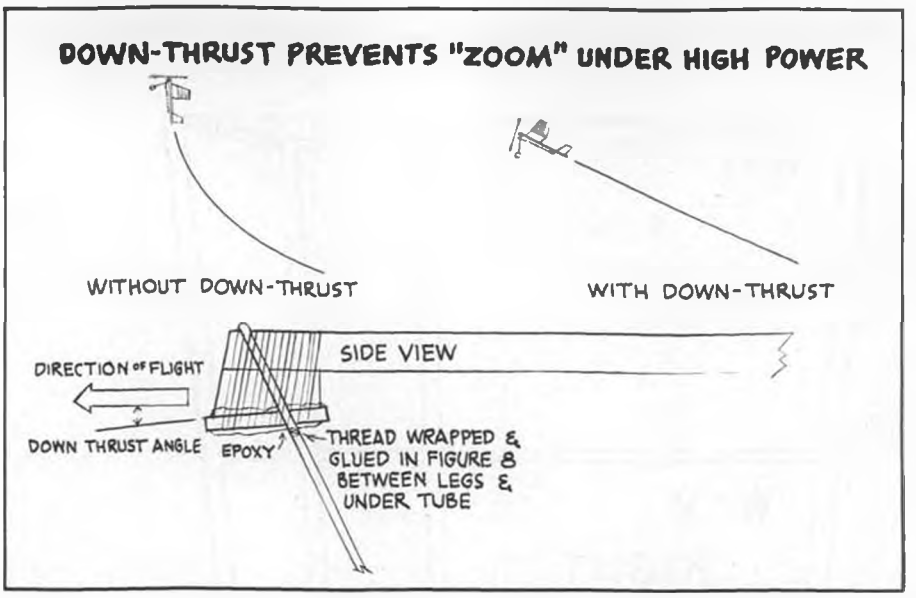
Glue the three "S" pieces together and then glue the lot to the front of your fuselage stick as shown on the plan. *Make sure the big end is at the front to point the thrustline of the prop shaft downward.* About one in five kids who do not understand the purpose of the angle here, does it backwards. The result is then UPthrust, and often a loop under power! The purpose of the downthrust stems from the fact that a rubber motor puts out a big burst of power at the beginning, which then tapers off to no thrust at all when it is out of winds. This big burst of power means lots of extra *speed* right at the beginning of your flight. This means lots more air speeding over your wing giving you lots of extra lift; too much, in fact. To keep the extra lift from just taking your model straight up into a stall or over the top for a loop, the thrust of the prop is aimed a bit downward to pull the nose down under this high-power part of the flight. As the rubber runs down, it has less and less ability to pull it down, but then the airspeed over the wing is less then, too. It all equals out, and when the motor runs down and the plane is gliding, the downthrust has no effect at all on the flight. This is not like radio control, where you can shove the nose down under high power by using a control stick. You are into *pure* model flight, and it has to be *right* because once you let it go, it's *completely on its own*!

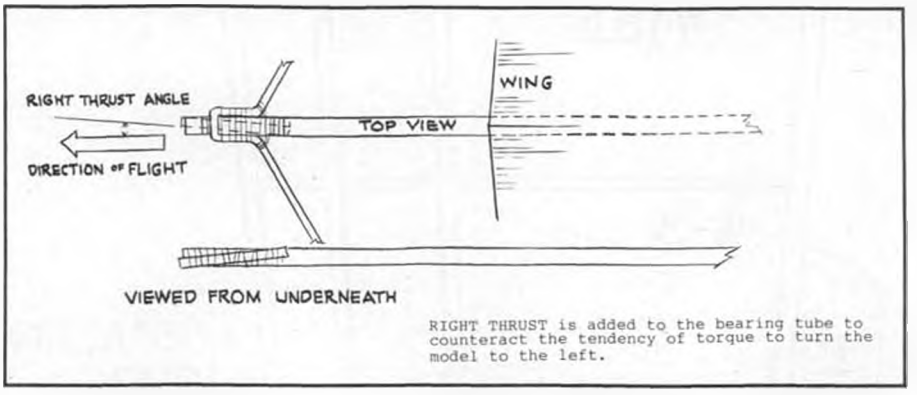
You will remember back in the Decem-


SHT. 3 OF 3
W-1
W-2
RIGHT
WING
W-3
AILERON TAB
W-4
W-5
W-6
WING
FRONT VIEW
WING
PYLON
WING
MOUNT
FUSELAGE
(DO NOT GLUE)
1/16" ALUM.
TUBE
SIDE VIEW
OF NOSE
(NOTE DOWN THRUST)
BOTTOM VIEW
OF NOSE
(NOTE RIGHT THRUST)
OR
PROP SHAFT - .031" MUSIC
WIRE
4"
DIHEDRAL
GAUGE
LEAN
RIB
W-1
DIHEDRAL SKETCH - FRONT VIEW



Rubber band holds the wing/pylon assembly on the fuselage for adjustment purposes. Short pin helps hook the rubber band onto the wing slider. The slider is glued to the pylon sides, not on the fuselage!



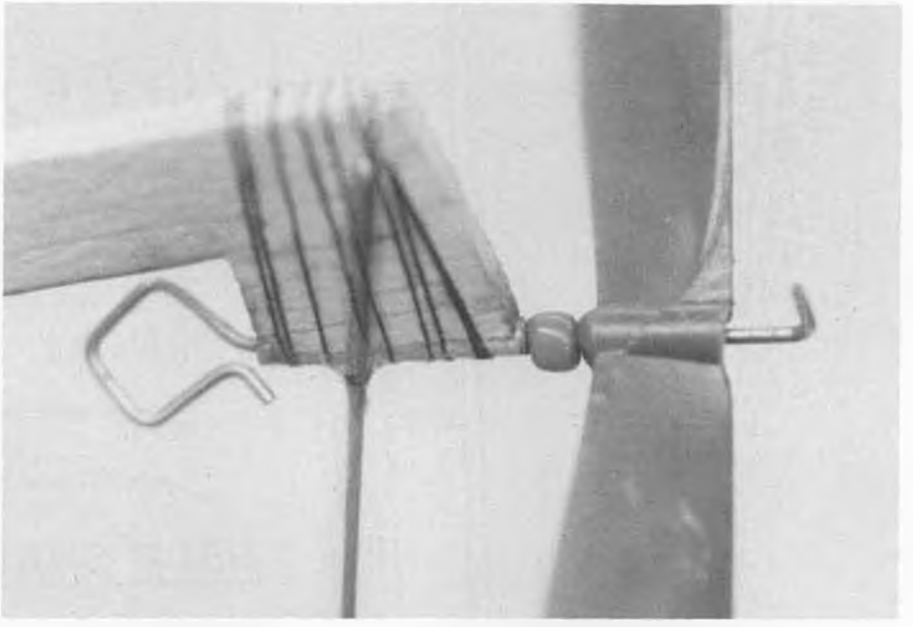


ber '87 *MB*, page 64, we had a drawing of torque reaction and the tendency of the model to roll in the opposite direction of prop rotation? Well, to counteract this, which makes the plane want to go left, we are going to point the propeller thrust a little to the right; just opposite. You will see on the drawing on the plan (page 3) that the aluminum tube is angled to the side. Make yours just like it shows. I have called out a 1/16-inch inside diameter (hole) tube. This leaves plenty of "slop" for a .031-inch prop shaft inside. That is to make sure it will not bind up on you. I have allowed for this looseness by adding just a tiny bit more angle on the right thrust. This will bother some good modelers who like everything to fit nice and snug. They are the ones you see changing prop shafts after every hard landing because their nice, tight fit binds up when the shaft gets bent even a little.

Gluing the aluminum tube on can be done with your Testor's (cellulose) cement, or with five-minute epoxy, where you mix the two parts, "A" and "B" together. The epoxy is stronger, but if you get any in your eye it can be disastrous. I have, on occasion, used "hot-melt" glue from a glue gun, and that works okay. Whatever you use, you will need to *rough up* the outer surface of the tube so the glue can get a grip on it. Use a file, your rough sanding block or whatever, but remember that rougher is better. While the glue is drying, keep checking the position of the tube as shown on the plan for sidethrust (right) and also make sure it sticks a little out in front of the fuselage so that the bead will not be rubbing against the "S" part.

SPLICING

Any time you need to join two pieces of wood, the more of an angle they have where they meet, the more gluing surface there will be. If you do not have a fuselage piece that is long enough, you will need to do the optional splice shown on the plan. I like to overlap the pieces to be spliced and cut down right though both at the same time so the angles will match up. If they don't, dress them a little with your sanding block. Double-glue (let the first coat dry) and put them together. Adding a few wraps of thread and rubbing glue into the thread will complete the job. A properly-made splice will be used for *repairs*. If you used cellulose glue to put on the prop-shaft-bearing tube, now might be a good time to give it an extra coat of cement. There is nothing more frustrating than having this tube come loose and slide backwards, stopping the prop! Don't forget the thread binding. Rub glue into the thread, too!

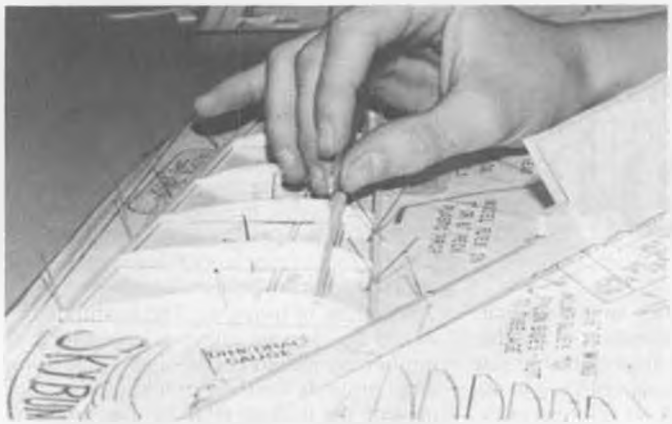


The Sky Bunny front end. Wind with thread as shown and use plenty of glue all around. Bind landing gear legs together underneath. Note bead position.

FINISHING THE WINGS AND TAIL FRAMES

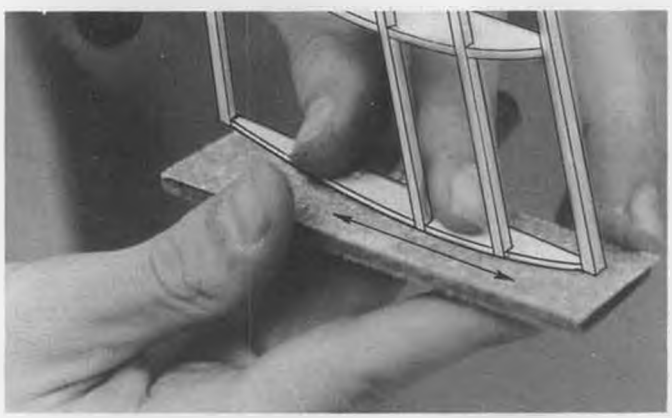
With your sanding block first, and then

Continued on page 80

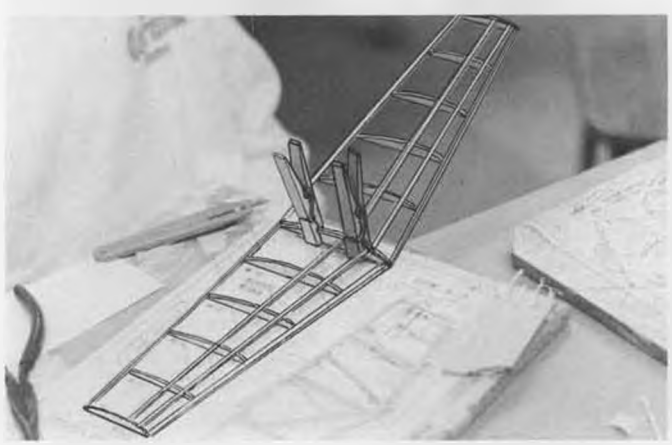


Fit wing spars after notching ribs in position with notching tool.

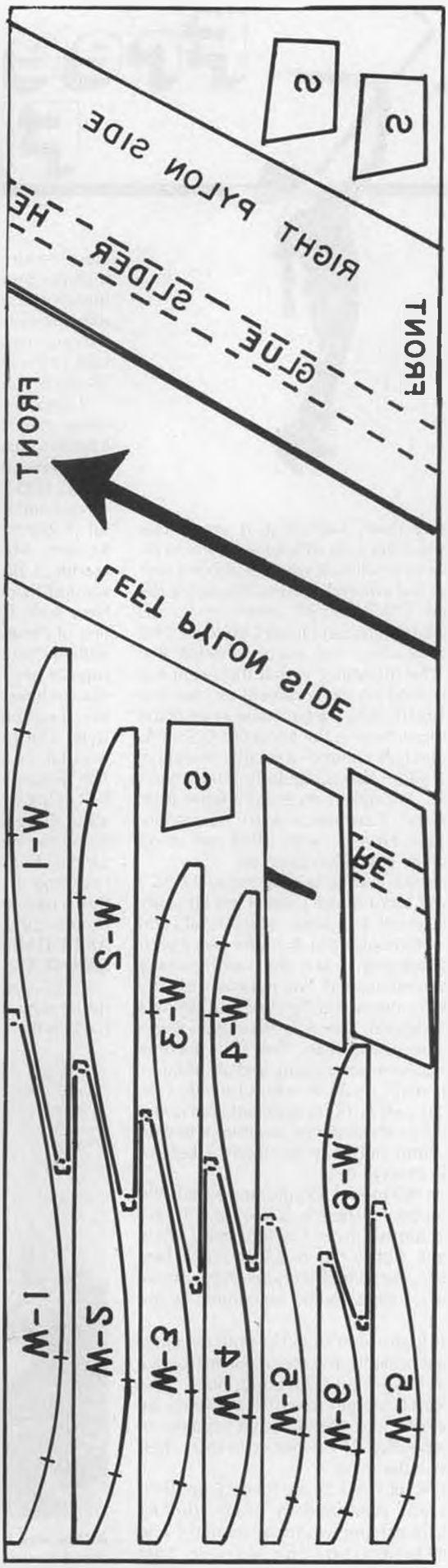
After laying down the L.E. with 'Xed' pins, trim each rib to fit the T.E. exactly. Then glue on the T.E.

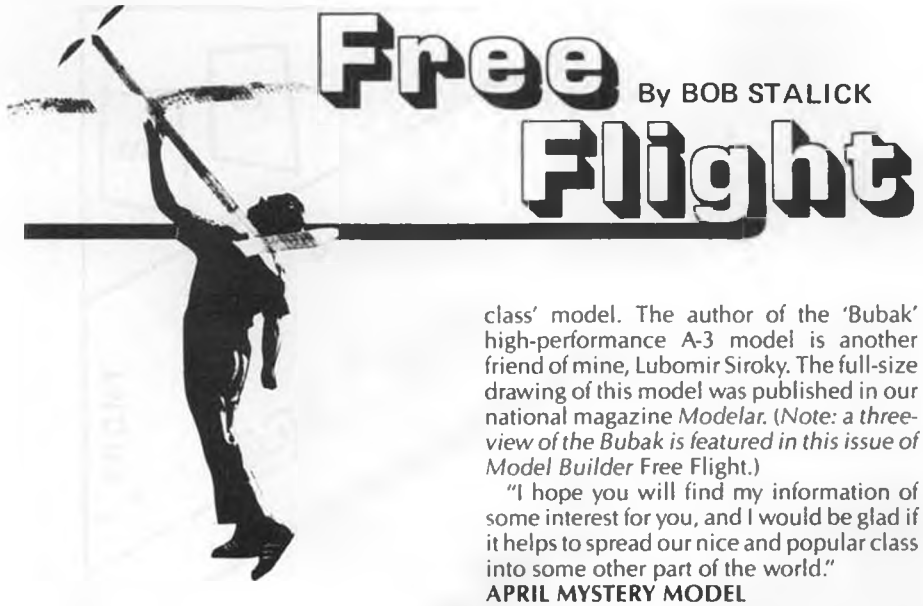


When the wing structure has dried, level up any overhangs before joining, and sand entire structure before covering.



Glue wings together before or after covering. Covering each wing separately before joining is neater. Doing it this was is fine, too.





Free Flight

By BOB STALICK

• Several times each year, it seems that someone comes up with a new event to pique our curiosities. It was just about a year ago that this column featured the newly developed Pee Wee 30 event as it was promoted by the San Diego Orbiteers. This month, another new event is being featured. The difference is that this event has been around on the continent for over five years, but it has just begun to be a part of the discussions here in the good old U.S. of A. The event is A-3 glider—a smaller version of the A-1 glider flown regularly in our AMA contests. Recently, I received a letter from occasional Czechoslovakian correspondent, Ivan Horejsi, who filled me in on some more details on the class.

Ivan notes that he read in the July (1987) issue of *Model Builder* about my curiosity with the event. He offers, "I feel I could add some comments, which might be of your interest because I live in the country where the class was created. I do not know exactly who is the inventor of the class, but I think it is not essential. The A-3s have been flown here for some five years. They have become very popular among young and old alike, as they are really fun both to build and fly. I am afraid they are not known outside our country and take this letter as an attempt to gain some more publicity for them. I believe they do deserve it.

'. . .an A-3 model is quite simple to build and can be finished in a few days. I have tried to furnish my A-3 with a small circle tow unit, but it did not work. The best choice is a simple offset hook. Anyway, we feel the CT units should be banned by the rules.

"Very high zoom launches with the offset hook are possible and the performance of a good A-3 is in the 90-second range. Anyway, the 60-second max has proven to be appropriate, as it allows even a beginner to be competitive. The experts can show their quality in the flyoff.

"The 'Rapid' A-3 by my friend J. Jindrich, which was published in *Model Builder* earlier, is extremely simple to build and thus the perfect choice for beginners. I am enclosing a drawing of a 'second end of the class' model. The author of the 'Bubak' high-performance A-3 model is another friend of mine, Lubomir Siroky. The full-size drawing of this model was published in our national magazine *Modelar*. (*Note: a three-view of the Bubak is featured in this issue of Model Builder* Free Flight.)

"I hope you will find my information of some interest for you, and I would be glad if it helps to spread our nice and popular class into some other part of the world."

APRIL MYSTERY MODEL

Now and then, a conscientious and helpful reader sends in a nomination for the Mystery Model. Such is the case this month. I offer you a strange design forwarded to me by Bill Colish of Harrison, New York. Bill notes that he actually built one of these things as a youth, powering it with a Spitzy .045. Flight pattern was a straight line with minimal glide. The ship did not have any special helium bags or the like, it was built in the usual stick-and-tissue style. The model article was carried in a popular modeling magazine of the time. The designer was well-known for his odd-ball flying ships. Now what do you do with all of these clues? Well, you just correctly name the model design and forward it to *Model Builder* magazine, attention Bill Northrop. If you are first in line, you get a free, one-year subscription of *Model Builder* for your efforts.

APRIL DARNED GOOD AIRFOIL—GRANT X12

C.H. Grant may have been forecasting the future when he put this section on paperback in the early days of free flight modeling. The Grant X12 is a more contemporary airfoil than any other section that I have seen published from the pen of Mr. Grant. The X12 has a seven-percent high point and a slight bit of undercamber. With the upswept leading edge, this section would be worth consideration for lightweight gas-powered free flight ships, such as any of the AMA gas classes. In contrast to other Grant sections, this one should be considered if you are looking for something new for that winter AMA Gas project.

A couple of thoughts: The leading edge would need to be either a large piece of lumber in order to get the upswept leading edge properly finished or it could be built up with the leading edge lumber set on its edge. Since the section is quite thin, it would pay to investigate webbed spars or a D box-type of construction as well. Good luck with it.

APRIL THREE-VIEW—THE BUBAK A-3 by Lubomir Siroky

As explained in the leader for this month's column, the A-3 class was developed in Czechoslovakia, and the Bubak is considered to be one of the most competitive designs of the class currently being flown. A-3 has established the following rules and are presented here for any reader who is interested in experimenting:

Total projected area of wing and stabilizer, 12dm sq. (approximately 186 sq. in.) with no wingspan limit; weight, 150gms minimum (approximately 5.91 oz.); towline length, 25m (or hi-start 25m line + 5m rubber); flights, 5 rounds with 60-second maxes.

You can see from the above rules that the models are quite small, with the wingspan of the Bubak just under 40 inches. Because of their size, they can be built practically anywhere and transported easily.

For the potential builder, the Bubak three-view has been presented in metric scale; however, the major large parts, rib patterns and fuselage front, are presented full-sized. If you will must, convert the metric scale to the English (American if you will) system of measure. Here are a couple of easy conver-

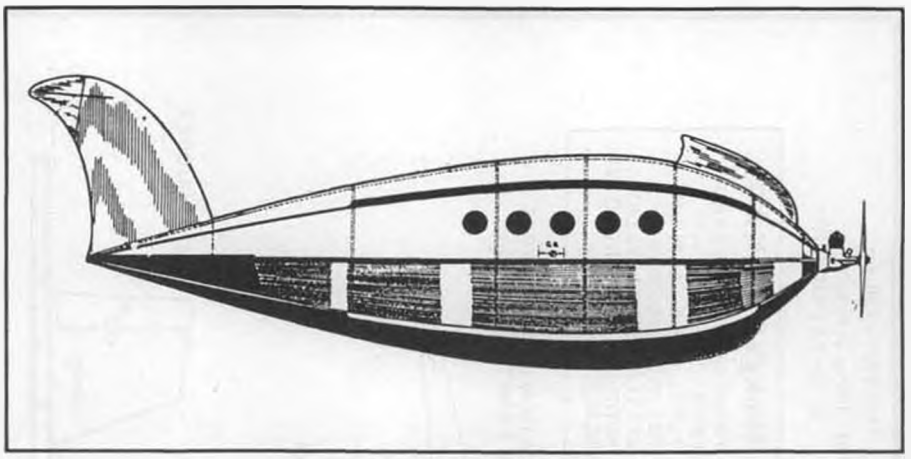
All the way from Czechoslovakia comes this photo of a trio of A-3 glider fliers. From left: correspondent Ivan Horejsi, Lubomir Siroky, holding the Bubak, this month's 3-view, and J. Smitka. Small ships, as you can see--or maybe the Czechs are very large men!

sions: 2mm wing ribs or other balsa parts can be substituted by 3/32-inch sheet. 3mm equivalents are close to 1/8-inch. Any metric measurement can be converted to inches by dividing by 25.4. Enough of this, let's get to the Bubak.

Review the three-view carefully. The surfaces are built in a very straightforward manner. Construct each wing panel separately with all spars completely installed. Install the wing wires where indicated by the + on the rib pattern. Use epoxy to adhere the aluminum tubes in the wing root. Since the model has tip dihedral only, sand in the dihedral angle where the tips join the main panel. Use epoxy to adhere the tips to the main panels. Cover both the wing and stab with a good-quality tissue.

The fuselage uses an 8mm (3/8-inch) basswood, pine, or hard balsa core. The rear end framework is made from 2mm x 8mm (3/32 x 3/8) balsa strip with uprights every 1-3/4-inch or so. Glue to the core and when dry, cover the entire fuselage with 3/32-inch medium "A" grain balsa. Sand to smooth section. If you decide to use a fiberglass tailboom as shown in the full-sized sketch, then the 3/32-inch balsa sheet cover only covers the core—not the boom.

After construction, add weight to the weight box in the nose until the ship balances at 50 percent. Add the towhook and other rigging as detailed. The model can glide to either the left or the right, so rig the autorudder to suit your particular tastes. Check the overall weight of the model. It must weigh 150 grams. If it is underweight, then add weight under the CG to bring it to 150 grams. If it is too heavy—build the next one lighter.



APRIL MYSTERY MODEL

Flying: Hand glide the model to determine glide. Raise the trailing edge of the stab if the model dives; raise the leading edge if it stalls. Turn is adjusted by autorudder offset. When satisfied with the glide, test-fly the model with a lightweight 25-meter line. Tow gently into a light wind. Move the towhook forward if the model weaves on the line; move the towhook back if it will not climb. Ideally, the model will climb straight ahead, and when overhead, you pull back on the reel to release the towline. After the release, check the glide for a 150- to 200-foot circle. Adjust the circle with autorudder. Good luck with the ship, I think it's a good starting point for small field towline glider—and worth the effort.

KEEPING UP WITH FREE FLIGHT AROUND THE WORLD

For free flighters who are interested in the world free flight scene, the premier magazine is *Vol Libre*. *Vol Libre* contains articles on all aspects of free flight—mainly in French, but also in German and English. It also contains a wealth of plans of models and details. Each issue contains approximately 60 pages 8.5 x 11.5 inches.

Now, *Vol Libre* is available via an American source. Send to Peter Brocks, 313 Lynchburg Dr., Newport News, Virginia 23606. The cost if $18 per year (6 issues).

AN OBSERVATION

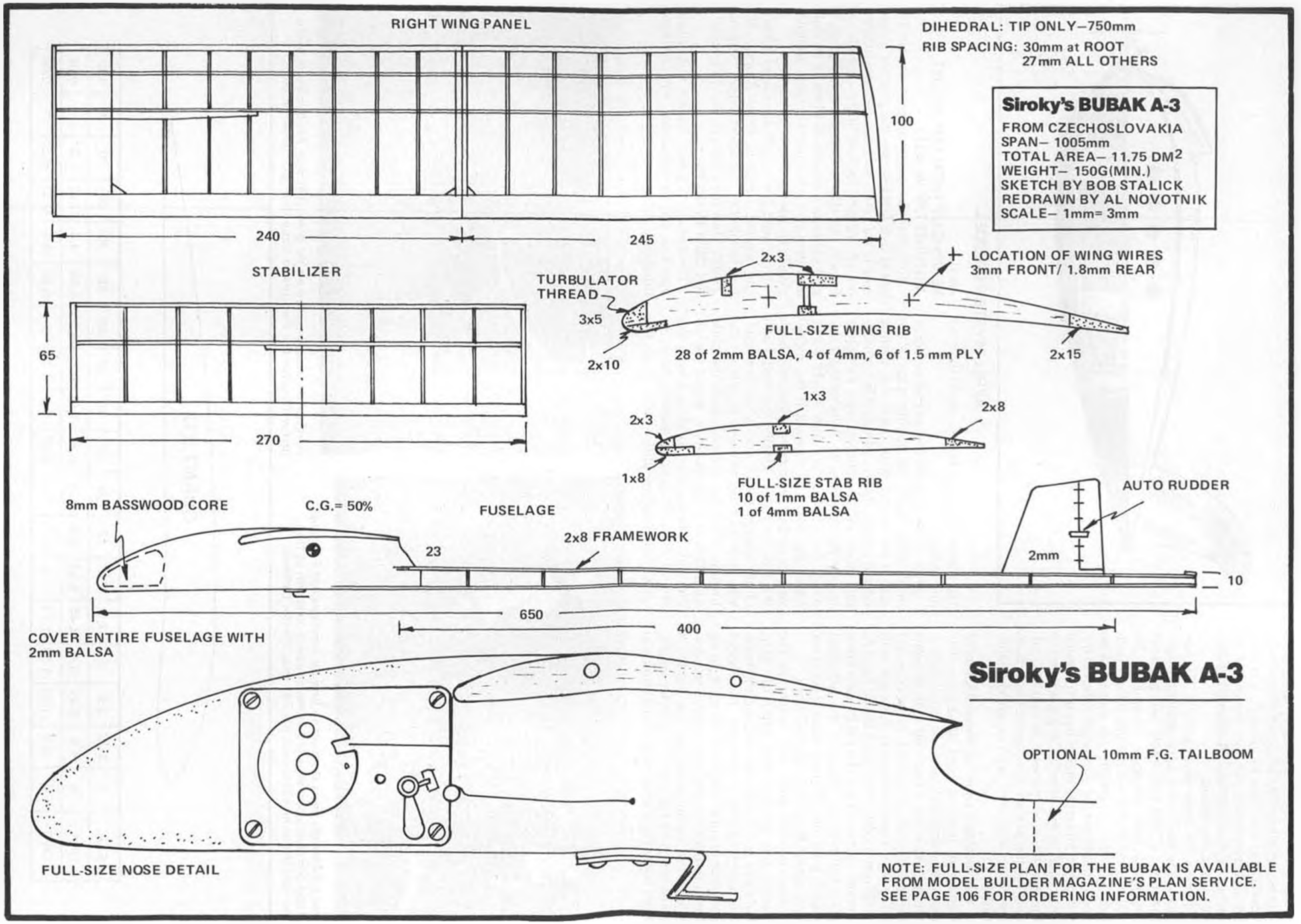
Hollywood is great. It's the only place you can buy a calculator with unlisted numbers.

Doug Galbreath peers skyward to find his just-launched FAI ship. Roger Simpson peers skyward in the opposite direction to find the right lift so he can launch his FAI ship. Photo: Dobbins.

Here's Walt Ghio, perched on the grass at Waegel Field in Sacramento just waiting for the thermals to come through. Photo: Dobbins.

GRANT X12

STA	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
UPR	0	1.6	2.47	3.6	4.47	5.13	6.0	6.6	6.87	7.0	6.87	6.33	5.53	4.4	3.13	1.6	–	0.04
LWR	0	-0.8	-1.07	-1.53	-1.73	-1.8	-1.73	-1.2	-0.87	-0.6	-0.33	-0.4	-0.53	-0.6	-0.47	-0.27	–	0.04


RIGHT WING PANEL
DIHEDRAL: TIP ONLY—750mm
RIB SPACING: 30mm at ROOT
27mm ALL OTHERS
100
240
245
Siroky's BUBAK A-3
FROM CZECHOSLOVAKIA
SPAN— 1005mm
TOTAL AREA— 11.75 DM2
WEIGHT— 150G(MIN.)
SKETCH BY BOB STALICK
REDRAWN BY AL NOVOTNIK
SCALE— 1mm= 3mm
STABILIZER
65
270
2x3
TURBULATOR THREAD
3x5
2x10
LOCATION OF WING WIRES
3mm FRONT/ 1.8mm REAR
FULL-SIZE WING RIB
28 of 2mm BALSA, 4 of 4mm, 6 of 1.5 mm PLY
2x15
1x3
2x3
2x8
1x8
FULL-SIZE STAB RIB
10 of 1mm BALSA
1 of 4mm BALSA
8mm BASSWOOD CORE
C.G.= 50%
FUSELAGE
2x8 FRAMEWORK
23
AUTO RUDDER
2mm
10
650
400
COVER ENTIRE FUSELAGE WITH
2mm BALSA
Siroky's BUBAK A-3
OPTIONAL 10mm F.G. TAILBOOM
FULL-SIZE NOSE DETAIL
NOTE: FULL-SIZE PLAN FOR THE BUBAK IS AVAILABLE
FROM MODEL BUILDER MAGAZINE'S PLAN SERVICE.
SEE PAGE 106 FOR ORDERING INFORMATION.

STILL ANOTHER NEW EVENT— NOSTALGIA IGNITION

With A-3 glider still in the mind, I noticed that the 1988 SAM Champs, which will be held on July 18 through 22 in Lawrenceville, Illinois, features the First Annual NFFS-Sponsored Nostalgia Championships. A full range of Nostalgia events is scheduled. Imbedded within the contest information is the notice that a Nostalgia Ignition Event is planned. Nostalgia Ignition, you ask? Well, sure; why not? It is the perfect crossover event for those of us unsure as to whether we are really old timers or on the cusp between the SAM folks and the Nostalgia movement. Nostalgia Ignition rules are simple, to wit: The engine must be an original ignition-type or replica thereof. Converted glow and diesel engines are *not* eligible. Recent production engines, such as Remco, Spielmaker's Golden Eagle, Morrill Hornet and Simplex, etc. are eligible. Fuel is to be gas and oil only.

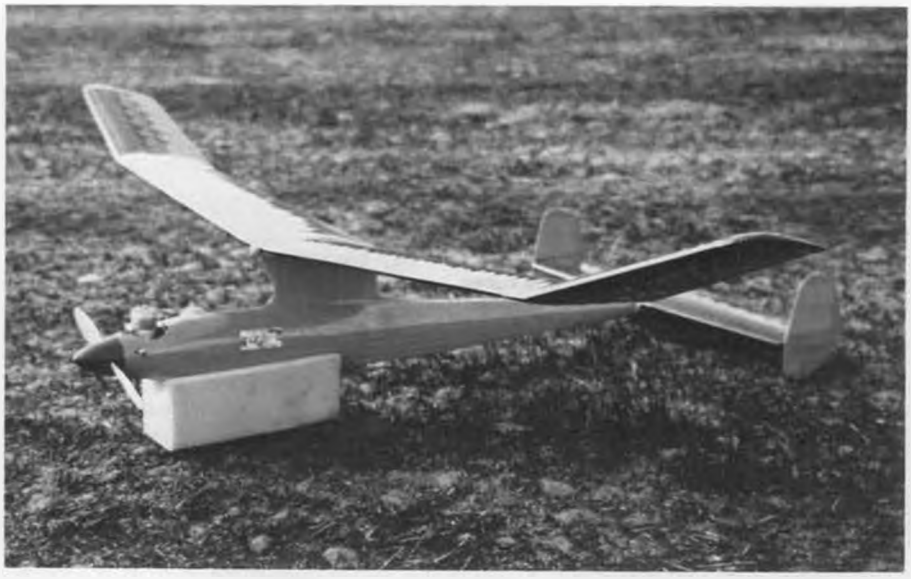
To be an eligible Nostalgia Ignition design, the model must show *only* an ignition engine on the plan or referenced in a published article. Models which show both ignition and glow installations such as the A/B Zeek and Civy Boy are *not* eligible. Models may not be scaled unless sizes are specified on the plan or article. A wing loading requirement of 8 oz./sq. ft. of projected wing area will be required. Motor run will be 16 seconds and models are to be hand-launched.

Further information about the Nostalgia Events at the 1988 SAM Champs can be obtained from Moe Whittemore, RR 1, Box 296, New Palestine, Indiana 46163. Send Moe a business-sized SASE with 39 cents postage for your free info kit.

Now, this is both a new event which really gets my juices flowing. Let's see, there's Hank Struck's Connecticut Yankee, Dick Korda's Champion, and I think even Goldberg's Cumulus and Denny Davis's original San De Hogan qualify. Time to start looking through those old magazines in search of the right design. Time to renew the membership in MECA in search of the right ignition engine. It's time to plan and build.

"Show me a man who laughs when things go wrong, and I'll show you a TV repairman."

Mel Chafin is a regular NWFF contest-goer since returning from a vacation from the hobby three years ago. Here he readies his Maria Coupe d'Hiver for a max. Mel won the Annual Coupe Perpetual Trophy competition. Photo: Bob Stalick.



George Oldershaw, Deadwood, Oregon, has had troubles with the model shown, but it's not because of mistreatment. Note the foam pad protecting the ship's front from the hard ground.

SPEAKING OF THE SAM CHAMPS, WHY WAIT UNTIL 1989?

As most of you who read John Pond's column know by now, the SAM Champs are scheduled to be held in Reno, Nevada, in 1989. The site of the event is Stead AFB. Now, the AMA is planning to host a "Fun-Fly and Convention" in Reno on June 24 through 26, 1988. The AMA will hold a free flight meet on the site of the 1989 SAM Champs, which is described in the AMA literature as a "new site north of Stead—a former drag strip in the middle of a mile-and-a-half square valley, with additional retrieval area beyond. The Free Flight site has already been called 'better than Taft' by several FF people who have tried it. There is currently a project underway to make it even better by cleaning sagebrush and marking bike routes for model retrieval." In addition to the FF events, which are not specified at this time, Control Line, R/C and other events are scheduled. Might be a good time for us West Coast types to try it out. Especially true if we intend to attend the 1989 SAM Champs at the same site. Better than Taft, huh? Might be worth a look!

Mike Slessor, from Vancouver, B.C. gets his 1/2A Satellite ready for a launch at the NW FF Championships. Photo: Stalick.

A WISE THOUGHT

The growth of wisdom can be accurately gauged by the drop in ill temper.

AN INTERVIEW WITH SAL TAIBI— HOW THE SPACER BEGAN

This interview was taped at the University of Nebraska dormitory by Jorge Triana during the Nationals. It was printed in the *Minneapolis Modeler*, the newsletter of the Minneapolis Model Aero Club.

ST: "I just finished a new Pacer. I gotta cover it when I get home. It's all framed up and wired and the engine in and the cowl on. All I gotta do is cover it.

JT: "What is the size?

ST: "It's sixty inches. It's probably 600 square inches. It takes a .35. Originally it took an engine called the Comet .35. The Comet .35 was built for Comet by Vivell. The only thing is when they stamped the bypass cover, instead of putting Vivell .35 on it, they put the Comet star, with the flash and the .35 on it. It's the same engine as the Vivell .35.

JT: "If you were going to build a Pacer today with today's engines, what would you put in it?

ST: "Oh, nothing bigger than .19 at the most. They've got so much power, you know. The Vivell .35 was a good engine, but it didn't put out the beans like ... you put a modern .35 in the Pacer, and I think you'd actually pull the wings right off it. So, I just put a Vivell .35 in it, I just finished it.

JT: "Can you tell me about the plane just be-

Continued on page 74

Control Line

By MIKE HAZEL PHOTOS BY THE AUTHOR

• Last month we were involved in a long journey into Jetmania land. Like any other technical piece, there is so much more detail that will not fit the space. One omission that I made was in regard to the spark source for starting the jet engine. Included this month is a diagram of the wiring arrangement for that.

As previously mentioned, this power source puts out a lot of voltage and can give you a rather unpleasant shock, although it is not harmful. The coil, battery, and wiring are best located in a non-conductive box so as not to be a hazard to the starting crew. If you will refer to last month's photos, take a look at the starting box pictured. It is fairly compact, has a handle for easy handling, and has a double switch setup. One switch is a toggle-type, which serves as a "safety," while the other is a momentary doorbell button. There are two external connectors so that spark leads can be quickly changed or disconnected as needed.

If you use a dry cell arrangement for six volts, make sure it is a high-quality battery. One of the alkaline-type lantern batteries works very well. In my starter box there is just room for two of these, so I wired a pair of them in parallel for long life and increased amperage.

Again, if you have any questions, I will try to answer them.

* * *

Each year at the AMA Nationals there are usually some extra control line events hold on an unofficial basis. Last year in Lincoln, special events were held for Carrier, Combat, Speed, and Precision Aerobatics. The Tidewater Nats in Virginia will have a Beginner Stunt event. Here's the official press release:

"The Marietta, Georgia, Sky Rebels CL club will sponsor an unofficial Beginner Stunt event at the '88 Nats in Virginia Beach. The event will be held at 9:00 a.m. Tuesday, July 26. Pattern and rules will be per PAMPA Beginner Pattern, *not* the AMA novice pattern as listed in current rule book. Entry is open to anyone not entered in any of the regular Nats CL Precision Aerobatics events, but the event director's discretion will be final concerning entrants who might be over-qualified. The intent is to offer an event to those not yet ready for Precision Aerobatics so as to stimulate interest in higher-level competition. Prizes will be stunt-oriented merchandise such as engines or kits. Copies of the PAMPA Beginner Pattern may be obtained by sending a self-addressed, stamped envelope to: Tom Dixon, 'Beginner Pattern,' 1938 Peachtree, Suite 401, Atlanta, Georgia 30309."

FAREWELL . . .

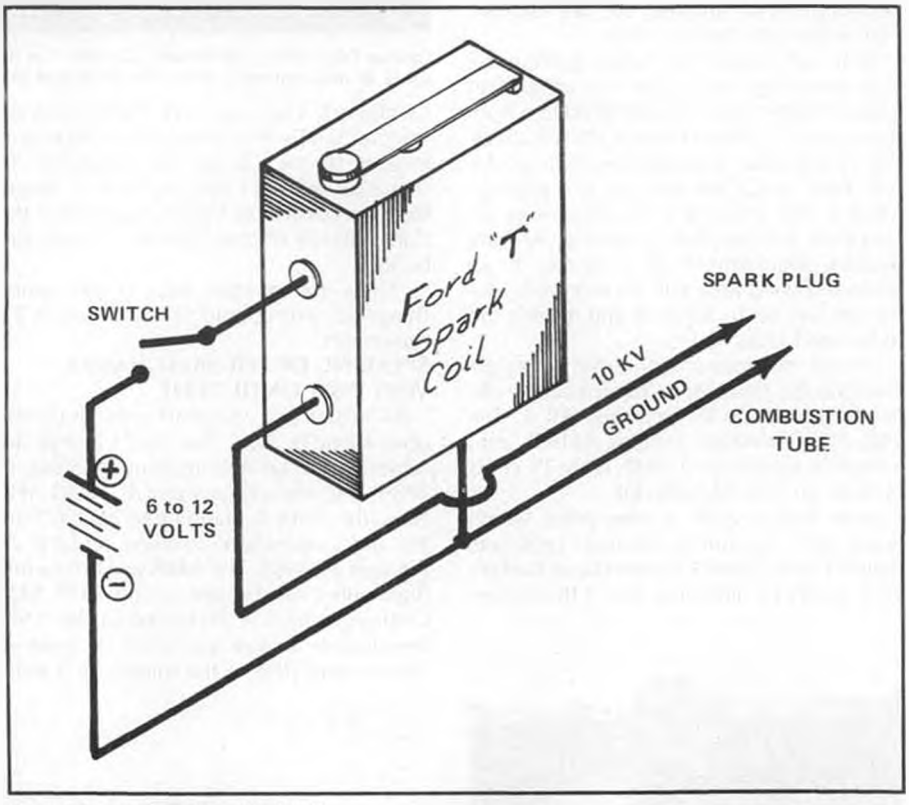
This is my last column in *Model Builder.* My first one was in the July 1983 issue, and here we are already in 1988! I can't believe that it has been nearly five years.

My reasons for hanging up the ol' columnist's hat and putting away the typewriter are rather simple. I do not like the term "burnout," as one does not like to be thought of in terms of being an ash. The creative writing juices have seemed to be a bit dry these days, which may be another way of saying that I've said all I have to say. Also the idea of doing most, if not all, of my modeling activities out in the workshop instead of in front of a typewriter sounds very appealing. I have so many back-burner projects that have accumulated that we had to get some more burners to put in the back. (Yeah, I know, dumb joke!)

Before I sign off, a few acknowledgments are in order, along with some recycled thoughts which will be summarized.

The first acknowledgement is to you, the reader. Thanks for your encouraging or otherwise expressive comments and suggestions.

Another very special group of people are the newsletter editors, who saw fit to send me a gratis copy of their club publications. Newsletter editors are usually unsung heroes, so it was always a pleasure to spread a little fame and glory in their direction. Here's another quick shot of fame and glory for you guys, the following are the newslet-



Jet engine spark source schematic.

Dimmit Perkins releases Steve Perkins' sport jet speed model. Pit crew was not identified.

Take two--they're small! Marty Higgs proudly displays a pair of 1/2A Snappers.

Neville Montagriff and Craig Sloan show off a spiffy-looking Omega old timer ship.

ters that have appeared for the last year or so:

Dope Bucket, edited by Laron Huddleston for the Utah State Aeromodelers, Salt Lake City, Utah.

Metrolina Control Line Society newsletter, edited by James Duckworth, in North Carolina.

Chicagoland Circlecutters newsletter, edited by Stuart Van Dorn, in Illinois.

Garden State Circleburners newsletter, edited by A.J. Knadle, in New Jersey.

Orbiting Eagles newsletter, edited by Bob Furr, in Nebraska.

Hangar Talk, newsletter of the Cholla Choppers, edited by Chris Peter in Arizona.

Aero Mail, edited by Cam Martin for the Norfolk Aeromodelers in Virginia.

The *Skywriter*, edited by Dave Mullens for the Seattle Skyraiders in the Washington area.

Last, and certainly not least, the *Hot Head*, edited by Chris Sackett for the Vancouver Gas Model Club in British Columbia.

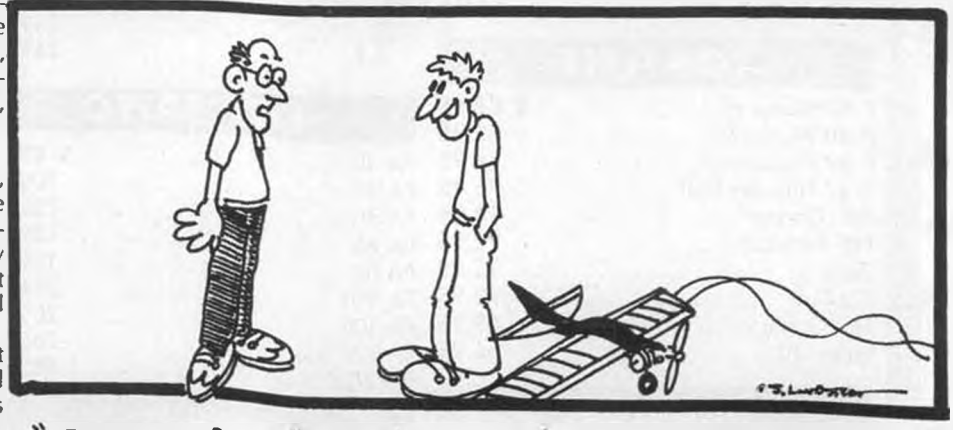
I hope none of the recent newsletters have been omitted here.

Many dozens of individuals have written in to share ideas, express their views on the control line scene, and in general served as a catalyst in keeping this general-interest column full of varied topics. While we obviously cannot list everybody, there is a special small group of individuals who have been very helpful in providing information, as well as photographs on numerous occasions. My sincere thanks to: Tom Dixon, George Lieb, and Frank Williams.

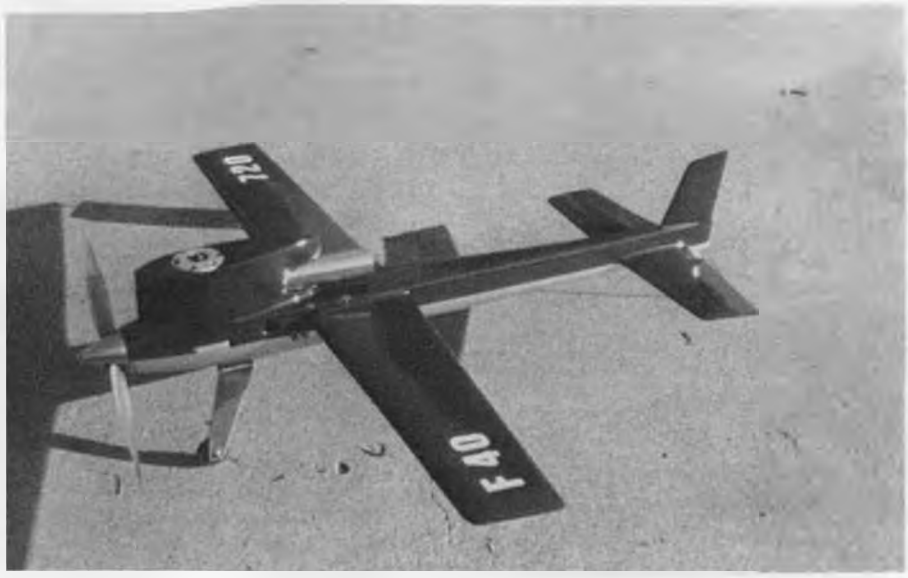
Now for some other thoughts. . . .

Control line modeling will always exist, but at what level of participation? I have preached before on the subject of CL "invisibility" as it relates to the hobby industry not recognizing us as a significant market share. (We use a lot of generic and so-called "RC" products in our operation.)

Bucks are what it's all about, but that shouldn't surprise anyone who has perused the slicko full-page ads extolling the virtues of an almost-ready-to-fly five-hundred-dollar wonder. I have read letters from manufacturing and distributor reps who repeatedly chant that there is "little call for CL," or there is no market. Let the truth be known that they are simply not interested in anything but pushing big-ticket items that are more profitable *short term*. I suspect that if a bellcrank could be sold for a hundred dollars, all of a sudden the industry would "discover" the market. Another truth be known, markets must be made. To state otherwise is a cop-out. In all fairness, there are some larger companies like Fox and Sig, who cater to all types of modeling persuasions and budgets. They will be around for a long time because they approach the market on a long-term basis, servicing and supplying a



By Steve Lindstedt



George Lieb sent in this photo of his fine Formula 40 speed ship. Landing gear is titanium.

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wide base of modelers.

The control line ranks must stand up and be counted. Unfortunately, many of us aren't there at roll call. The R/C ranks are very visible, not only because there are more of them, but also because they are much more oriented to club membership. Control line folks on the other hand, tend to be lone wolves, diminishing the "strength in numbers" presence.

Back to the bucks thing. A few months ago Bill Northrop wrote an editorial reply to a disgruntled reader who thought that CL coverage was insufficient. He suggested that maybe some plan of action could be put together which would document the buying power of the CL ranks. That sounds good, but in reality would be hard to pull off. May I suggest that at the minimum, every CL modeler let his local hobby dealer know that the purchases made are for CL. But don't stop at your local dealer. Many of you, no doubt, do some business with the R/C-oriented mail-order houses. How about letting them know as well?

May I also suggest that we be positive about all of this. Being negative or bitter can only typecast us as a minority market that is not pleasant to deal with. Support your local hobby dealer first, offer input as to what sells and what doesn't.

What about the manufacturers? Again, please be positive and not too acidic with your criticisms. Thank the industry members that offer CL goods; the others you can encourage their consideration.

Now let's get on the AMA's case! First of all, the AMA offers lots of great things for the CL modeler, the Nats, the insurance benefits, and a magazine that offers consistent CL content. However, it sure looks like things are geared mostly for the R/C guys. Sure, the AMA should have worked in behalf of the R/C interests for new frequencies, but what has been done for CL *lately*?

This is another area where your voice needs to be heard. Please be informed as to what's going on, and offer your comments to the appropriate AMA officer or representative in your area. Don't forget to keep the perspective that you *are* part of the AMA. By the way, another little handy hint: when you mark off your interest category on the membership application, do not check "general interest." That will no doubt be interpreted as meaning "helicopters and giant scale." Check only CL!

There is a lot more to say on this subject, but let's wrap it up here. In summary, please do your part to perpetuate our great sport by always keeping control line in a positive light by your words and actions.

Please give the next control line columnist your support, and I hope to see you on the flying field.

Keep your lines tight . . . Mike Hazel. •

Big Birds. . . . . *Continued from page 25*

cause even I use the stuff.

EASY STARTING

From Crash Evanson out in the wilds of Minnesota comes a tip on how to make gas engine starting a snap. According to Mr. Crash, he and his band of renegades depend on WD-40 for those almost instant starts. He swears that it works every time, although his experience has been limited to two-cycle gas burners only.

TWO NEW BIGGIES

Just got through rummaging through two new kits; Great Planes Super Sportster 90/120 and Sig's Spacewalker.

The 90/120 is the latest of the Super Sportsters, and, although it's not a great BIG Bird, its 72-inch span does sorta put it into our category. I've seen a few of the 60-size SS's fly, and they appear to be an excellent choice for that first low-wing plane.

The Spacewalker sorta reminds you of the Flybaby and the Wimpy 'cause it's got that '30s classic homebuilt look to it. Now this is a real BIG Bird; she somehow crams 1800 squares into a meager 104-inch span.

Both kits appear to be very complete and include comprehensive instruction/building manuals.

Check 'em out at your favorite hobby shop.

ACCESSORIES FROM SIG

A few new products from Sig that should delight BIG Bird builders.

The first, Wheel Pant Mounts, come in two sizes to fit 3/16-inch and 1/4-inch diameter wire landing gear. The sketch shows how simple and installation is. Just bolt the mount on the inside of a wheel pant, and then slide the pant onto the landing gear wire along with the wheel and a wheel collar. Then tighten the wheel pant mount set screw to hold the whole assembly in place and the wheel collar set screw to hold the wheel on the axle.

The second item, a Heavy-Duty Tiller Bar, is perfect for cable-operated (pull-pull) control systems.

And the companion product to the tiller bar is the new one-piece rudder control horn.

Sig points out that, "Both the tiller bar and rudder horn are molded from super-

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tough nylon for long life and trouble-free operation." All three of these new products are included in the Spacewalker's very complete hardware bag.

THOUGHT OF THE MONTH

All things being equal, a fat pilot sweats more than a thin one.

Al Alman, 16501-4th Avenue Court East, Spanaway, Washington 98387; (206)535-1549. Most parts of the country should be having decent flying weather soon, so make sure that your battery packs are up to snuff. If they've been forgotten during the winter, be sure to cycle 'em through a few times before you fly. **BE SAFE!** •

Inside Engines. *Continued from page 18*

the test engine is that the two front engine mounting holes are drilled about .020 inches off center, towards the exhaust's side of the engine. It's darn little to be wrong with a top-performance engine.

MEASURED PERFORMANCE

(Readings are after break-in and with Master Air Screw props and 10-percent nitro fuel with one ounce of castor oil added. The supplied muffler is installed for the following readings.)

Prop Size	Low Speed	High Speed	Speed Range
9 - 6	2300	15,300	6.6:1
9-1/2 - 6	2200*	15,200**	6.9:1
10 - 6	1850	14,100	7.6:1
11 - 6	1700	11,900	7.0:1

*without muffler = 2500
**without muffler = 15,500

Prop Size	Low Speed	High Speed	Speed Range
9 - 6	2300	15,300	6.6:1
9-1/2 - 6	2200*	15,200**	6.9:1
10 - 6	1850	14,100	7.6:1
11 - 6	1700	11,900	7.0:1

*without muffler = 2500
**without muffler = 15,500

A speed range below 4:1 is unsatisfactory.
A speed range of 4:1 is barely satisfactory.
A speed range of 5:1 is average.
A speed range of 6:1 is excellent.
A speed range above 6:1 is superb performance.

The Fox 40 Standard #24096 is manufactured by Fox Manufacturing Company, 5305 Towson Ave., Fort Smith, Arkansas 72901; (501)646-1656. The retail price of this engine at time of testing was $79.95. •

Cox E-Z Bee. . . *Continued from page 29*

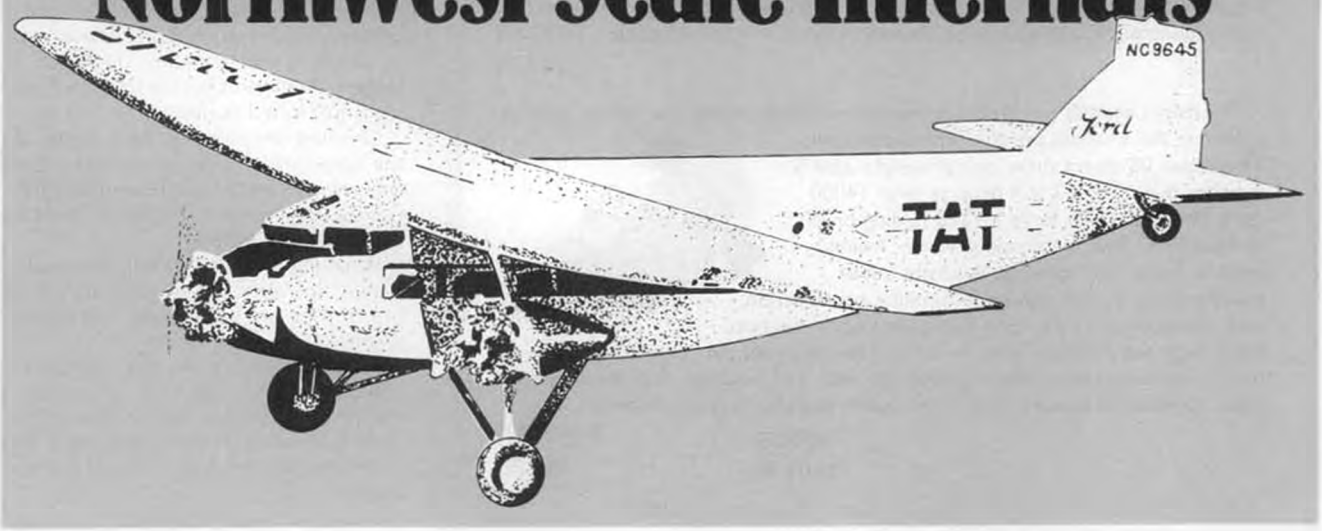
lowing flight instructions.

WIND CONDITIONS

Your E-Z BEE is a beginner's airplane and is designed to fly in calm air. It should never be flown when the wind velocity is too high. To check acceptable wind velocity, and attach the colored frequency ribbons to the top of the transmitter antenna. Extend the antenna and set the transmitter down with the antenna extending upwards. Notice the angle at which the wind is blowing the ribbons. If the angle between the ribbons and antenna is more than 45 degrees, the wind is too strong for you to successfully fly your E-Z BEE. The calmest conditions are usually found during the early morning and late evening.

The first flight of my E-Z BEE took place while on vacation at the Trapp Family Lodge in Stowe, Vermont. Plenty of wide open spaces, but did I go to these places? No. I chose the area out in front of the guest houses; a nice open space, but it had a few trees. The Bee was taken outside in a few inches of snow, the glow plug clip put on, fuel put in, a snap of the prop and the .049 came to life. A gentle hand launch and Bee was on its way to a memorable flight. The rudder works very well, and the elevator keeps the model flying smoothly. Once the engine runs out of fuel the Bee Goes into a gentle glide and it responds to all your com-

Silverwood, Idaho Welcomes The U.S. Scale Masters To The Northwest Scale Internats



It is perhaps the Northwest's most prestigious scale competition.

Where scale hobbyists the world over will gather for a single three-day event, to vie for top honors in every scale class. Expert. Giant. Sportsman. And team. They'll all be represented—by some of the best in the world.

The Northwest Scale Internats.

June 17th, 18th, and 19th. This year held at Silverwood, Idaho (formerly Henley Aerodrome), and the Farragut State Park. Sponsored by the Farragut Flyers, the Coeur d'Alene Aeromodelers, and Silverwood, Idaho.

U.S. Scale Masters

For those who take their scale aircraft modeling seriously. And also for those who just enjoy seeing expert enthusiasts displaying their proudest achievements in the beautiful setting of one of North Idaho's most unique communities, Silverwood, Idaho.

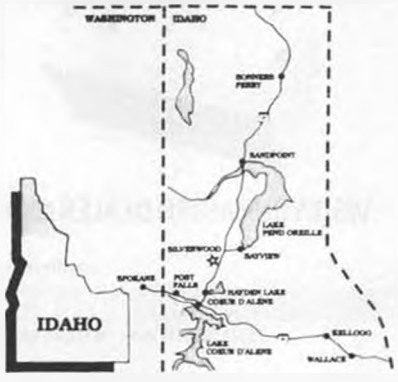
Nestled amidst the rugged Idaho Rockies, Silverwood showcases the grandeur of a perfectly reconstructed turn-of-the-century mining town—complete with its saloon, fine eating establishment, and shops that are guaranteed to bring back memories of a bygone era.

There will be more than twenty antique aircraft on display, and rides in everthing from vintage airplanes to Silverwood's very own stagecoach and narrow gauge railroad.

So plan to attend, whether you compete or not. Static judging will be held on June 17th from 10:00 to 4:00 at Silverwood, and the flying competition is scheduled for June 18th and 19th at nearby Farragut State Park.

A special banquet will be held in honor of the competition Saturday, June 18th at Silverwood, and overnight camping is available at Farragut for self-contained vehicles.

Silverwood, Idaho



Silverwood, Idaho and the Northwest Scale Internats. Without question, the premier scale event of the season. We'll see you there.

For more information or entry materials, contact Paul W. Parks, Contest Director, 4200 Woodland Drive, Sandpoint, Idaho 83864, or telephone (208) 263-2045.

mands. Well, the model was on its way down, and I was sure I had everything under control. I took my eye off the Bee for a minute and, you guessed it; a tree reached out and grabbed it! It took a little doing to get it back to earth, but no damage at all, and in a few minutes, E-Z BEE was back in the air. This time the flight was perfect, even the landing; as well as the six other flights that day. The model has been flown many times since the tree incident and each time has made very successful landings on the ground. Many people have tried the E-Z BEE and everyone has been impressed with its flight abilities. Now the second servo has been added, and it's even more fun to fly. The Cox way to get you into R/C is certainly the way to go. •

Pattern. . . . . *Continued from page 41*

and have watched rules change to fit new equipment and logically, equipment change to fit or maximize new rules.

The singular goal that was apparent, up till now, was design/equipment changes to permit large straight-line maneuvers that were literally strung out on a straight wire—slow rolls—four points—eight points, etc. The ideal model was fast and generally very clean to permit the high reving engine to build maximum speed before entering the maneuvers!

Retracts, high rpm engines plus props, tuned exhausts, very accurate servos, super clean aerodynamics all evolved to accomplish this goal. The singular change in new rules (FAI) that alters the design requirements is that the model no longer is allowed to accelerate to maximum speed before starting a maneuver.

So then, rather than absolute speed, the new goal is to be able to control speed. The model must accelerate, decelerate, fly slowly or fast—depending on weather (wind) conditions.

One of the fist approaches was to use geared-down, high rpm engines to swing big props—it worked pretty well, but the models were usually slower than desirable, especially in steady high winds. Too much speed variation; upwind vs. downwind.

The next shot was the four-cycle engine. The real problem here was that some of these engines were too difficult to handle for many modelers. The new ones are real performers and much easier to use. In order to control speed, many designers built large, light models but the drag on these designs just killed performance.

The best bet seems to be a model about the same size we presently have. The big difference? Get rid of the weight! Now we can use the engine to produce lots of thrust at any speed desired.

What about retracts? Well, they really enhance the appearance of many designs, but, if they are heavy, you may regret the results.

Super duper servos and radios? Good resolution and absolute reliability are desirable. And if you have to buy a "better" radio to get these features, then do it. Again, go for the exponential feature if you can afford it.

If you, like many modelers, live in a part of the country where you are the only pattern flier for miles around, you may wonder how well your own model fits the criteria for a good FAI model.

Here are some guidelines: 1. The model should be very easy to fly with no twitchiness. 2. You should be able to fly along slowly and then by increasing power, do a vertical climb and roll, then an Immelman turn with little or no loss to the model's speed.

Ideally, you should be able to do a vertical roll up at a constant speed that appears faster than a vertical roll down over the same distance.

We have found that the real factors that count here are low weight and an engine that has much raw pulling power plus a very slow idle that does not "windmill up" on vertical dives. Now its up to you to decide which equipment you buy to accomplish these goals. Just remember light, quiet, and reliable is the wave of the future. •

Free Flight. . . *Continued from page 63*

fore the Starduster; The Spacer?

ST: "The Spacer. The Spacer was something that I designed for Bill Baker's California Model Company. He had a guy who wanted to kit a 1/2A model. And, believe it or not, this guy had a 1/2A model that was sheet-covered; it was cap-stripped on the wing and tail. The body was square, covered with sheet. It was heavier than hell. He had a sad Atwood in it, and it wouldn't even

take the power of an Atwood. And it was small. It was only 180 square inches, and I told Bill, 'You know this airplane is obsolete right now. It might have been a good 1/2A five years ago with the Holland Hornet, but not any more, not with the new Cox engines. It's obsolete.'

"I told Bill to give me two weeks, and I'll design something for you, and we'll go out and fly it. So, I designed the Spacer. We went out to a racetrack two weeks later when I got it finished, and we flew it. And it just flew beautifully! We used a Cox Thimble-Drome engine, and it had a tank on it about 1-3/4 inches long internally threaded. So what we had to do was put an outlet right on the bottom of the tank, and then drill and tap a 4-40 hole right in front of the needle valve fitting. We modified every one that we used—it was a hell of a good engine.

"Bill, I guess, sold thousands of Spacers. And then I designed the A-B Spacer for him. That airplane at one time held all the national records, all of them in Class B. Then I got out of it with Bill; he bought me out. And I was doing nothing at all until I saw Jack Green's high-thrustline model fly. I don't remember the name of it, but it was designed by Jack Green of Mishawaka, Indiana. It was never published, but he was flying it. I said that it had good potential. I liked the layout, but his airplane was too complicated. He had a double-tapered wing, ellipse tail, and the body was too hard to build.

"So what I did, I took the Spacer wing and tail, and I designed a fuselage which became the 1/2A Starduster."

PUZZLER

What is it when two yuppies are involved in a fender-bender? A Saab story!

LIDBERG'S PLANS SERVICE ANNOUNCEMENT

Just received a note from Al Lidberg. Seems that some folks who have tried to contact him have had their mail forwarded to a nonexistent address in California. Be advised that Al still lives in the same place he has lived for 15 years. It's located at 614 E. Fordham, Tempe, Arizona 85283. If you are one who has written to him asking about his exquisite plans and haven't heard back—either be patient or try again at the above address. Hope this helps both Al and you.

AND SO ANOTHER MONTH PASSES

This article is being written just as the Christmas holiday reaches its highpoint. Obviously, you are reading it at the beginning of spring. I hope that this is a good free flight year for you with plenty of exciting competition. Most of all, I wish you good friendship and stimulating activity in all that you do—on the field, in the workshop, and in all your endeavors. And, if you do manage to take along the camera to those competitions, take a few pictures of the action. Send them to *Model Builder* Free Flight for instant fame and recognition. Your friends will appreciate it; so will it. Until next month, catch a thermal for me. •

Electric Power. *Continued from page 39*

makes testing very easy. I prefer direct drive for 1/2A models, and the Cessna came with a gear drive. However, the change to direct is so simple that there is almost nothing to it. I enlarged the hole in the cowling for the prop driver since the prop sits lower with direct drive. A balsa block at the rear of the motor mount sets the thrust angle of the motor, and that's it! The cradle mount supplied with the Cessna is very versatile, I can mount any size motor from an 020 to an 05 in about a minute with rubber bands. This is the other reason I use the Cessna for my testing!

I have seen other MRC Cessna 172s that

do not have nearly the performance that mine has, and that is really too bad, since this is such a fine plane. The plane in "stock" configuration has a handicap; it uses a glass fuse with an inadequate fuse holder and substandard wiring. I strongly advise you to replace all the wiring with good wire from Jomar, or SR, or Adams, or use the high-flex wire used by offroad cars. Replace the fuse and fuse holder with spade lugs and the plastic automotive fuse; 15- or 20-amp is a good value. You definitely see an increase in performance, I like the Lambda charger from Tower Hobbies (TG1126, $69.99). An 800 mAh six-cell pack from Astro or a 900 mAh pack from SR Batteries will give you another jump in performance. The Cessna has a mount for batteries under the fuselage (in the open), but I never use it; I put the batteries inside. There is lots of room inside if you use servo tape to mount the servos. Don't use a servo tray, it just adds weight anyway.

The last hop up that I recommend is to put in a direct drive 05, a 6 x 4 or 7 x 3.5 prop is about right. Modify the plane as described earlier. The 05 really gives an increase in performance, better duration, climb, loops, and wide rolls. You have a glorious selection of 05 motors, thanks to the offroad car revolution. I recommend any offroad "stock" motor, most cost $25 or less. I like the ones that use pigtail brushes and the clockspring-style brush springs. Have fun!

Lyn Perry sent a wonderful batch of photos of the Clarence Sailplane Society fun-fly in East Aurora, New York. These guys are obviously having fun! If you are in the western New York area, I would definitely contact them. Lyn Perry, 123 Park Place, East Aurora, New York 14052, is the club secretary. The planes represented at the fun-fly included Goldberg Electras, Gentle Lady, Malibu, Drifter II, Playboys, Viking, Lanzo Bomber, and the Great Planes ElectriCub. The oldtimers carried the day, they had an advantage in the windy (16 mph) conditions with Ron Kirk taking the high time of 17:21 with four motor runs on his Leisure Playboy. Very good! As an aside, I have heard nice reports about the ElectriCub. A friend of mine watched one fly, then promptly went and bought one! He says that it will fly very well from hand-launch on just six sub-C cells and will take off from grass on seven cells! This is with the Thrustmaster motor that is supplied with the plane, and the prop that comes with it. His impression was that the Thrustmaster motor puts out more power than the usual 05 motor. He is now yanking hard on my arm to get me to build one and put floats on it. But where do I get the building time? Busy, busy. Thanks, Lyn, for the great photos!

Photos are the life blood of a column, and I really do appreciate all of you being so generous in sending them. Any photos (color or black and white) are just fine, with the exception of Polaroid, which just doesn't reproduce well. •

Simply Scale. . *Continued from page 15*

Another popular mounting method is, of

course, to use a commercially available radial mount made of aluminum or plastic and sized to fit the engine. The benefits of these are obvious, as it makes short work of mounting the engine. These mounts must be drilled and tapped to attach the engine and are then bolted to the firewall. Some of them can even be drilled to accept nose gears. They have the added benefits of allowing minor thrust adjustments through shimming, they leave the tank compartment unobstructed, and they permit the engine to be easily shifted to position the spinner accurately to the front of the plane. There are times though when such a mount may not work out. This may be the case when an engine installation is too tight to allow room for the mount. I had such a problem when I built my DeHavilland 86B model. Because of the limited space in the cowlings, it was necessary to devise a compact radial mount for the O.S. .20 engines. A simple backplate mount was made for each engine from a square piece of 1/4-inch aluminum. The piece of aluminum was cut out of a sheet using a hacksaw so that it was a little larger (by about 1/4 inch all around) than the backplate of the engine. The 1/4-inch backplate was then marked and drilled to the exact pattern of the backplate bolts. The holes were then countersunk so that the backplate bolts would fit down flush into the mount. Longer backplate mounting bolts were sourced to allow for the extra metal they must pass through. The mounting plate was drilled on the four corners to accept 4/40 mounting bolts, and the backplate and mounting plate were then installed onto the back of the engine. The new mount and engine were then bolted to the firewall of the plane.

This mounting method has not failed in years of flying the model and should work with virtually any two-stroke engine. It takes nearly no space at all, and it is light in weight.

I have been asked many times how to calculate the center of gravity of a new original scale model for which no kit or plan is presently available to refer to. I have found through the years that there is one reasonably reliable, unsophisticated, and fun method of doing this. I usually start by looking through my piles of old magazines for construction articles on similar designs and noting where the CG is located on them. This will give you a ballpark estimate from which to start. Next you make a drawing of a reduced version of your model. Sometimes you can even utilize your scale three-views. Next you construct a scale profile model with the exact planform and angles of incidence of the wing and tailplane. You can now go out to the backyard when the neighbors aren't looking and have a ball trying out your test model to discover the best CG for stable flight at those scale incidence angles. When you have established the CG location and you are tired of flying your test model (or if you break it), draw onto your plan the point at which the profile model balances. Now measure ahead of that point five percent of the chord and you have a very good starting point for your model's CG. It works very well, especially if you have an unusual subject you are modeling.

The profile test model also has the added benefit of showing you if your tail surfaces will be large enough for stable flight. It is a very worthwhile exercise. After all, even the designers of full-size aircraft don't trust all their calculations and computer designs until they have tested their theories on a model.

Well, that's all for this month. By the time you read this, it will probably be spring, and flying fever will have hit our area. I only hope we all got the building time we need to keep us in planes for the summer. Keep those letters and photos coming in, and, until next time, keep it simple and keep them flying!

Steve Gray, 39 Ebydale Dr., Kitchener, Ontario, Canada N2A 3N7. •

ARFs. . . . . *Continued from page 13*

and it was no surprise when the overall highest score was turned in by Jerry Kitchen, flying his ARF EZ Christen Eagle put out by Hobby Shack. This is a 1/3-scale model that has been around for a while, but to see Jerry fly it with his smoke system in full operation is a sight to behold! For power, Jerry used an O.S. 300 twin four-stroke, a recent change from the Saito 270 he used previously. Jerry has always been an outstanding scale competitor, and at this time he is flying ARFs almost exclusively. I asked Jerry if he had any special hints or shortcuts he used in assembling his model, or if he beefed up the structure in any way. "No," Jerry insisted, "I just put them together exactly according to the instructions, and I fly them completely stock." Other ARFs entered included another EZ 1/3-scale model, the Bud Laser, flown by Larry McDougle, another highly respected West Coast competitor. Larry feels the Laser is a better plane for pattern-type maneuvers than the Christen Eagle. Compared to the Eagle the Laser tracks a lot straighter and truer and is somewhat easier to fly. I also asked Larry if he had any special proce-

dures or tips he used in assembling his models, and the only deviation from instructions he followed was that he likes to use various types of Devcon epoxy products instead of the adhesives supplied in the kit, probably because of a better working knowledge with a product he has been using for a long time.

Other ARFs included an EZ FW 190 with an O.S. .90 four-stroke, another EZ FW 190 with a Magnum .45 two-stroke, an RPM Piper Cherokee powered by an O.S. .61 four-stroke, and an RPM Cessna 40T running a tuned pipe. Even a couple of "foamies" were entered, one by Robert Moore, age 14, who flew a Sure Flite Cessna three-channel with a Super Tigre .15 for power. This was his first contest ever, and Robert managed to place third in the "Student" class. The CD was John Haggart, and, for a first-time experiment, it was a great job.

Let us pause and take note at this point that this was not truly an ARF contest. What really is important here is that for the first time ARFs were given some degree of recognition as an acceptable type of model when it comes to organized competition. While it is obviously not intended that ARFs eventually compete in World Scale events, at least some effort is being expended to determine exactly in what way ARFs can be used in the lower echelons of scale contests. Further, we are still waiting to see a contest limited exclusively to ARFs. Not that I object to pitting ARFs against standard models in the same competitions, but in order to truly come into their own, ARFs must one day develop their own flying events. If your club is getting into any type of ARF flying event, please let me know about it.

One interesting aircraft was entered in this contest that was on display for the first time to the R/C flying community. John Greenshields of Hobby Shack showed up with one of the prototype Ryan PT-19 ARFs which are about to be announced at any moment. This model is the latest in the EZ line of warbirds (if you consider a military trainer to be a warbird), and it really looked quite realistic with its yellow and blue color scheme and those snazzy red and white stripes on the rudder. The landing gear strut treatment was unusual in that the bare wire treatment was not in evidence. Rather, the plane sported scale-type struts with oleos that could pass for functional ones. The model was powered with an O.S. Surpass .48, which would seem to be a perfect choice. But in actuality, it seemed to fly the plane much too fast for a two-holer trainer. I suppose you can always throttle back or go to a lower pitch prop. The plane flew straight and steady just like all the other EZ warbirds, and seemed to have plenty of maneuverability. I predict we will be seeing plenty of these at our local fields, powered with anything from .25 to .90 engines!

We are planning many interesting articles for our future columns, so all you ARFers (and potential ARFers) don't miss out! •

Ramblin'. . . . . *Continued from page 47*

MB: "Why?

Les: "Well, the extra cost of carbon is a factor, and the extra stiffness of carbon just isn't needed for scale.

MB: "Plus it also bends crankshafts!

Les: "Carbon is a lot more brittle so if you have a nose-over in a paddock (their 'orse-stryl-yun name for "field") like this you might break it. The worst a glass prop might do is splinter a tip a bit.

MB: "Please tell us how many countries your props go into.

Les: "I have no idea. America, Australia, New Zealand are good markets, also Pacific Islands, Sweden, Norway, Germany, Hong Kong, South Africa. I don't have a clue as to how they go so far!

MB: "Are you undercambering your blades? How do your designs evolve?

Les: "That's a big curly question, that one! A lot depends on what the prop is used on; some of our control line speed props are highly undercambered, others are low in camber and semi-symmetrical. Normal props, not made for a specific purpose, are mostly flat-bottomed Phillips-entry airfoils that are semi-symmetrical at the root and the tip. The root does no work. The tip does no/little work generally, so if you can cut the drag down in those areas, it helps. The snag comes when you realize the tip determines how well the piece of prop next to it works, and the same for the root. If you get the root wrong and the tip wrong too, you may as well not have the bit in the middle!

MB: "The *prime* aerodynamic purpose of washout is usually *not* understood by model builders. They'll tell you it inhibits a wing from tip stalling, which is *not* correct.

The true purpose of the geometric twist (washout) in a lifting surface is to reduce lift to near zero at the tip where aerodynamic drag is the highest. As lift is reduced to zero, drag is reduced to near minimum. The surface sort of becomes an infinite span without a dragging wing tip. Are you washing out your new successful helicopter blades?

Les: "No, they're straight.

MB: "Same for most full-size helicopters; but lately I see they're starting to use washout.

Les: "It's almost/totally impossible to tell what a helicopter rotor blade is doing, and it's the same with propellers. The only thing you can do is suck and see.

MB: "Suck and see?

Les: "Yea, Stu, that's Australian for try it and see how it works.

MB: "Who's your competition?

Les: "That's a hard one, really. There aren't many people who do what I do. In Australia there are probably 20 to 30 people who make fiberglass props, but they'd only do a dozen a year, just for themselves mostly, except for a fellow in Sydney who probably makes 50 to 100 a year.

MB: "How many might Bolly make a year?

Les: "I have no idea. I guess it's in the thousands.

MB: "What age are you, Les?

Les: "I'll be 29 in a few days.

MB: "Congratulations! As a manufacturer you're pretty durn young. What'd you do before props?

Les: "I worked in a bank for a while—totally boring, uninspiring. Guess who else works in a bank, me wife! I spent a bit of time as a maintenance man in a hotel, stuff like that. I've been an active modeler since I was knee high to a grasshopper. Modeling's where it is. Stu, there *is* competition out there, but it's specializing in areas. Germany is making props for electrics, and there are makers for control line this and that. One area being long missed is for big R/C props. Most are only copying wood, and they're only getting rubbish, not really good products.

MB: "Les, it's interesting to talk with you here on the other side of the world from home. I think the *MB* readers will enjoy your philosophy. What's in the future for Bolly?

Les: "A difficult question. Probably a lot more of what we're doing now. We really can't automate any of our prop manufacturing. (*Carbon and glass fiber prop production parallels radial tire making. There's a tremendous quantity of skilled hand lay-up work before curing—Stu*) I design our own props, make our own molds, train our own people. We're hiring slowly and sales are growing nicely.

MB: "Les, many thanks for talking with the *Model Builder* readers." A stamped, self-addressed envelope mailed to Tom Dixon (he also advertises here in *MB*) will get you a full listing of Bolly props as well as the specially produced Merco engines he imports. For you readers in the southern hemisphere, write to Bolly, 11 McKinley Street, Elizabeth Downs, S.A. 5113, Australia. The new line of Four-Bladed Bolly props is an eye-opener. Also, *R/C Report* ran a prop survey in 1987, and the Bolly blades sure scored well.

BACK TO THE NATS

The indoor events of the Australian Nats drew the largest (150 to 200) spectator crowds, and they *applauded* the flights! Something I've not seen in my 50 years of model building/flying.

USA's *Model Builder* magazine has a bigger impact on Australian National contests than Bill Northrop knows about. In August 1979 *MB* published a cute little Hangar Rat R.O.G. rubber job for *indoor* flying designed by Harry Barr. So the indoor section of their Oz Nats features a Hangar Rat contest in addition to their regular indoor events. It's a one-design endurance contest (kits can be bought at their Nats for $5 and whatta bargain they are). This was a small Nats, but it drew 26 Hangar Rats, and our own *MB* columnist John Pond placed a mighty second and brought to the USA a prize plaque from Oz. John, we're proud of you!

Next month we ramble across a section of Australia's "outback" to reach Sydney. Stay with us, 'cuz lots happens. We'll talk with Gordon Burford about model engines too.•

Hey Kid. . . . . *Continued from page 59*

with some fine sandpaper, (220- to 320-grit) go around and even up all the parts so none

stands out above its neighbor. Tissue will *not* cover up poor workmanship. It will just make a lot of wrinkles which will point at *exactly* what is not taken care of before covering! If something breaks while you're doing this "evening-up" good! Better now than after its covered! Inspect closely for poorly glued joints and give them what they require.

An airfoil shape does not have a piece of square 3/32-inch sticking out in front and in back, so now is the time to round those to blend in with the camber of the wing ribs. This is most easily done with your sanding block, with the piece you are sanding right up to the edge of your building bench. Don't sand it *too* much, or you'll take its strength away.

You can glue both right and left wings together now, which will make for a nice strong glue joint, or you can cover them first, which will make for a nicer covering job. Whichever you do, just make sure you measure the proper dihedral angle, which will come to four inches under the high wing tip with one wing flat, or two inches under each tip. The spars and the L.E. and T.E. ends should all touch the opposite part, or strength will be lost. If the wing does not come out to the right match, or if the dihedral angles are wrong on the root ribs, cut the parts involved loose (or brush acetone or dope thinner on them to loosen the glue) and make them right before proceeding.

I mentioned why dihedral was a help in maintaining lateral (side-to-side) stability back in the November '87 *MB*, but it's worth repeating. You fly your model in a turning pattern. This is easy to do, because the propeller is spinning and wanting to turn the model anyway. But mainly, a straight-line flight will mean you will probably fly right off the field (or into the wall if you're in a gym). Instead of catching and staying in thermals outdoors (those rising "bubbles" of warm air coming up from the warming of the earth), you'd fly right through them! So you turn. But when you turn, not having a pilot to make corrections, the wing on the inside of the turn develops less lift, allowing the plane to slip towards the ground in a sideways spiral. By making the wing tips higher than the roots (W-ls), as the wing drops on the inside of the turn (it's slowing down, while the outside wing is speeding up) it gets closer to the horizontal, which gives it *more* lift, while the outside wing, by going higher, *loses* lift automatically. Imagine a wing in a vertical position as having no lift at all, and the closer the wing gets to being straight up-and-down, the less lift it will have. The dihedral is *very important* to the pilotless free-flight model, and although the pylon side area will help straighten the model up in a sideslip, dihedral in the wing itself makes for an excellent-flying model.

Another effect of dihedral is to think of how the airflow will "see" the model in a sideslip. The "inside" wing will have a "sideways angle of attack" to the relative wind (airflow "coming from" the direction in which the plane is slipping). This can be still air, but as the model is moving, it gives the effect of "blowing" toward the model. In a sideslip it will pick up the low wing (see "sideslip" diagram).

I know that some of you will be so persuaded by the above paragraphs that you will think, "If a little dihedral is good, a whole *lot* will be great!" Well, before you add *more* than called for in the plans, just remember that every bit of dihedral is purchased at the cost of some lift. If you get so much in that both wings point straight up, you'll have a "road warrior" instead of an R.O.G., as it will certainly not "Rise Off Ground." Also, the more dihedral you put

in, the less effective the vertical tail or "rudder" is in keeping your model flying straight. Too much dihedral will give you "Dutch Roll," a condition in which your model wags its tail from side-to-side! The cure is a bigger vertical fin or less dihedral.

Too little dihedral, that is, less than the amount shown, can get you back into a sideslip condition. A smaller vertical fin can help, or redoing the dihedral to the proper amount will be even better if you miss it the first time. I know there is always the temptation to change things about a model that you don't like. All kids like to experiment, and that's good, but realize that most of the features that have been designed into a model have a purpose, and to change any of them on a whim is to ask for trouble. I once took the muffler off a motorcycle I owned because I liked the noise and thought it would go faster. Guess what? It went *slower*! The designers knew more about what that engine needed for maximum performance than I did. Change things on the models you make, but only when you understand the principles involved. I have had dozens of kids who have left the dihedral out of their models over the years, and not a single one of them flew worth beans.

Some of the more adventurous among you will doubtless cover and finish your models now. Next month, we will go over some of the best ways to do this. We will also try our hand at bending music wire, an art which has driven many strong men to the brink. We will talk about dope (model), shrinkage, and finishing tricks. Then we will cover the relation of the center of pressure to the center of gravity and wing incidence, things which may help you early birds understand why maybe your models did not fly!

Materials and kits for this series are available from *Peck-Polymers/Beginners*, P. O. Box 2498, La Mesa, California 92044. Send a SASE for a list. Their full catalog is $2 or free with your first order.

Well, gang, until next time remember that famous quote by an unknown modeler many moons ago, "If at first you don't succeed, read the instructions." See ya' next month! •

Plug Sparks. . . . *Continued from page 34*

Master: Piper Cubs.

8. Glues they use.
Hacker: Mucilage.
Builder: Super glue, epoxy.
Expert: Cyanoacrylates in three viscosities, aliphatic resins, four different epoxies, contact cement, and has a relative in the chemical industry.
Master: Makes own glue from celluloid and solvent.

9. How they fly them.
Hacker: Crashes on takeoff.

Builder: Crashes on downwind turns.

Expert: Only crashes when it is someone else's fault.

Master: Knows better than to fly them.

READERS WRITE

Lescher Dowling, former newsletter editor of SAM 21 still is active and taking photos of interest. His latest, Photo No. 10, shows Marvin Miller at the Pond Shop (SAM 21 meeting place) with a beautiful Al Pardocci "Air Warden." For the benefit of those not aware of Marvin's activities, he is presently sorting out the match plates to the Anderson Spitfire, the result of purchasing the production molds from Karl Carlson.

At present, Marv has no complete engines, but he says 1988 will see the first productions. Not sure if he is going to produce the honed piston or the ringed piston version first. Regardless, both will be excellent running engines. No address is given, as he is not ready to withstand an onslaught of orders. Patience, men!

SAM 3

R. J. Mikkelson sends in Photo No. 11 showing two 1946 Wakefield winners, the Jaguar, as designed by Evans and flown by Roy Chesterton. Seen are Graham and Karl Hatrak with their versions of this unusual Wakefield design.

Photo was taken at Mile Square Park, which is about the only area left to fly any form of free flight for the Los Angeles-area modelers.

CLEVELAND BALSA BUTCHERS

Matt Basta, 3204 W. Main St., Marion, Illinois 62959, sends in Photo No. 12 showing Harvey Steadman and Dick Korda with their control line models in 1941. These old prints, taken in the Cleveland area, show the design of Korda's model was quite similar to his free flight "Champion" as kitted by Cleveland Model & Supply. Note the oval-planked fuselage powered by an Ohlsson 23.

Harvey Steadman was a fighter pilot in WWII. He was shot down and killed in the European Theatre. We did receive three photos, all of the Cleveland Balsa Butchers model club, but selected only two.

Not shown is Mike Morrell. Mike and Dick were really close friends and Steadman was quite a loss. The last of the trio was Milan Kasenda, seen in Photo No. 13 holding his original scale-like model. Finished all white, the model had an absolute gorgeous paint job.

Of course, as Matt says, Milan was always meticulous about all his models. The free flight models reflected the same care and worse of all for the competition, flew as good as they looked.

SAM 29

Thanks to "Bo" Buice of the Planesman Chapter No. 29, we have Photo No. 14 showing one of their lesser-known members, Fred Wolfe, of Ft. Worth.

Fred is holding an excellently built Scientific Mercury seen at the recent SAM Champs held at Seguin, Texas. For those who think this design is not competitive in radio control, this model flies just great. Matter of fact, quite a few kits were made up of this design.

SWEDEN

Once again, we are indebted to Sten Persson for Photo No. 15 showing Nils-Olof Gustavsson with a 1938 Magnusson Wakefield. This photo was taken several years ago at the Swedish O/T Championships.

This design by Bjorn Anderson, appeared in Frank Zaic's 1938 Year Book as flown by Anderson and Stark in 1937 Wakefield Champs. Powered by sixteen strands of 1/4-inch flat brown rubber, this model literally whistled off the ground. The models were good enough to place sixth and eighth. Just shows you, the race is not always to the swiftest.

SAM MEMBERSHIP NOTICE

There has been a considerable amount of mail directed to this writer for SAM membership. It has been suggested that a notice be posted in this column that for membership in SAM, please write to Bob Dodds, Secretary-Treasurer, 209 Summerside Lane, Encinitas, California 92024.

Bob has been doing an outstanding job and any help in writing direct to him would eliminate tiresome exchange of mail and speed up membership service.

***POPULAR SCIENCE*/ZAIC FOLLOW-ON**

After making the statement that only three model designs were published in *Popular Science* under Frank Zaic's name, Peter Mann of Guelph, Ontario, took this writer to task by going through his collection of *Popular Science* magazines ranging from the mid-twenties to the mid-forties.

In all, Pete found that Zaic had 26 articles or notes published between August 1936

and August 1943. Pete sends in this list of model airplane projects:

Gas, Miss Science; *Indoor,* Microfilm model; *TL Glider,* all pine; *Wakefield,* Fred Bowers 2nd pl.; *Rubber Outdoor,* Thermal Hunter 8/36, Utility Special 4/37, Contestant 9/37, Experimenter #3 8/38, New Thermal Hunter 7/39, Minute Man 6/41.

Peter also reports the Banshee .60 engine (designed by Barrett) is very close to completion. When George gets over a bout of pneumonia, engines should start making their appearance to customers and to this writer. Look for an early write-up.

THE WRAP-UP

Instead of an obit notice this time, we are featuring a "comeback" story about Roy Hutchinson, 16350-55A Avenue, Surrey, B.C. V3W 5A8, Canada. It has been quite a few years since this columnist has heard from Roy, and it is indeed a pleasure to run Photo No. 16 of Roy and his Buzzard Bombshell on Bunch-type floats. Roy has this to say:

"Long time since I last wrote you. I've moved from Edmonton to Calgary to Vancouver over the last nine years. I have had a few bad years with deteriorating health. This has taught me to look after myself!

"First I threw my cigarettes away over three years ago and am now on a diabetic diet. Have lost 18 pounds "payload" over the last few months (I fly much better with a lighter wing loading). My medication is minimal, as I am now at one-third of what I used to take. Now I'm back to building!

"Had a great time at the various water Fun-Flys with my Buzzard Bombshell employing Bunch-type sled floats (my design). For power I used an O.S. 40 four-stroke. Great model to fly.

"I've now got an Ehling Contest Winner on the board. Ain't it great to be alive!" •

Hannan. . . . . . *Continued from page 49*

specifically for just that. Then be patient, a lot of us are pestering them. It sometimes takes a while to get an answer.

"While research is never really finished, you must finally make the decision that you have enough to go on, and begin the design. The documentation presentation should be assembled first, then the aircraft designed to conform with that presentation.

"Now then, please accept my most heartfelt 'thank you for your help' and my most sincere apology for not responding directly and privately. I hope to be of assistance to someone, sometime, much as you have been to me, now. Keep 'em looking good, and keep 'em flyin'."

NO SUCH ADDRESS?

If you may have tried to contact plans purveyor Al Lidberg without success, be aware that some of his mail has been addressed to a nonexistent location in California! The correct address is: A. A. Lidberg, 614 E. Fordham, Tempe, Arizona 85283. A preaddressed, stamped return envelope will bring you his current list of scale and sport model designs.

PITY THE NEWSLETTER EDITORS!

Among the most important members of any organization is the newsletter editor. According to Jim Alaback, who carries that title for the San Diego Aeroneers, he is more often the *author* of the newsletter, not the editor, since members seldom provide anything to edit.

Some of our best material originates from club newsletters, which are remarkable in their variety, style, and coverage. Most of these are the work of a single dedicated individual, and feature inspiration articles which deserve sharing with broader audiences. For example, here are a few extracts by editor/author Tom Arnold of the *San Diego Scale Staffel*:

"I never could understand some fellows who go to a contest, see a beautifully detailed aircraft, and announce how depressing it is. As if someone else's skill somehow takes away from their efforts. They moan how they'll *never* build something so finely crafted. Chances are, with that attitude, they never will." Continuing in a philosophical vein, Tom writes: "Let's take a look at planes and men, so to speak, and see what should be occurring. At the bottom of it all, we have to accept the fact that there is absolutely no logical reason to build stick-and-tissue models. Our wives have impressed that on us all long ago. So since there is no 'useful' reason we pursue this madness, it must be for sheer fun. Some neurons in our brains have short-circuited in a pattern to give us intense pleasure at gluing balsa, and seeing sun shining through translucent tissue." Isn't that poetic and refreshing? The message seems clear: Appreciate all the hard-working newsletter editors. Better yet, why not supply them with some of *your* thoughts to edit?

MORE PHILOSOPHY

Model builder Herb Kelley, of Yucca Valley, California, notes: "It's a funny thing, peculiar, the way projects overlap. One nearly completes one when another just as fascinating comes along." Herb also sent in a summary (source unknown) of why reading is more rewarding than watching television: "Books are quiet. They do not dissolve into wavy lines or snow effects. They do not pause to deliver commercials. They are three-dimensional; having length, breadth, and depth. They are convenient and completely portable." We hasten to point out that *Model Builder* magazine also fulfills all these fine points!

SECRET WEAPON?

Fulton Hungerford, famous for spoked wheels, once considered a way to extend the indoor flight duration of a Gee Bee R-1: 'Keep it ridiculously light. Before flight (while winding, for instance) hold it in a jig which supplies a very slow flow of helium somewhere near the rear of the fuselage, allowing the air and/or helium to escape out the nose-plug hole. Tests with a six-inch cube of condenser tissue proved that helium would lift the tissue, three feet of string and three paper-clips (spaced evenly along the string). After two minutes the first paper-clip was resting on the floor; after four minutes the second clip was on the floor, etc. The helium diffuses out through the condenser paper, but its 'half-life' in a cube appears to be two or three minutes—which is good enough for a Gee Bee." Hungerford points out that contest rules specify a "man-carrying heavier-than-air craft," but they don't mention the possibility of a lighter-than-air gaseous boost: "As I see it, it might go over once, and then some killjoy would pass rules outlawing it. Anyhow, it would be interesting to try. Think about it!"

ANOTHER "30"?

Speaking of rules, Tony Naccarato of the Burbank, California, Black Sheep Squadron reports his club has tested a new event. Intended to promote electric-powered sport planes, the idea is to encourage relatively simple entries. Key provisions are:

Model Specifications: Projected wing span, 28 to 30 inches; minimum weight, 60 grams with batteries; propeller, must be commercially available plastic type.

Electric Motor Systems: Ferrel Enterprises; M.R.C. system as found in foam

model kit #IS01 (the model itself does not qualify); V-L HY-70; no modified or rewound motors; only two 50 mA batteries allowed.

Flight Score: An official flight is 40 seconds or more, a max (maximum) is 3 minutes. Six attempts are permitted to achieve three official flights. If three max flights are attained, succeeding flight maxes are increased by one minute, with flyoffs continuing until the contestant's model fails to reach the duration limit for that flight. Only one attempt is permitted for each flyoff flight.

At least five commercially available kits qualify under the rules, including the Peck-Polymers One Night 28, Micro-X Hornet P-30, Pharris Models Potent P-30, RN Panda and Blue Ridge Square Eagle.

If this event works out as well as expected, it may join the popular P-30 rubber-power and Pee Wee 30 gl?? Dick Johnson, of Dallas, Texas, sent us a three-view drawing of a homebuilt aircraft called the Sea Hawk, and asked us if we noticed anything unusual about it. Apart from the fact that pusher amphibian biplanes are not exactly common place, we didn't find anything out-of-the-ordinary. Some days later Dick's "solution" arrived: The three-view drawing was the work of Jeana Yeager, copilot of the Voyager!

FINAL LANDING

On that subject, the globe-girdling Voyager has recently been enshrined in the National Air and Space Museum in Washington, D.C. The 108-foot wing span craft, suspended at an angle in the south entrance hall, is a snug fit in the building, and required some 32 hours to install.

How appropriate that the Voyager should have a final resting place in the same facility as the Spirit of St. Louis! •

Clipped DC-7. . *Continued from page 27*

caused a delay; and more often than not, one or the other did.

It was this Sky Sleeper that evolved into the DC-3, the transport destined to become standard equipment on every airline in the world; an aircraft that would roar, creak, flex, and groan its way into the hearts of thousands of pilots. Over 10,000 militarized versions of the DC-3 were built by Douglas during the years of the Second World War. Those military transports hauled equipment, towed gliders, delivered airborne troops, and supplied Allied forces in every part of the world.

When war erupted in 1941, Douglas had just started production of the four-engined, tricycle landing gear (all previous DC-series planes had been tail draggers), DC-4. Over a thousand were built for the military, and a few more as commercial airliners after the war ended. It was mostly the military versions, converted into 41-passenger airliners, that were used by airlines to link the principle cities of the world in the early post-WWII years of aviation.

Larger and faster than the DC-4, and with the first pressurized cabin, the DC-6 took to the sky in 1946; first as a military transport, and then as an airliner capable of carrying up to 85 coach passengers. The ultimate piston-engined airliner, and the last Douglas non-jet airliner, was the DC-7. She could carry 58 passengers in the all-first-class version, and about 100 passengers in all-coach configuration. There were 1,041 DC-7s built in three models. The first was introduced in 1953, the longer-range DC-7B in early 1955, and the even longer-ranged DC-7C in late 1955. There are only a few DC-7s still flying. Like most air-weary and antiquated old air-

craft, the majority have been gutted of all usable parts and turned into aluminum scrap. Fortunately, a skilled and dedicated aircraft enthusiast is making certain the DC-7 will be saved from total extinction by painstakingly reconstructing the forward cabin of one.

Our story starts on the night of April 8, 1980, when a DC-7B slipped from the night sky and landed on desolate grasslands in Pasco County, Florida, to unload a cargo of marijuana after a nonstop run from South America. The heavy ship became bogged down in the rain-soaked ground and was abandoned. A few days later, after being discovered by the authorities, she was freed and flown to a small airport near Tampa. This poor old abandoned DC-7 languished in dead storage for several years, during which time the drug smugglers were apprehended. In 1982 the plane was sold as salvage. The buyer had completed stripping her and was about to start disassembly when Dick Vosburgh entered the picture.

Vosburgh is a former pilot who loves all airplanes, but especially old ones. Despite progressive immobility due to an industrial accident, Dick continues to do all he can to help preserve vintage aircraft. Since he can no longer get out and crawl around a plane, he takes great pride, and properly so, in the flawless reconstruction of old aircraft components, and in creating replica instruments and other parts to be used on static display museum aircraft. His skills are extended gratis to nonprofit organizations dedicated to preserving aviation equipment and related memorabilia.

With the assistance of family, friends, and a local aircraft recovery organization, the forward section of the DC-7B was moved to St. Petersburg where it was attached to the Vosburgh home. The entire cabin was in extremely decrepit condition. Every instrument was missing, as were most of the panels and switches, the pilot's pedestal, all seats, and hundreds of other parts big and small. Over the three years that have passed, Dick has been able to scrounge some original parts like a stripped pedestal and a pair of seats, but the majority of the cockpit area has been reconstructed from stuff most folks

would call junk. The whole thing is a mockup of course, but it is all so expertly done that about any old DC-7 jock who crawled into the left seat would have to study things for a while to realize that what he was looking at was not real; that every instrument and switch was a replica.

The first step in accomplishing all this was to request assistance from the aircraft information director at the McDonnel Douglas Corporation, who very kindly responded by providing photographs and technical assistance that Dick has found invaluable. To give you some small idea of the work Vosburgh has put into this project, consider what is involved in the duplication of a single instrument. First, usually working form a considerably smaller than life photograph, Dick draws up a scale pattern of the instrument. Since he has only the most basic of power tools, the instrument bezel is pretty much hand-fabricated from scrap plastic and painted. The instrument face is cut from discarded cardboard shipping tags, the clear instrument covers from old plastic storm windows, and the instrument needles from brass paper fasteners. The task of recreating the instrument face is accomplished one number, letter, and indicator line at a time with an ancient hot-press. This ingenuity that produces such perfect instruments is displayed everywhere you look. A gear from a scrap copy machine has been turned into a perfect duplicate of the nose steering wheel, the identification and information plates have been stamped out using keys from a worn-out typewriter, all dash and overhead panels were cut from salvage mobile home aluminum siding, and—well, you get the idea.

Efforts to positively identify this aircraft continue. It's tough because all serial number identification is missing and the N-number was a phony. Dick believes his DC-7B is one of seven purchased by Pan American for use on their nonstop New York to London service initiated June 13, 1955. The reasons being that this DC-7B was equipped with the more powerful 3,400-hp EA-1 versions of the Wright R-3350 Turbo Compound engine, had the engine nacelles extended to form saddle tanks, and carried extra fuel cells in the forward fuselage. Research suggests that only the seven planes purchased by Pan Am for their North Atlantic route, and another four bought by South African Airlines, had those specifications. Dick's ship has evidence of Pan American markings.

There's a lot left to do. Vosburgh is just finishing up the wiring that will not only illuminate the instruments and restore original cockpit lighting, but will, with the use of things like cooling fans from old copy machines, provide such details as cabin blowers. Next Dick hopes to fill the cockpit with the sounds of an actual DC-7 starting up, taking off, and cruising. So far, the closest he has been able to come is an offer by a DC-6 owner to record a sound track from his machine. Be it DC-7 or DC-6, Vosburgh intends to have engine sounds function in conjunction with the mockup's starting switches and throttles. This still leaves the engineer's panel and stewardess' station to do, a lot of old radio equipment to locate or duplicate, and considerable interior finishing to complete.

It will take a while, but when Dick Vosburgh is done, he will have accomplished more than just the static preservation of a piece of aviation history, he will have put this DC-7 back in the night skies over the North Atlantic, ready to start its descent into London's Heathrow airport. Passengers, fasten your seat belts please! •

Fail Safe. . . . . . *Continued from page 11*

R.E.A.L. F/S considers each of those re-

KYOSHO® Electric Flight Never Looked Better

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With its aerodynamic shape, high T-tail, and Eppler 178 airfoil, the 70" wingspan **Valencia 1800** provides easy-flying and glider-like grace for beginning and intermediate fliers alike. A strong, damage-resistant LSS molded fuselage and MonoKote covered balsa wings are pre-built, allowing you to assemble the Valencia in one evening. A quiet, powerful LeMans 240E motor and gear reduction unit are supplied with the Valencia. This is one beautiful model that you'll be proud to fly.

MELODY MP™

When you're at the controls of the 59" **Melody MP**, you'll have convenient electric power and graceful glider flight at your fingertips. If you're at your favorite launch site, simply hand launch the Melody MP for great slope soaring. The LeMans AP-29 motor, pylon, and matched prop will get you aloft fast during light lift conditions. A factory-built LSS molded fuselage and OHS wings are lightweight and extremely strong. Kyosho also includes a NiCd battery and quick charger for your convenience. If you enjoy fun soaring, the Melody MP is also available in a non-powered glider version, the Melody 1500.

FLASH™

With aerobatic and pattern capabilities formerly reserved for gas planes, the 47" span low-wing **Flash** is the first electric ARF specifically designed for advanced fliers. Able to rise off ground under its own power, the Flash features a LeMans 240E motor with matched prop, LSS molded one-piece fuselage, and built-up balsa wing in a Tsugutaka Yoshioka design. Now experienced fliers can have electric convenience and breathtaking aerobatics – with the new Flash ARF.

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quirements separately, ultimately integrating them to result every time, in that satisfying soft touch down in the middle of the runway.

I have to tell you here the most difficult part of accepting the R.E.A.L. F/S: After doing the necessary programming, to test it you have to take off *and turn your transmitter off.* Even knowing that you can turn it back on at any time and regain control doesn't help much, it is still what, in the my Air Force days, we called PMP flying!

First, orientation! We all know about the navigation satellites, officially the "Transit" Navigation System, by which any properly equipped vehicle, either flying or on the surface, can pinpoint its position extremely close. Originally planned for the Polaris submarine program and later released to all nonmilitary users, the accuracy of the entire system became highly improved after the incident of the Korean Air Lines airplane that the Russians shot down, claiming it was over their airspace. Soon after, our President ordered the release of satellite navigation data not previously released to nonmilitary users. The use of 100 percent of the satellite navigation system and the fairly slow speeds of our models give the R.E.A.L. F/S system the ability to establish the position of the model relative to any established point, *down to the inch.*

We know where we are—we now turn to another established technological discipline, one that has already had some application in models and light planes as a sort of auto-pilot. This equipment is called an "electrostatic stabilizer." Briefly, this system operates on the electric field that is present in the earth's atmosphere, in waves of varying potential, but parallel to the earth's surface. Now if we mount a sensor capable of measuring this potential in each wing tip of an airplane, model or otherwise, they would read an equal voltage as long as the wings were level. However, in an unsignalled bank, such as one caused by wind, these uneven voltages are read by our microprocessor as an error, and it would signal the aileron servos to eliminate it by bringing the wing to a level attitude. Simple, no? Well, it is if you are A. Maximus Nescient! Add two more sensors at the nose and tail of the airplane, and you have pitch control.

At this point you are probably thinking "Well, it sounds great, but who will be able to afford all this." The answer is that you will! Again, notice that there is very little actually new here, other than application of existing systems and equipment. The cost, as you will see, is surprisingly low, based on the cost of the PCM system and of course—how much is your airplane worth in dollars and time?

Anyway, as we get closer to the ground, things start to get more critical. Here, another technology comes into play, in this case borrowed and adapted from the photographic field. You probably have not paid too much attention to how they do it, but you do know that a large number of automatic focus cameras have appeared in recent years. I personally use a Nikon 2020 for my shots of in-flight models, and it sure makes my life easier. The idea started with Polaroid many years ago, but that system, based on two separate audio tones, was limited to short distances and was rendered useless by close-proximity high noise levels, such as being in the same fuselage with a roaring 60! Present-day techniques involve the processing of converging light rays and, yes, you guessed it, a microprocessor in the camera to signal the lens to adjust itself in or out till perfect focus is achieved. Using that same method, and a large part of the already existing hardware, we can tie into our receiver microprocessor to read and to adjust the altitude of our model above the ground—comparing it to and keeping it exactly as previously programmed. Ain't science wonderful?

At this point, I am sure that even those of you that do not know electronics in detail are beginning to see the concept. The R.E.A.L. F/S rides along, generally being about as useful as a copilot in a large full-scale airplane. Its sole, like the copilot's, is to listen to the radio, in this case, the R/C receiver. As long as the control signals are being received "loud and clear" it, again like the copilot, sits there, fat, dumb, and happy. However, should the signal stop, or become garbled, the R.E.A.L. F/S then takes control of your model, orients it via the satellite signal, flies it to a pre-programmed point and altitude, makes a landing approach, and a landing. Just how well it lands depends on you, but we will get to that in a minute.

Let us first discuss a bit more about just how this is accomplished, with as little of the technical stuff as possible. Notice our

block diagram of the PCM receiver. It starts off pretty much as a normal high-quality FM receiver. Next comes the microprocessor, where all those rates, programmed flight, mixers, and the now useless old Fail Safe come in. This information is fed to a decoder, which then drives the servos as commanded by you through the transmitter. In the R.E.A.L. F/S-equipped system, the output of the receiver front end goes to the added electronic module, which first monitors the signal. When the signal is lost or interfered with, it immediately turns on a monitor receiver, tuned to the satellite frequency and which then captures position information. Now completely in control, the R.E.A.L. F/S microprocessor commands in a completely programmed manner, in the same manner you do. And did—because this is where you came into the R.E.A.L. F/S picture.

Remember I mentioned programming, designated points, etc.? Well, like any other computer, the R.E.A.L. F/S has to be programmed. That is, it has to be "taught" to land. One time, and one time only, assuming your approach and landing is a good one, you will have to fly the R.E.A.L. F/S to a point and altitude from which you would normally start your landing approach, turn on its programming function via an unused auxiliary channel on your transmitter, and make your approach, land, taxi to wherever you want, and cut the engine. Cycling the aux channel on the transmitter completes the programming and from then on, whenever the R.E.A.L. F/S becomes actuated, your airplane would fly first to its assigned entry point, and then through the approach. You can re-program the system any time you like, as for example if your approach and landing did not quite earn a "10," or if you change landing fields or airplanes.

A little bit about the hardware now! The R.E.A.L. F/S module is a bit large, approximately the same size as a 1.2-amp airborne battery. However, this includes the lithium power-cell which provides 250 hours of operating time, and, plated into the plastic cover, is the omni-directional antenna required by the UHF receiver. A multi-conductor cable goes to the receiver, the electrostatic field sensors and an altitude gauging lens plug in the same manner as do servos to an R/C receiver, and that is all. Actually, I don't find the size or the 4.75-ounce weight objectionable, as this is a system that will probably only be used in large airplanes with both the space and weight carrying capability. Actually, I fully expect that as soon as the usefulness and safety features of the R.E.A.L. F/S are fully recognized, its use will become mandatory for models over certain sizes and weight being flown at public events.

Not being your average do-it-yourself type of device, the R.E.A.L. F/S will require that your receiver be sent to Dr. Nescient's company for the minor but necessary modifications. When it is returned to you, with the R.E.A.L. F/S module, the only apparent change will be a small multi-contact plug on one side, into which the F/S cable is inserted. A shorting plug is also furnished, in case you decide to use the receiver less the R.E.A.L. F/S. As an option, you can also purchase an already modified PCM receiver of the type originally furnished with your R/C system, its price obviously being added to that of the R.E.A.L. F/S.

Can't wait, can you? I'll admit I couldn't either—I was in the car and headed for Max's flying field ten minutes after our initial phone conversation, during which he told me about this amazing development. And it has been difficult for me not to mention it till now, at the most opportune time. You'll have to write for a complete information package, which includes more information and detail than I have space for here, and, of course, prices for the basic system plus some suggested options. Please refer to our Advertiser's Index for the necessary information. And I do want to hear about your experiences with the R.E.A.L. F/S. •

Electronics. . . . *Continued from page 19*

watch.

Not so, and it is not Marez's Law, but Ohm's Law, which in one of its forms states that "the current is equal to the voltage divided by the resistance." According to that then, you can establish a desired current flow, with a given battery and resistor, as long as everything remains constant. However, the current is going to lessen as the battery voltage drops, which it is going to do as the battery is discharged. A greater error is involved using a light bulb, because the resistance of the element changes with its temperature, which depends on the cur-

rent which is dropping as the voltage drops.

It is easy to see that such tests should not be depended on as an accurate measure of battery capacity. However, if carefully done, such a test could establish a standard of performance for *one* specific battery, and if repeated, again carefully, could indicate if and when said battery started to drop off in performance.

FUTABA AND THE NEW FREQUENCIES

In recent months I have been able to report what some of our R/C equipment manufacturers and importers are able to offer in the way of keeping their older equipment in operation under the new frequency plan. In that respect, there is good news from Compton for *all* owners of Futaba equipment.

The news is that all Futaba transmitters, no doubt meaning all digital proportional equipment, can be updated to legal specs under the new frequency plan. In review, you will remember that with the adoption of the second part of the new frequency plan, we lost all "White and Something" 72 MHz frequencies, and gained others, for a total of 22, for model aircraft use only. Furthermore, the 72 MHz band has been subdivided into a Narrow Band (transmitter) portion, channels 12 to 34, and a Wide Band portion, channels 36 to 58.

All Futaba transmitters of the Conquest Series; the FG and FGK Series, and all FM and PCM equipment, can be updated to meet the Narrow Band requirements and put on any of those frequencies. This includes AM transmitters as well.

All transmitters older than that, generally of the AM type, can be changed to any of the Wide Band frequencies. The necessary frequency changes only can also be made to the companion receivers, and should not be confused with converting them to narrow band or so-called 1991 specifications.

The cost of these conversions is only $30 to $40, plus, of course, the cost of any other service that you may require or request at the same time. I said, "only," and I mean that sincerely, as it involves two crystals and I can't forget recently paying $21 *each* for crystals from another importer to send to an overseas friend. There *are* differences in our radio suppliers, and, in time, we all learn who to deal with and who not to!

What about receivers to meet the requirements in 1991? Well, Futaba is not advertising such equipment at this time, but I do know that test receivers are being flown, and being flown in places around the country that are notorious for having dirty 72 MHz environments. The news for FM and PCM fans is that those designs are out of the test stage; the AM, a harder nut to crack in this respect, is still being test flown, with acceptable results so far, and all will be available before they are actually legally required.

And if you want a real eye-opener, the next trade show you go to, get Steve Helms to show you the new Futaba PCM for pattern and helicopters that will be available later this year. Fantastico!

MOSFETS

You will remember from our previous discussion here that this acronym stands for Metal Oxide Semiconductor Field Effect Transistor. MOSFET is the family name for all such devices—confusing enough, but we still have to contend with certain names that individual companies feel necessary to attach to their MOSFETs. For example, you might run into "MOSPOWER" from Siliconix or a "HEXFET" from International Rectifier. Remember that a MOSFET by any other name. . . but there the resemblance ends. There are literally thousands of these transistors around, and, while interchanging them at low power levels and in some circuits can probably be done with a high success rate, such is not the case in one of the prime uses of MOSFETS in R/C. MOSFETS are the reason that Electronic Speed Controls are as efficient as they are.

Efficiency is the name of the game for MOSFETs; no other semiconductor presently available has the ability to carry the heavy currents with minimal losses that a MOSFET can handle. For example, a popular MOSFET, an International Rectifier HEXFET in this case, designated as IRFZ40, is rated to carry 50 amperes continuous (at 25 degrees C) with an on resistance of only .028 ohm. The same MOSFET, if allowed to reach 100 degrees Centigrade, is only rated as capable of carrying 32 amps, so it is definitely to your advantage to do all possible to help them keep their cool! Give them plenty of ventilation and use a heat sink.

So much for background. In recent months, we discussed Electronic Speed Controls here in EC, and included a couple of reader's circuits. Subsequently, similar articles and schematics have appeared in other R/C publications. Some of them included a feature which I would like to discuss a bit.

Most Electronic Speed Controls also feature a proportional brake, and just how it is obtained is quite clever. As it happens, when an electric motor is allowed to coast, as it will after power is no longer being applied to it, it actually becomes an electric DC generator. Without any braking action of any kind, obviously it will coast until gravity and inertia do their job at which time the motor will stop. However, if a low value resistor is connected across the motor's output to absorb the electrical energy it is now producing, it will load the motor and tend to slow it down. The braking action can be made proportional by varying the resistance applied across the motor, and will eventually completely stop it.

Now this brake is what I wanted to talk to you about in the first place. In the ESC, in addition to using the very efficient MOSFET to handle and control the motor current in forward, one is also used as a proportionally variable resistor across the motor to provide the braking action as described.

In some of the aforementioned articles, a Z-40 MOSFET has been specified for use in the brake circuit, and I would like to caution you about this.

First I must also state that I have a lot of experience with ESCs—much more than I ever expected to have. I won't claim to always know exactly why, but I do know, from experience, which MOSFETs work and which won't work acceptably in this application. The Z-40 has the qualities required for MOSFET service as a motor driver, but for some reason it does not like the pulsating, high-peak voltage being fed into it by the motor, and fails in a very short time. A much better MOSFET for brake service is the Siemens BUZ-11, if you can get one. Unfortunately, MOSFETs are not a hobbyist-type item and are hard to find in small quantities. Some, including the Z-40, listed at $6, are listed in a catalog I have mentioned here before: Digi-Key Corporation, P. O. Box 677, Thief River Falls, Minnesota 56701-0677. I don't know of a retail source of Siemens BUZ-type MOSFETs; if one of our readers do, please pass it on.

Talking about passing things on, how about the note you have been meaning to send with your clever solution to that problem you ran into not long ago. After all, it will get your name immortalized here in EC.

Counter..... *Continued from page 10*

enthusiast, there is a SpaceCase made just for you. For more information, write: SpaceCase, 7015 Carroll Rd., San Diego, California 92121.

* * *

Circus Hobbies' new JRA 900 FET Speed Control features eight top grade MOSFETs which create a very smooth throttle response, with smooth midrange. Neutral, high speed, and brake points are easily adjusted without a voltmeter by using the unit's own LED indicators. The JRA 900 is available direct from Circus Hobbies for $125.95. To order, call toll-free: (800)782-0022.

* * *

Ace R/C, 116 W. 19th St., Higginsville, Missouri 64037, has a new constant voltage charger on the market, one that will charge 6-volt starting batteries, as well as being a 110-volt charger for all 12-volt batteries. The CVC delivers a constant 400 mA HI charge rate for 90 percent of the charge cycle and then tapers to a 15 mA trickle charge rate which will allow a safe full charge of any 12-volt wet cell, sealed lead acid, or gel cell battery. Now there is no need to worry about overcharging and ruining your 12-volt starting battery when using the CVC. The CVC comes complete with alligator clip battery connectors.

* * *

Great Planes is now distributing a new O.S. .61 SF-HS helicopter engine. The new .61 long stroke engine has a rear starting cone for added convenience. Designed to give top performance all along the rpm curve, the .61 SF-HS is a clear choice for dependable, easy chopper flying. It is available now at your nearest Great Planes dealer.

* * *

Here's a nose gear developed especially for the Air Fair Impulse Plus. The new 1/4-inch diameter wire features a four-turn, 3/4-inch outside diameter coil. Because demand for this nose gear has been so great, Air Flair is making it available separately. The nose gear comes complete with steering arm and mounting blocks, and the strut is available in two versions, either with a pre-bent axle, or unbent. The nose gear is available at your local hobby dealer, or contact Air Flair, Box 2075, Fairborn, Ohio 45324.

* * *

From Benson Hobby Products, 7119 N. Chimney Rock Pl., Tucson, Arizona 85718, comes the new MC-1 motor control, an electronically controlled relay which plugs directly into the receiver throttle servo output to provide motor on-off control and prop stop. The MC-1 will handle motors using 4 to 8 cells and drawing up to 20 amps. Typical voltage drop, not including leads, is less than 50mv at 20 amps. Size is 1x.75x.62 inches, and weight is approximately 3/4 of an ounce with leads. Price is $19.95 plus $2.00 postage and handling. You can order direct; Arizona residents add $1.00 sales tax.

* * *

Futaba is now offering a servo, that is a refinement of their popular S128, known as the FP-S148 with computerized circuit board assembly, direct motor, amplifier, and potentiometer mounting to increase reliability. Resistance to shock and vibration is increased as well. Torque and speed for the new S148 is also comparable to coreless servos, and the height and weight of the S148 are considerably reduced over that of the S128. The FP-S148 (J-connector), and the FP-S48 (three-pin mini connector) are excellent, all-purpose servos for car, boat, and aircraft applications. Look for them at your Futaba dealer.

* * *

Eldon Lind Company has introduced an accessory for its Magic Magnet Builder called Steps. When used with the Magnet Builder, the Stands, and the Vertical Press, the Steps allow you to correct the positioning of the leading and trailing edges, and it is also useful for setting the dihedral angle of wing panels. For more information, contact Eldon Lind Co., 3151 Caravelle Dr., Lake Havasu City, Arizona 86403.

* * *

Aero Plans 'n' Parts has introduced a plan

in quarter scale for the USAAF Aeronca L-3 Defender. The Aeronca has a wingspan of 105 inches and requires a two-cycle engine of from .90 to 1.3 cu. in. displacement or a four-cycle engine of 1.2 to 118 cu. in. displacement. The wings attach and dismount in two halves for easy transport. As with Aero's earlier offerings, the design and engineering emphasis is on traditional construction methods resulting in a sport scale aircraft which is realistic, yet easy to fly. Plans come rolled in a tube, and a construction manual is included. A fiberglass cowl and matching decals are also available. You can order your plans direct, by writing: Aero Plans 'n' Parts, Box 939, Olean, New York 14760. •

R/C Soaring. . . *Continued from page 45*

Eagle as do most serious F3B designers in Europe. His tests against a similar sailplane of the same span, area, and airfoil, but with straight taper wings proved that the Schuemann tips do indeed improve handling by making better turns and decreasing the tendency to tip stall at low speeds and high angles of attack such as during thermal turns. And just in case you were wondering if the Eagle was copied from the Epsilon, it wasn't. They were designed about the same time. The major differences being the choice of airfoils and philosophy about camber changing, and the final tip panel which on the Eagle has a chord of four inches versus 3.5 on the Epsilon (60,000 Rn vs 50,000 Rn). Mark felt this was as small as he wanted to go.

Specs on the Eagle are: 122.5-inch span; 1060 square inches of wing area; chord tapers are (constant center section) 9.75 to 7 to 4 inches; empty weight a little under six pounds (production models will be another eight to ten ounces lighter); wing loading on production models will be 12.5 oz/sq ft; functions will be flaps, ailerons, rudder, and elevator; wing construction will be vacuum-molded sandwich of fiberglass-balsa-fiberglass with carbon fiber spar caps

(see photo of unpainted tip panel) and balsa shear webbing; and recommended maximum ballast two pounds of lead shot in wings or fuselage. The Eagle wing in the photo successfully withstood having its center section supported by two chairs 52 inches apart with 210 pounds of Mark Allen parked right in the middle. This wing cannot be broken by winch towing!

Just in case you are skeptical about the Eagle's ability to go fast, here is what Mark had to say on this subject. Ron Vann piloted the Eagle to two second place finishes behind Joe Wurtz in the last International Slope Race. In the process it flew faster than the V-tailed Slope Dohle flown by Casey Goeller and the Nova slope racer flown by Rich Spicer (1987 US F3B team pilot). At one of the final US F3B team practices before Germany last summer, the Eagle got its feet wet in F3B flying. With only two days of flying time prior, the Eagle beat all three team members three rounds in a row in thermal duration, few within tenths of seconds of their times in speed, and in spite of mediocre launches caused by an inadequate stab pin support which allowed excessive stab wobble, flew respectable distance flights. The stab wobble was cured and launches are now where they ought to be. Mark believes that distance is actually the Eagle strongest point. In later practices, the Eagle was doing 22 laps in four minutes, that's better than a 30-mph average!

There is a lot more to tell about this incredible model, but there is no more space to give. If I get a three-view of the Eagle, I will pass it along as well as better pictures. For now I'll end this segment with the comment that this is the only serious F3B model available in the US today, and it is available for about 600 to 700 bucks. Considering all the development time, expense of mold making, and costs involved in actually making you a highly prefabricated F3B ship; it is a bargain. Contact Flight Concepts at the above address for more information and availability.

FUTURE FLIGHT

Here is another model which really caught my eye at the show. It is a true R/C flying wing similar to a Horten or a Northrop wing called the Klingberg Wing. It was on display as a static competition model. By chance, I just got lucky and while trying to photograph the model, its designer/builder Rollin Klingberg stopped by. He is an aeronautical engineer at Lockheed, and he told me that the original model was actually a stability test model for a full-size, foot-launched, rigid-wing glider. The model proved to be such a good flier that the full-size glider was built and also successfully flown. Rol said that the Klingberg Wing is very stable and very easy to fly.

The kit is attractively packaged in a 2 X 6 X 49-inch box with a four-color label. It has a 19-page photo-illustrated instruction booklet, two plan sheets, die-cut ribs, and full hardware. Specifications for the model are: span, 78 inches (2m); area, 650 square inches; flying weight, 20 ounces; and construction materials, balsa and plywood. Kit features also include a building jig and power pod materials.

To quote from the introduction of the instruction booklet: "Congratulations! You have selected a model glider which will bring new excitement to your flying hobby. This model is unique as it is one of only a few pure flying wings available in kit form. Comprehensive analysis and testing by a team of aeronautical engineers has created a design which is docile enough for a beginner, yet also challenging for the experienced flier." The text goes on to say that you should be able to finish the model in about a week, and if you have any problems, questions or comments, feel free to write to Future Flight, 1256 Prescott Ave., Sunnyvale, California 94089. The model sells for about $35. Wholesale prices are available to qualified buyers.

I plan on building one of these wings for myself sometime in 1988, and I will keep you posted on its progress.

Gary Moline displayed a very interesting-

looking, V-tail, electric motor glider called the Thermal Charger. Available late in April at your local hobby shop or factory direct for $59.95, this model will include a Leisure 05 motor, switch harness with micro on/off switch and arming switch, and a propeller.

The specifications for this pusher motor-glider are: span, 60 inches; area, 550 square inches; prop size, 6 X 3 Cox pusher; and flying weight with seven 800 mAh cells, 38 ounces. The wing has a 12-13 percent Clark-Y type airfoil, I-beam spar construction, and the fuselage has a small opening in the nose for cooling air to enter and flow over the batteries and the motor. The pusher configuration will ensure no more broken propellers or bent motor shafts.

The flying performance of the Thermal Charger is quite good. With this motor, prop, and battery setup, the plane will fly for four minutes in dead calm air. Of course, with thermal activity this can be extended many more times than this.

The price of this model direct from GM is $59.95. Shipping is by UPS COD, freight paid. Dealer and distributor prices are available.

GOLDBERG MODELS

The Sophisticated Lady is now available. I first reported on this model from Chicago's RCHTA show where it was first announced but not yet shown publicly, now with its appearance at the IMS, I have a photo for you to see.

The Sophisticated Lady has the same wing as the Electra, a totally redesigned fuselage, a canopy with pilot figure inside, and a T-tail. Look for it in your local hobby shop or favorite mail order catalog.

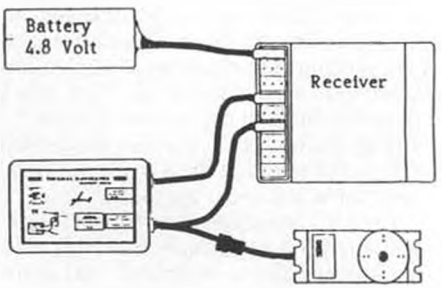
There was a second new product shown at the IMS for the first time, and that was the electric Power Pod. This unit features clam shell design plastic pod with plywood spine, Goldberg Turbo 550 motor, propeller, spinner, switch harness, and instructions for installing it in any glider, but specifically the Gentle Lady or Sophisticated Lady. Batteries are not included.

HIGH SKY

The High Sky Thermal Mixer has been improved and is now the Thermal Navigator. This electronic device is incredibly sensitive and can sense lift and now sink too!

The Thermal Navigator can be used to let you know when to speed up if you are in sinking air or circle if you are in lift. It is carried aloft inside the fuselage of the glider where it can sense very minute changes in air pressure. With rising altitude comes less pressure and the Thermal Navigator reacts.

To install the Thermal Navigator, one lead is plugged into the ratcheted throttle channel or retract channel of the receiver for on/off control. The other two leads are plugged into the rudder servo and the rudder output jack in the receiver. That's all you have to do! (See the illustration below.)



In use, the Thermal Navigator (let's call it TN for short!) is switched off for launching. After launching, it is turned on and allowed to fly your airplane for you. If your plane is sinking, the plane will turn slightly left. If it is a normal sinking rate (dead air) you might wish to retrim your rudder for straight

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ahead flight. When your plane encounters lift it begins turning right. The stronger the lift, the stronger the right turn! If your plane encounters stronger than normal sink, it turns left! In this way, you have an airborne variometer or Thermal Sniffler that you don't need to get a Ham license to operate. Thermals which are normally too weak to see with your eyes are now obvious. And believe me the TN is sensitive enough to really make a difference!

The TN only weighs one ounce, is 2.3 X 1.5 X 0.6 inches in dimensions, uses only six milliamps of 4.8-volt battery current, and comes with Futaba connectors (others available on request). The TN sells for $49.95 directly from High Sky, $1.00 for shipping, and Californians need to add $3.00 tax. Contact High Sky for further info: 3929 Kansas St. #9, San Diego, California 92104; (619)297-5792.

PECK-POLYMERS

If you can recall Keith Schwemmer's flying wing RC HLG from my report on the ISS HLG contest several months back, you will recognize the "Genesis" flying wing in the Peck Polymers booth. It will be available "sometime in 1988" as a kit. It has a 59-inch wingspan, 346 square-inch wing area, and weighs from 10 to 12 ounces. The wing flew surprisingly well as a HLG but should excel as a light-weather sloper. Contact Peck-Polymers for further info.

SIG

New at the Sig booth was a 100-inch thermal glider designed by Mike Pratt called the "Riser 100." This Standard Class glider will be available this spring at about Toledo Show time. It has 1,000 square inches of wing area, weighs 48 ounces, has a 6.2 oz/sq ft wing loading, beautifully die-cut Lite-Ply fuselage sides with lightening holes in the tail boom, modified Eppler 205 airfoil, 3/16 X 3/8-inch spruce cap, box-beam spars with two top surface and one bottom surface 1/8 X 3/16-inch spruce leading edge turbulator spars for added strength. The LE material is a 1/4-inch hardwood dowel so the beginner will automatically get a perfect LE shape. The two-piece wing joins at the center with a 1/4-inch joiner wire and can be bolted or rubber banded to the fuselage.

The Riser 100 is a real floater which goes up in the lightest lift, yet has enough curve on the bottom LE surface to give good penetration in windy conditions.

The kit features full hardware, photo-illustrated instruction book, full-size plans, and shows a spoiler option for third channel operation. Standard servos will fit.

The kit price will be about $59.95. Contact Sig directly (Montezuma, Iowa 50171) or see your local hobby dealer.

SLOPE SCALE

Brian Laird and Paul Masura have four little slope gliders that will really turn some heads at the hills. They have a P-51, a Spitfire, a P-39, and a Me 109 that are super good looking. They cost $50 plus $4 shipping (and California tax where needed). They span 45 inches, have 292 square inches of wing area, a modified Eppler 374 airfoil, and weigh 28 ounces RTF. Each one has an polyester-fiberglass fuselage and foam core wings, so these are in reality only partial kits.

The company name is Slope Scale, and you may reach them at 4047-141st Street, Unit 5, Hawthorne, California 90250.

SUN FAIR AIRCRAFT DESIGNS

New from Sun Fair is the Slope Dart, a 48-inch span, 345 square-inch wing area, 27-inch long, twin-tail sloper that looks like a lot of fun. Steven Grochowski, the owner, says this little foam core, balsa wood model holds momentum very well through all maneuvers, likes to fly inverted, does crisp axial rolls, inside and outside loops, and more with ease.

The Slope Dart kit features full-size plans, machine-sanded parts, complete hardware, and foam core wings. The price is a reasonable $52.95. Contact Steve at (619)434-4492, Carlsbad, California.

WELL, NEXT MONTH . . .

I'm all out of space for this month again! Where does it all go? Next month I'll get caught up on all those great ideas and neat-looking models you guys keep sending this

way. They are appreciated!

Thermals, Bill Forrey, c/o *Model Builder.*•

Choppers. . . . . *Continued from page 13*

you had. The instructions don't do a really good job of explaining this.

The "N" means the selector switch for the two separate throttle/pitch curves is in the top position N rather than the bottom position "L." The letter "L" means the stick is at the Low position; and the arrow indicates that the setting can be changed at that point.

My problem, you might recall, was that I had too much throttle at zero degrees pitch. Checking my helicopter with a pitch gauge, (that's a lie. I just eyeballed it) I find that flat pitch (zero degrees) occurs at about 1/4 stick. When I move the stick to the 1/4 position, the numbers on the display go from 42 to 79. The display now reads:

THROT N MID 79 ←

I press the DEC (decrease) button once, and the display reads:

THROT N P 1 79 ←

That means I am establishing a point (1) where the throttle curve is altered. There are two points below the mid point of 128 (256 divided by 2) and two above, to which I can make an adjustment. In addition, I can make adjustments to the low stick, high stick, and mid point positions—making a total of seven possible alterations to the throttle setting. The next time I press the DEC button, that number goes down to 78. If I hold the DEC button down, the numbers keep decreasing until I release the button. Since each number represents a relatively small amount of servo travel, I'll hold it down as the numbers go from 78, 77, 76, 75, all the way down to 69. Okay, I'll try it now. Press ENTER once again. The display reads:

THROT LOW!

Whoa! Thanks, Galaxy radio, for reminding me to return the throttle to the low position before I exit the program. (It won't display that if the stick is already in its low position.) I hit ENTER again, and the display goes back to:

FUNCTION ?

I don't want to do anything else right now, so I hit ENTER once again. The display is back to:

11.1 MODEL 1.

Ready to fly once again. *The difference is that when the rotor hits flat pitch, it doesn't overspeed anymore.* But that's not all. Even though I reduced the throttle setting at one quarter throttle (from 79 to 69), *low throttle didn't change at all!* It's still at 42. Some of the settings close to the 1/4 throttle position have changed a little, which is logical since I am really altering a curve rather than just a single point. What used to be pretty much of a linear throttle servo travel is now a curve that is tailored to my helicopter's particular power requirement; and not just a plain curve, but one with any number of turns and bends in it. Can you think of another helicopter radio that can do that?

You may also be interested to know how long it took me to do what I have just described. Without hurrying, it took me 21 seconds.

There are, of course, many more functions that are contained in the Galaxy program. They are shown in the Function Code Index as follows:

CODE 11 Reversing Switches
CODE 12 ATV/Endpoint Adjustments
CODE 13 Dual Rate Adjustment
CODE 14 Exponential Adjustments
CODE 15 Sub Trim Adjustments
CODE 16 Throttle Hold
CODE 18 Throttle Curve
CODE 28 Data Resetting
CODE 47 ATS System Revolution Mixing
CODE 48 ATS System Acceleration
CODE 55 Mode Selection
CODE 56 Model Select
CODE 61 Inverted Flight Switch
CODE 68 Pitch Curve
CODE 75 Servo Test Step
CODE 77 Fail Safe
CODE 85 Selection of Modulation (PPM/PCM)
CODE 86 Stop Watch
CODE 87 Countdown Timer
CODE 88 Display of Accumulated Time of Use

(The missing numbers are assigned to non-helicopter functions such as those found only in the Pattern version of the Galaxy radio.)

I don't have the space to describe every

single function in detail, but I'd like to highlight a few of the interesting ones.

CODE 12 ADJUSTABLE TRAVEL VOLUME (END POINT ADJUSTMENT)

If you understand that many of the Galaxy functions are preset to points based on a "normal" amount of servo travel (about 80 degrees, including the trim adjustments), a lot of the adjustment features become clear. For instance, the end point adjustments are set at 100 percent, which you can reduce all the way to zero (no servo travel whatsoever); or increase to 150 percent, which comes out to about 60 degrees servo travel in each direction. Select the control that needs to be adjusted by pressing that button on the key-pad, and hold the stick in the direction of the end point you want to change.

CODE 13 DUAL RATE ADJUSTMENT

Dual rates on tail rotor (rudder), pitch (elevator), and roll (aileron) all have individual external switches designated "0" and "1." The range of adjustment is from zero to 125 percent.

CODE 14 EXPONENTIAL

Exponential very simply creates a non-linear servo travel for aileron, elevator, or rudder. The desired effect is to have less servo travel close to center stick position, and a great rate of travel at the extreme stick position. The purpose is to keep the neutral positions "soft" to help stability, particularly when hovering; while maintaining the full amount of control needed for aerobatics or "hot-dogging." If you aren't using the dual rates, those same switches allow you to alternate between two different rates of exponential. Or you can use one switch position for exponential, one for high or low rate, or one for high rate and one for low rate.

The range of exponential is from zero, which is linear, to 100, which has practically no servo movement at all for about half the stick movement away from center, followed by a very rapid movement for the remainder of the stick travel. The ideal percentage of exponential exists somewhere between those extremes.

CODE 68 PITCH CURVE

The Throttle Curve is one-half of what makes up the Throttle/Pitch curve combination. There are some equally unique features in the other half of that equation: CODE 68 Pitch Curve.

Balancing rotor blades and setting up a pitch curve are two subjects that usually bring the beginner around looking for help; keeping us more experienced chopper pilots feeling needed. The pitch curve challenge: Set the pitch so that the maximum and minimum desired pitch are attained within the mechanical limits of the collective system while deriving optimum power from the engine at every pitch setting. We could really sink our teeth into this problem, experimenting with servo arms, differential settings, and the use of end point adjustments. Now, with this radio, anybody can do it—and better! If you want 9 degrees pitch at full throttle, 5 degrees at hover, -3 at idle—just set it that way. Working with the Throttle Curve and the Pitch Curve there's no reason that you shouldn't get exactly the performance you're looking for. Like the Throttle Curve, the range of adjustment for the Pitch Curve is zero to 255, with the preset positions being 42 at low stick, 213 at high stick, and 128 midpoint. Like the Throttle Curve, there are a total of seven points within the pitch curve that can be adjusted. But remember that you've got four individual pitch curves. Set up the normal (N) pitch curve the way you like it for our "everyday" flying. Next, flip the switch between N and 1 and set up a completely different *second* throttle/pitch curve. Hit

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the Throttle Hold switch and set up your third pitch curve for autorotations. (This will most likely be the maximum pitch at high stick that you can get, and the low pitch that gives you the best autos.) Hit the Inverted Flight and now set up the fourth pitch curve for inverted flight (if you're into that). Since the Galaxy has three separate throttle curves plus the throttle hold setting, four separate pitch curves, and with the capability of seven different settings within each curve, this really isn't the radio for the person who can't make up his mind.

On the other hand, for the beginner, or the flier who just wants to keep it simple, stupid, this radio is perfect. Set the throttle so that it doesn't bind at the top or bottom; set the high, mid-range and low end pitch the way you want it; and go fly.

One of my friends who has a Galaxy radio decided he wanted a helicopter that would be very precise in hovering maneuvers. His first throttle/pitch curve (N) is set up for normal flying. The second (1) is set for hovering. His chopper will just about hover at 3/8 stick. Very little pitch or throttle change occurs between 3/8 and 5/8 stick, and the rotor speed remains constant. It's almost like the exponential function that you get on ailerons, elevator, and tail rotor. This setup is especially effective for realistic scale flying and the precise hovering that wins limbo contests.

I prefer to use the second pitch curve for aerobatics. Rotor rpm stays pretty constant between the nine degrees top end pitch and the five degrees negative at bottom. (The throttle curve adjustment that I have described prevents the rotor from speeding up at flat pitch.) With all that negative pitch, my chopper will actually fly inverted just using the low position on the collective/throttle stick. (*For about 30 feet.*)

CODE 56 MODEL SELECT

You know, it always seemed ridiculous to be dragging around a separate transmitter for each one of my helicopters. It's like having five or six television sets, one for each channel. MODEL SELECT on the Galaxy radio allows you to program completely different settings for seven helicopters or airplanes. Whether you buy a complete flight pack (receiver, battery, servos, and switch harness) for each machine is between you and your wallet. I think a good compromise is to use a separate set of servos and switch harness in each helicopter, and get double duty from the receiver and battery.

CODE 55 MODEL SELECTION

Perhaps there's an airplane or two in your fleet. Entering CODE 55 will display the words:

HELI MODE

Pressing INC changes the display to:

STANDARD

This eliminates Throttle Hold, Throttle Curve, Pitch Curve, Revolution Mix, Acceleration Mix, and Inverted Flight—all the helicopter functions. What you've got now is a pretty good airplane radio, but just for that one model. However, you won't have some of the real fancy features that are found in the pattern version of the Galaxy radio, like Flaperons, Snap Roll, V-Tail Mixing, Elevator-Flap Mix, and Program Mixing.

After a while you will memorize all the Code numbers, but if you haven't or you forget one, press CLR instead of ENTER after the radio is turned on. The display will then read:

DIRECT MODE

By pressing INC the code numbers and description will print out in numerical sequence. Stop when you get to the function you want to adjust.

Once you've programmed all those settings, you won't lose them when you turn the radio off. You won't lose them even if you leave the radio *on* and completely discharge the battery. A five-year lithium battery backs up the radio's memory.

If, however, you do want to clear everything out of a program that you put in so you can set up a new helicopter, go to CODE 28 DATA RESETTING. Press key number 1 in response to the prompt:

RESET 1 YES - 1 KEY

All the functions for Model 1 will return to the factory preset condition.

The Galaxy is capable of transmitting in either PCM or PPM modulation. CODE 85—SELECTION OF MODULATION lets you choose. If you have other JR radios on AM or FM with removable transmitter modules, you can use those other systems with your Galaxy transmitter by plugging in the

other radio's RF module, and selecting the PPM mode through CODE 85.

There are many more features that I haven't covered, but I'll let you find those out for yourself. Now, there are some pretty sophisticated radios around, like the Robbe CM Rex (made by Futaba) and the Graupner MC-18 (made by JR). Trouble is, they're big, awkward things with a ton of dials, knobs, and buttons. Since I don't use a strap or transmitter tray, I really appreciate a radio as easy to handle as the Galaxy. Besides, those other radios aren't even sold in the U.S., and if they were, they would be priced in the $1500 range. One of the best things about the Galaxy is its *price*, which is about a third of that. Parts and service are available all over the world, if you need it, but you probably won't. I'm always torn between the thrill of being one of the first to have a new radio that's just out and the fear of *my* helicopter being the guinea pig. I waited over a year to see what the feedback was on the Galaxy 8. It's all been good.

ROTOR RAMBLINGS

In a past column I mentioned that the use of weighted rotor blades was becoming very popular, and the fears that the weights would detach from the blade and shoot through the air like a "misguided missile" were unfounded. What is happening is that rotor blades are pulling out at the root, and I said that it has happened with every brand of blades. Jeff Urcan of Yale Manufacturing contacted me and informed me that he had not heard of any instances of this occurring with his "Tru-Spin" blades. I knew I recalled some incident that involved Tru-Spin blades so I checked back into my letter file, and sure enough, there was a letter from Marshall Emmandolfer of New Lathrop, Michigan. Marshall told me he had weighted his Tru-Spin blades up to 250 grams, and that while attempting an autorotation, the bolt holding the blade snapped. Obviously this was not a failure of the rotor blade, in fact, it's a testament to the strength of the blades that they held together with that much weight. Never, never put that much weight on a rotor blade. The additional force of each additional gram is amplified many times over when spun around at 1700+ rpm that our R/C choppers turn. World Champion Curtis Youngblood did weight his Yale Tru-Spin blades up to 200 grams on his winning GMP Competitor, but this was for the very specialized FAI hovering-type of flying. Even Curtis says that 175 to 180 is the most your blades should weigh—both for performance and safety. •

Forward-Swept *Continued from page 37*

opposite to the normal nose-down pitching moment.

Some studies and works by well-known scientists and design experts show that tailless aircraft do not necessarily need sweep (see Fig. 3).

A reflex trailing edge incorporated in a section of the wing can provide an unswept wing with stable characteristics. However, the CG position of an unswept tailless wing is limited in range. In essence, wing sweep, which effectively increases the chord of the wing, provides more margin for mis-loading (see Fig. 4). However, when the trailing edge is reversed, as shown in Fig. 3, the center of pressure moves to the rear if the angle of the wing increases, thereby tending to reduce the flying angle and return the wing to its normal flight position.

Planform arrangement shown in Fig. 3 lends itself favorably to R/C slope soaring models with resulting exceptional flying qualities, providing the CG is properly positioned and aggressive efforts towards finite flight trimming is achieved. The reflex portion of the wing trailing edge can incorporate elevon application for lateral and longitudinal control effectiveness.

In support of the reflex wing tailless concept, there are a number of model plans and kits in free flight and R/C designs available through most model aircraft publications. Successful models such as: The Gryphon, by Ron Neal; The Windfreak, by Roger Sanders; and The Raven, by Dave Jones are a few of the more popular designs which offer combinations of aerobatics and slope soaring qualities.

Again, various planform designs are compromises, and performance considerations are equally varied. A tailless airplane relying singularly on the qualities of a straight wing can be extremely sensitive, to the point of producing a less than required amount of damping about the lateral axis. In contrast, a swept wing, having a longer length between the forward apex and the aft

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NOWLEN AERO Peanut Scale Classics: Wright Type A $6.95, Nieuport 11, Deperdussin $10.95, Bristol Scout $13.95, Aerodrome $7.95. $2.00 S & H any size order within U.S., 139 Boardwalk B, Greenbrae, California 94904.

BUILD A BEER CAN BIPLANE from 15 cans. Kit contains step-by-step instructions, photographs, cut-out patterns. No special tools required. Plane is 9 inches long, with 14-inch wings, cockpit, struts, etc. Propeller spins, wheels turn; $9.95. Kit Can Kit Nine, Box 72104, Marietta, Georgia 30007.

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TARGET DRONE ENGINE, two-cycle, two-cylinder, contra-rotating props, swings two 26-inch props (included) $250.00. F.J. Hiles, Star Rt. 1, Ozark, Arkansas 72949.

WANTED: RTF u/c planes from Aurora/K&B, Comet, Cox, Gilbert, Sterling, Testors, Wenmac, etc. Complete or pieces, buy or trade. John Fietz, P. O. Box 593, Lynbrook, NY 11563.

BOOKS FOR MODELER. Out-of-print/current. List 400+ items $1.00. John Roby, 3703C Nassau, San Diego, California 92115.

end of the lateral edges, would, therefore, be more acceptable using the wing tips for stabilization and control. Considering the areas near the tips as a pair of horizontal tail surfaces, we conclude a configuration which is basically similar to the conventional wing with a tail arrangement. To enhance directional stability and control, the wing tips can be designed to include a pair of vertical fins.

Early British developments with similar parameters produced the "Pterodactyl," and several similar successful aircraft and

gliders were designed and built by Dr. Ing. Alexander M. Lippisch.

The forward-swept, or "Buzzard Wing" as it is sometimes referred to, is really a borrowed principle which has long been provided by Mother Nature's wing planform for soaring birds—such as buzzards (see Fig. 5).

Soaring birds, such as buzzards, retain their wings motionless with an average sweep forward of the tips from approximately 10 to 20 degrees ⌒ sweep angle. For the approach-to-landing phase, when highest possible lift is required, birds place their wing tips even further forward which results in an extreme forward sweep angle. Because nature appropriates the simplest and most effective "design concept," this function for increasing lift can be accepted as ideal. If a more effective measure could be made applicable, as increasing wing camber for example, nature would undoubtedly have provided that concept.

Next month the author delves deeper into the theory of swept-wing aircraft, including the Grumman X-29A, the advantages of aft-swept vs. forward-swept wings, and tailless model gliders. •

Dear Jake. . . . . *Continued from page 7*

to state on which side of the fuselage I should attach the half stabilizer shown on the plans. What do you recommend?

John in San Diego

Dear John:

When plans show only one half of a stabilizer, the designer is telling you that both halves of the stabilizer are identical, and that both halves can be built over the same plan. I have tried this, and all I ever get is half a stabilizer that's twice as thick.

Jake

* * *

Dear Jake:

I have a large collection of .049s, .020s, .010s, etc., none of which will reach top rpm. These engines constantly bog down and are quite hard to start. All of these problems have arisen since I moved from Anaheim, California, to Salt Lake City, Utah.

The elevation in Anaheim is about five feet above sea level. The elevation in Salt Lake is about 5,000 feet above sea level. I suspect that the thinner air could be the problem. If so, I would appreciate any information you can give me on detuning these engines so I can get them back to racing condition.

Jerry in Utah

NOTICE: New Full-Size Plan prices are now in effect. Send a long self-addressed stamped envelope for your list of revised plan prices.

Dear Jerry:

You are absolutely right in your assumption that thinner air is at the heart of your problem. By attributing the thinner air solely to the difference in altitude, however, you are overlooking half of the cause of the trouble. Air is thinner at higher altitudes, true, but the salinity of the Great Sale Lake in Utah is many times greater than that of the Pacific Ocean which dominated your atmosphere when you lived in Anaheim. Therefore, you are now living in saltier air than you used to. It is a known fact that a high concentration of salt in the air leaches out aerions. As you no doubt recall, aerions are those subatomic particles we have talked about before in conjunction with aerodynamic half-life. Due to its salt content, your lower-density, high-altitude air is made even thinner by the loss of aerions.

Detuning your engines is not the answer. Thickening your air is. Add a second tank to your airplane. Plumb it to the carburetor's venturi air inlet. Fill the tank before each flight with aerions (available from Neiman-Marcus). Use crankcase pressure to pressurize the aerion tank. The thickened air being drawn in by the carburetor should bring your engines back to peak performance.

Jake

* * *

Dear Jake:

In real life, are you as famous as Harold deBolt, Bill Northrop, or John Worth?

Lex in Lambert, Pennsylvania

Dear Lex:

Who are they? No, wait, let me guess. Those are the real names of the Hudson Brothers; right?

Jake

Workbench. . . . *Continued from page 7*

latter is usually a sure sign of approaching lift and the time to take an "official." All at once there is a mad scuffle of hyperactivity to get models in the air, at which time nearly everyone is following the lead of the hot shots. In free flight terms, this is known as "piggybacking." Well, you can imagine what would happen if all of these fliers were using R/C, not only during the testing periods, but particularly when all of them want to get into the same thermal at the same time. Bedlam! That's the bad side of it, and at a major contest with many entries, a real problem.

Another point has to do with a more philosophical aspect of R/C in F/F. If R/C is used in a F/F model, during competition, for any other reason than tripping the D/T, it's really no longer a F/F model. Some R/Cers who have a fair knowledge of F/F will comment on the super-gimmicked F/F models with timer-tripped rudders, VIT, flaps, prop-stoppers, etc., and claim the models have more gadgets than a two-channel radio model. However, the fact still remains that with a F/F model, you dial in all the control the model is going to get before you turn it loose, and once it leaves your hands . . . it's free . . . and there's nothing more you can do to the model until you pick it up when it comes back to earth . . . in one piece, or a whole mess of 'em!

Of course, if the radio is only used for D/T, then why bother? A fuse or mechanical D/T timer is just as reliable as a radio (sometimes more, sometimes less), is a lot cheaper, and you don't have to wait for a frequency pin in order to light a fuse or trip a timer. So let's forget *that* one!

The primary need, and really the only one, for installing R/C in a F/F model, is for its retrieval, and retrieval should not begin until the model has completed its free flight competition requirement, ie, a two or three-minute max. In dead or light wind conditions, a F/F model does not usually get too far away or downwind in two or three minutes, and with a moderate amount of R/C experience, the flier can guide the model back to the starting point (Like Sal Taibi says, "If I use R/C to retrieve my model instead of chasing after it, I'll lose my girlish figure!"). The problem really comes up on those windy days, when a model, even on a two-minute max, may have just about gone out of sight. At this point, even an experienced R/C glider guider would have a difficult time doing any better than to simply point the model back toward the field and hope that it can penetrate the wind enough to not get blown even further away. Incidentally, this can only be accomplished if the model has both rudder *and* stabilizer or pitch control of some sort. It's tricky business that takes quite a bit of learning to accomplish, and when a free flighter first tries it himself, he may suddenly acquire a little more respect for the abilities of some of his R/C contemporaries.

To get around the problem of not allowing retrieval of the model until the max is attained, after which it may be too late to effect a retrieval with the R/C system, we have to consider a less than max flight. After all, this is not uncommon in F/F, for reasons too numerous and painful to mention. So, instead of setting rules that say you can't start retrieval until a max is attained, let's look at the other, and quite normal circumstance where a flight is less than max. Some of the more usual reasons for a short flight are: no lift available or the thermal got away, poor trim so the glide is either stally or steep or in a tight spiral to left or right, bad power trim so the model screws itself into the ground before the engine cuts.

If there's no lift but the flight pattern is OK, the model will simply glide until it lands, probably not too far away. If the trim

is bad, and you want to save the model before it makes impact with the ground, start using the radio, at which point your flight time stops. What the heck, a short flight is better than a broken bird, and you can then apply the proper trim adjustments. If it crashes and you have to rebuild, *all* the trims are shot. If you save it, you only have to correct the one problem. Are we making sense yet?

In the case of the bad power trim, there are two ways to go. One, if you stick to the rule that you can't have the transmitter in hand during the power portion of the flight, let's hope the problem isn't a spiral dive, 'cause you done bought the farm! If the flight is erratic but safe, you probably won't get the desired altitude, and you can only hope that the glide portion is OK. The second possibility is that the rule will allow you to hold the transmitter during the power portion so that you can save the model even though you abort the flight for using the transmitter. This would require a certain amount of trust, as it is possible to cheat, by giving imperceptible control movements that could correct the problem. The solution to this could be that the timer can hold the transmitter "at ready" and within quick reach of the flier during the power flight. If the flier shouts "Abort!" the timer allows him to grab the transmitter and attempt to save the model.

To follow the same line of thinking, the timer can continue to hold the transmitter throughout the flight albeit a little more relaxed after the model has transitioned into glide. If at any time prior to max the flier requests the transmitter, the timer can stop his watch when the flier takes possession. As mentioned before, this would probably occur only when the flier decides that he would rather cut the flight short than go for a max, whatever the reason may be. Actually, this puts a bit of gamble into the competition, as the flier weighs his chances of recovery after the max verses playing it safe and taking a shorter flight in order to be sure of having a model for the next round.

As this discussion has progressed, a set of tentative "R/C Recovery F/F" rules is beginning to formulate in our alleged mind. Next month, we'll put these ideas in rule form for your review. Also, the details of the R/C installation in our 900 Starduster will have to wait until then. We've been so busy with the Pasadena and Atlanta IMS shows that we haven't had time to put it together.

TOOTING OUR OWN HORN

During this year's IMS show in Pasadena, this writer was deeply honored to be inducted into AMA's Hall of Fame. As a modeler who started out with dime store solid scale and stick-n-tissue rubber ships in the early 30s, it is something very special and pretty awesome to find yourself in the company of some of the people whom you have looked up to as heroes and pioneers in this great hobby. Though I have been allowed to join them, I'm still looking up to them, and it'll never be any different.

What really put the icing on the cake was a postcard of congratulations from our "Insider." Dave Linstrum, who pointed out that all of a sudden *Model Builder* magazine now has three Hall of Famers on its editorial staff: Bill Hannan, John Pond, and yours truly. That and a buck ninety five ought to get us a free beer somewhere!

CREDIT WHERE DUE

We received a nice letter from Mrs. Heidi Martel, who wishes to set something straight. Apparently both Al Novotnik, in his article about the 1987 Byron Giant Scale Fly In, and Byron Originals, in some of their advertising literature, gave the wrong credit for the builder of the model of Rick Brickert's well-known modified P-51 air racer, "Dago Red." The true builder of this model happens to be Heidi's husband, Rollie Martel. Rollie first saw Dago Red at the 1982 Reno Air Races, and built the model as the plane then appeared. Back at Reno in 1985, Rollie and Heidi were allowed to join the pit crew of Dago Red as they struggled unsuccessfully with an engine change after an unfortunate engine failure. While there, they took detailed photos of the new graphics, and Rollie promptly repainted his model accordingly. In 1986, Rollie and Dago Red won the Canadian Nationals, then in '87 they took it to Ida Grove.

Heidi is proud of her husband's work, and we're glad that she took the time and trouble to set the record straight. If there's enough space, you'll see a picture of Rollie's model in this issue.

ABOUT THAT COVER . . .

Our February cover painting by Bob Benjamin has stirred up quite a few complimentary letters. George Schulz, Secretary of the Staggerwing Museum Foundation, Tullahoma, Tenn., writes to say that, "Our Museum owns the title and parts that remain from the Mystery Ship R614K. All that is left from the final crash in the 30's are the tail surfaces and one aileron. The horizontal still has some original fabric on it. We have a set of short wings that were built for 614, but had been sold to Frank Hawks and are painted in the Texaco 13 pattern. The original Texaco No. 13 (with long wings) has been in the Museum of Science and Industry in Chicago since before WW II. The flying replica you mentioned was built by Mr. Jim Younkin in Arkansas, We have been working intermittently on the restoration of Mystery Ship R614K, but it's completion is still some years away, with other projects taking precedence." George has been a *Model Builder* subscriber since he got back into modeling several years ago.

The following is a copy of a letter sent to Bob from Bill Selzer, President of Cox Hobbies, Inc. in Santa Ana, California.

"I enjoyed your illustration of the Travel Air on the cover of the February Model Builder. I was raised in Cleveland and as a kid I spent many hours hanging around the Cleveland airport during the National Air Races. In those days one could wander from hangar to hangar, view the racing planes, and catch a glimpse of idols like Steve Whitman, Art Chester, Roscoe Turner, Earl Ortman, Tony LeVier, et al! I remember seeing Doolittle fly the Gee Bee!

"I have a particularly vivid memory of seeing Doug Davis fly—I guess because I went to the site of the crash in which he was killed and for many years I saved a few fragments of fabric and plywood from his plane.

"Your illustration fairly accurately portrays the Cleveland Air Race scene of the early thirties, except that the course was laid out for counterclockwise flight (as the Travel Air's bank in your illustration indicates), but the grandstands were off the left wing of the planes as they came down the straightaway over the airport. Also, all of the grandstands were of the temporary type, with no boxes on top. The dignitaries and reporters sat on a special raised platform out in front of the main grandstands.

"I hope you plan to paint more of the Thompson Trophy scenes (*He does. wcn*)—that was truly the golden era of aircraft racing in the United States!" •

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(Far left) 6NLK/FM 6 channels of Conquest performance with dual rates, S148 servos and FM. 6NLK/AM also available.

5NLP/PCM brings contest features like Pulse Code Modulation and dual rates to sport flyers.

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MRC-Tamiya's Blackfoot

Tamiya enters the all-terrain crusher category...and everything that came before doesn't come close.

Setting the standards to power the industry

Churning mud and spitting rocks like a malicious monster gone mad, the Blackfoot is the nastiest, most powerful brute in the bog. He's also the most beautifully detailed R/C pickup, and the leader of the new generation of great looking, hot performing crusher pickups.

A deranged Ranger

This 1/10 scale Ford Ranger is all business and no compromise. Perched on its mammoth wheels and turf chompin' tires that are nearly a full 5" high, the Blackfoot towers above the ground like a Goliath. It stands high enough to scale sharp inclines and stomp the stumps and bumps that strand lesser pickups. Single piece hubs allow quick assembly, low weight and maximum ruggedness.

Tall isn't all

The Blackfoot's hefty ground clearance means it'll climb most any obstacle. And Tamiya's high output, high torque RS-540S engine pumps plenty of ground thumping power. While the Blackfoot's heavy duty, coil-dampened suspension — double wishbone in front, trailing arm in the rear — lets it effortlessly cut and dart with a nimbleness that belies its size.

Other creature features

Tamiya has engineered the Blackfoot with attention to quality and durability. Like a sealed gear box to protect the drive train gears from debris and moisture, differential gears for tight cornering stability and positive control on any type of terrain. And its one-source power from its BEC (Battery Eliminator Circuitry) gives you maximum space in the chassis with lower weight. For overall best performance we suggest you buy genuine, matched MRC-Tamiya ni-cads (not included).

The beauty at rest

Check out the lifelike scale and detail on the authentic undercarriage. Examine the carefully crafted chrome grille, the headlights, the doorlocks. From top to bottom, few R/C reproductions rival it.

Don't pussyfoot...get the Blackfoot

Add excitement to your hobby, and take command of the Blackfoot today. It's a beauty and a beast...prowling in a hobby shop near you.

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