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volume 19, number 212
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PARIS AIR SHOW
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All 4 channel systems are not created equal. Airtronics' Vanguard VG4R FM offers you incomparable quality, features, 1991 performance and component compatibility, that no other manufacturer can match, at any price.

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Airtronics Vanguard VG4R FEATURES	Other Leading 4 Channel Radio System FEATURES
Servo Reversing on All Channels	Servo Reversing on All Channels
Adjustable Length Sticks	Adjustable Length Sticks
Adjustable Tension Sticks	Adjustable Tension Sticks
High Capacity Rechargeable 600 MAH NiCd Batteries	Rechargeable NiCd Batteries
Gold Label Super Narrow Band Dual Conversion FM Receiver	Single Conversion AM Receiver
Transmitter and receiver exceed *all* AMA Guidelines for operation beyond 1991	/
High Quality Micro Precision Gimbals	/
Trainer System	/
Full connector compatibility with all Airtronics systems	/
Full One-Year Limited Warranty	180 Days Limited Warranty

Proven 1991 Performance

Vanguard VG4R FM utilizes Airtronics' Gold Label Super Narrow Band Dual Conversion 1991 Receiver for performance far superior to any single conversion AM or FM receivers.

RECEIVER	Airtronics 92765 FM	AMA Guidelines and Measurements
Adjacent Channel Rejection:	Better than −81.3 db @ +8.5 KHz	−60 db or better @ +8.5 KHz
	−69.2 db @ −8.5 KHz	−60 db @ −8.5 KHz
Image Rejection:	−70.8 db	Greater than −60 db @ Image Frequency
3rd OIP:	+3.8 dbm	Better than −4 dbm

TRANSMITTER	Vanguard VG4R FM	AMA Guidelines and Measurements
Occupied Spectrum:	Better than −55 db @ ±20 KHz @ 3 KHz RBW	Better than −55 db @ ±20 KHz @ 3 KHz RBW
Frequency Tolerance:	±1500 Hz	±1500 Hz
	*(Test results are on file at the AMA.)	

Vanguards Dual Conversion FM receiver and transmitter exceed all AMA technical guidelines and specifications. This assures you reliable 1991 operation at 20 KHz channel spacing and increased security against frequency interference.

We back up our performance claims with verifiable independent test results.*

Complete Compatibility

Airtronics offers total component compatibility, a full one-year limited warranty, and complete system upgrades and conversions to help eliminate costly R/C system obsolescence and replacement.

Vanguard VG4R gives you superior quality, incomparable features, and proven performance at a price that leaves our competition green with envy. If you demand Super Narrow Band Dual Conversion 1991 FM Receiver technology, product compatibility and the best R/C systems for your money, Airtronics is the only choice.

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MODEL BUILDER

OCTOBER 1989

volume 19, number 212

898 West Sixteenth St., Newport Beach, California 92663 Phone (714) 645-8830

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FEATURES

CONSTRUCTION

COVER: As part of his mini-report on the Paris Air Show, our "Chopper Chatter" columnist, James Wang, supplied the striking photo of the Rafale, the latest new-generation combat jet from the French Dassault company. The Rafale is a single-seater, about the size of an F-16, can reach Mach 2 in level flight, features a canard foreplane for outstanding maneuverability, and makes extensive use of composite materials, particularly for wing panels and fuselage structural components. Fuselage panels are made from a specially developed aluminum-lithium alloy. The Rafale is still in the prototype/testing stage and has not yet entered full production. We think it would make a great subject for a twin-engine ducted fan model, as the air inlets are large and virtually in line with the exhausts, yielding a straight-line airflow through the fans for maximum efficiency. Photo courtesy of Dassault.

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Weight 12.1 ounces Top RPM 13,600

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C/L STUNT AND SPORT MODEL

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SIG
KIT CL-25

SPECIFICATIONS:
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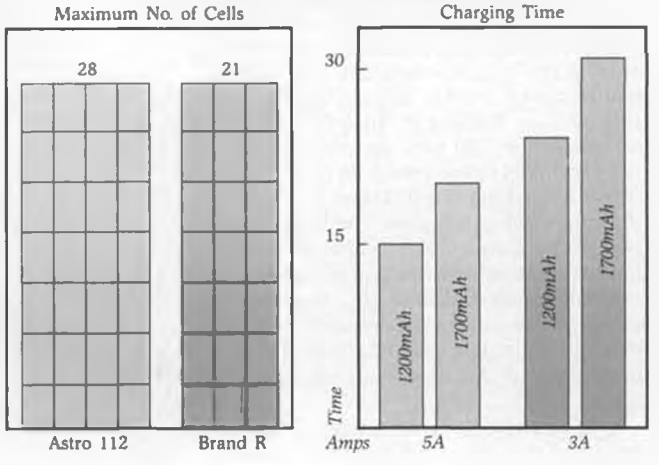
The Astro Model 112 DC/DC charger is specially designed to charge BIG ELECTRIC SYSTEMS FAST. No more waiting around for hours trying to charge the twenty eight cells in your Quarter Scale Cub. No more removing the wing to take out the four battery packs so you can charge them one at a time. Now you can charge all twenty eight cells (44 volts) at the same time. Just plug the astro Model 112 into the charging jack on the side of your model, set the timer for fifteen minutes and relax. Our high power precision electronics will do the work.

For versatility the Astro Model 112 can't be beat. It can charge any nicad battery with as few as one cell or as many as twenty eight cells. And the Constant Amp Charging Circuit is adjustable from one to five amps, so you can safely charge 250 and 500ma receiver packs, 900 and 1200ma airplane packs, and 4000ma boat and truck packs. The Astro Model 112 charges them all faster and more efficiently. The reason is simple, our super heavy duty DC/DC inverter puts out more juice. The proof is right there on the meter.

You will appreciate another little feature. The input cord is both fused and diode protected so if in haste you were to inadvertantly hook up the alligator cord backwards nothing would get fried. Just pop in a new 20 amp fuse and you're back in business. Also, voltage jacks are provided on the front panel, so you can monitor the charging process with your digital voltmeter.

DC/DC CHARGER COMPARISON



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WAKEFIELD LIVES! At a gathering of British and American modelers at Mile Square Park, Fountain Valley, California, one week after the NFFS Championships, fliers hold up their Wakefields for officials' identification. Following a one-two-three-go mass launch, the winner was to be the one at the greatest altitude in 40 seconds. Jim Adams, SAM president, faces camera a little to right of center. SCIFS member Al Hellman is at center with his Korda.

from Bill Northrop's workbench

• Notices have gone out and reservations are already coming back from exhibiters for booth spaces at the 1990, Thirteenth Annual, IMS Pasadena Model Sport and Hobby Show on January 12, 13, and 14, 1990. Because of the steadily increasing crush of people traffic, which this year resulted in the ticket office having to be closed temporarily at 1:30 on Saturday until some spectators had departed, Friday's schedule has been changed for 1990.

Instead of all day Friday being closed to the public while dealers and distributors visit the show exhibitors to examine new products and place orders, it will now be open for the industry-only from 9:00 a.m. until 2:00 p.m. Then at 2:00 p.m., the general public will be admitted until show closing at 7:00 p.m. Saturday and Sunday will continue on the same schedule as in the past . . . 10:00 a.m. to 6:00 p.m. and 10:00 a.m. to 5:00 p.m. respectively.

In addition to the schedule change, two other steps have been taken because of the crowded conditions. The hallway between the two exhibit buildings will no longer include manufacturers' booths, as the bottleneck developed by people gathering at the booths has created both an inconvenient and potentially dangerous traffic jam in this busy walkway and exit area.

It has also become necessary, again because of the crowding and potentially dangerous traffic jam, to discontinue the indoor flying demonstrations put on by the Black Sheep Squadron of Burbank, California. Indoor flying demonstrations were pioneered by the International Modeler Show at its second annual in 1979, when electric powered R/C record trials were put on during the show. Obviously, these were not official record trials, as no such category existed, but aside from the interest developed in electric powered model flight, it was a great "gimmick" to promote the show. The following year, Tony Naccarato put up a flight of one hour and 32 minutes, which may still stand as an all-power, no-thermal record flight for electric powered model aircraft. In the following years, Tony and his mother, Addie Mae, brought the Burbank model club known as the "Black Sheep Squadron" to the show to demonstrate indoor free flight models and electric powered control line models in action, It has been a star attraction of this and the IMS Atlanta show ever since. In the last few years, however, as the Pasadena show has continued to grow, the traffic congestion created by spectators at the twice-a-day demonstrations has become an increasing concern of IMS, Pasadena Center, and Fire Department officials, to the extent that the cancellation has become necessary. It should go without saying that if there was a larger facility available in the same geographical area and the same non-conflicting time slot, IMS would have taken the steps to relocate.

The only other significant change in the show relates to the Giant and Continuous Raffles. To create more recognition for the donors of raffle prizes, and more excitement for the holders of raffle tickets, all prizes, big and little, expensive and inexpensive, will be given out during the show. Big prize drawings will be announced as drawn, and small prizes will be posted, as in past years, however, as new tickets will be sold for each day of the show, winners of big prizes must be present to claim prizes or another drawing will be made.

Other than the above changes, the "Baker's Dozenth" Pasadena IMS show will

This prominent member of the model industry was a top British competition flier . . . British Open Champion in 1950 . . . about the time the above photo was taken. Name this mystery modeler for a free one-year subscription to *Model Builder*. Name the model, which was his design, and we'll throw in an Uber Skiver knife set.

be the same as in the past few years, with the entrance being through the west doors of the Conference Building, right next to the ticket booths at the auditorium entrance facing on Green Street. See ya there!

NORTHWEST EXPO

While we're on the subject of model hobby shows, the second show of the 1990 season will be the Ninth Annual Northwest Model Exposition, February 3 and 4, 1990, at the Puyallup Fairgrounds, Puyallup, Washington, put on by the Mount Rainier Radio Control Society. Keep your eye peeled for an ad to appear in the next issue with further details. In the meantime, if you're a manufacturer wishing to exhibit at the Expo, write to Bob Ford, at P.O. Box 73939, Puyallup, Washington 98373, for further information.

DIESELS

Be sure to read John Thompson's "Control Line" article this month. Having mentioned diesel engines in a previous column, and commenting on some of his difficulties with diesels, John received a long letter from Ian McQueen, who resides in Tokyo, Japan, and imports P.A.W. diesels from England and Davis Diesel equipment from the United States. The bulk of the letter contains what amounts to a primer on the "care and feeding" of diesel engines, and is so clear and basic that John has made it the major portion of this month's column.

With so much justifiable emphasis on noise abatement in modeling these days, it is amazing to us how the diesel engine continues to be overlooked as a power source for control line and radio controlled models in the United States, particularly among those who prefer combustion engines over electric motors. Diesels are quieter to operate than glow engines for two reasons. As they develop more torque than a glow engine, they have the power to turn larger props at lower rpm, whereas the glow engine has to run at high rpm and turn a smaller prop to develop the same amount of thrust. The higher prop rpm means higher tip speed, which produces more noise, and secondly, the higher pitched exhaust tone of a glow engine is much more irritating to the ear than the lower exhaust bark of a diesel. This illustrates one of the fallacies of using a decibel meter for measuring sound in relation to ear comfort. A deep exhaust note can produce the same reading on a decibel meter as a high pitched exhaust note, but in terms of ear comfort, the lower note is far less annoying. A lawnmower can putt around all day and not stir up any neighborhood resentment, but ten minutes on a model engine or a chain saw and everyone is up in arms.

Diesels have long seen more use in European modeling, possibly because of the scarcity and/or high cost of nitromethane, as compared to these factors in the US. The two best features of diesel engines are; (one) no starting battery is required, as there is no glow or ignition plug, and (two) no fuel-proof finish is required on the model. The main disadvantage is something that only occurs when

Continued on page 107

ADVICE FOR THE PROPWORN
—By Jake

Dear Jake:

I'm a modeler who also likes to golf. I know that the dimples on a golf ball improve its aerodynamics and makes it fly straighter and farther. I felt that this principle could be applied to aircraft, so here's what I did. I took a rolling pin and screwed 432 pan head screws into it, evenly distributed all over the roller. After covering the balsa sheeted foam wing on my new airplane, I rolled the bumpy rolling pin all along the top and bottom of the wing. The result was a very uniform dimple pattern on the upper and lower surfaces of the wing. Standing there looking at my new dimpled plane, I had one of those visual inspiration experiences you talk about, and named it the "Titlist."

I had very high hopes for success, but after takeoff on the first test flight, the aircraft veered to the left and crashed in a sandy area adjacent to our grass runway. Can you explain what might have happened?

Arturo from Orlando, Florida

Dear Arturo:

Sounds like you hooked it into the bunker.

Jake

* * *

Dear Jake:

What's the difference between an $800 PCM radio and a $300 analog radio?

Comparison Shopper in Maine

Dear Comparison Shopper
and Loyal Readers:

All together now . . . about $500.

Jake

* * *

Dear Jake:

The anthropology department here at Brandeis has been studying hobbies of ancient and current cultures. The whalers of early New England, for instance, carved intricate nautical drawings on whale teeth. This art form was known as Scrimshaw. More recently, the nomadic tribes of Greenland have carved drawings on walrus tusks. A carving of this type is known as a Tupeluk. In Hawaii, natives string shark teeth together to form ornate necklaces. This art form, which is called Tourist Trap Junk Jewelry, is also practiced in turquoise by the American Indians of the Southwest.

A colleague of mine has a nephew in Tarrytown who enjoys the building and flying of model aircraft. This young man has brought to my attention that certain members of the modeling culture carve aeronautical artifacts of foam and wood, then collect their wares at mass social gatherings where grandiose and imaginative lies are exchanged. Could you tell me please, what this fascinating art form is called?

Professor in Waltham, Massachusetts

Dear Professor:

Swap shops.

Jake

* * *

Dear Jake:

An aviation chronicle on TV referred to the B-57 as having a bicycle landing gear. Does that mean somebody like Schwinn made the wheels?

Warren in Wisconsin

Dear Warren:

No, it meant that the B-57 had to be chained to a fence whenever it was left unattended.

Jake

* * *

Dear Jake:

You're the best thing that has happened to a model magazine since Phineas Pinkham first appeared in Flying Aces.

Some years after he appeared, the magazine disappeared.

You're not related to Phineas are you? There is a family resemblance.

Worried Multi-Year Subscriber in Middletown

Dear Worried:

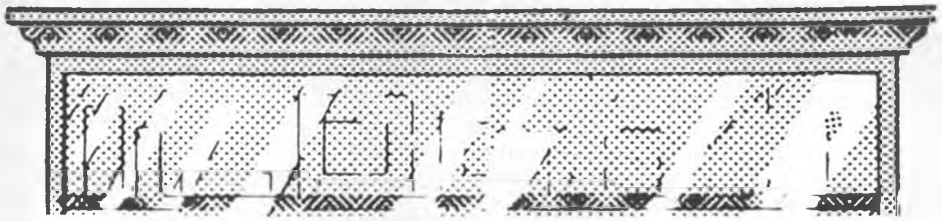
No, Phineas and I are not related. That's just a name I used to use in a previous job.

I'm sure that if I were to suddenly find myself out of work, *Model Builder* would be glad to transfer the remainder of your subscription to another suitable hobby publication such as the HO Scale Synthetic Shrubbery Review.

Jake •

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.



• Zenith Aviation Books favored us with review copies of two of their latest publications, both of which come from England. They are volumes 1 and 2 of *Aircraft of World War One*, part of the popular *Aircraft Archive* series. Scale modelers who like WWI stuff will go nuts over these two books, as they are full of excellent *Aeromodeller*-type three-views and detail drawings, plus lots of good clear photos of the full-size aircraft. Little historical background is given for any of the 55 different machines covered, except what can be gleaned from the photo captions; these volumes were created with the modeler in mind and concentrate instead on the airplane itself. Both volumes comprise 96 pages and are done in an 8-1/4x12-inch format. Price is $16.95 each.

From Zenith Aviation Books, P.O. Box 2, 729 Prospect Ave., Osceola, Wisconsin 54020.

* * *

Sig Mfg. is now shipping kits for the new "Four-Star 40," a four-channel low-wing taildragger designed for exceptionally sporty aerobatic performance on .30-.40 two-stroke or .40-.50 four-stroke engines. Wingspan is 59-3/4 inches, wing area is 604 square inches, length is 47 inches, and the flying weight should be somewhere around 4-3/4 pounds. Kit features include ultra-simple Lite-Ply fuselage construction, spruce wing spars, pre-cut sheet balsa tail surfaces, formed aluminum landing gear, canopy, decals, hardware, photo-illustrated instructions, etc., etc.—in other words, it's a typical Sig kit, and that by itself should tell you more about the quality and completeness of the kit than we can here.

Four-Star 40 kits are priced at $69.95 and are available now, either from your local hobby dealer or direct from Sig Mfg. Co., 401-7 Front St., Montezuma, Iowa 50171.

* * *

The first of the 1990 model aircraft shop calendars has arrived here at *MB* headquarters and a very nice one it is. It's being put out by photographer Dennis Crooks, under the DC Aviation name, is printed on high-gloss card stock, and features 12 photos of some top caliber R/C scale aircraft built by noted modelers, each photo accompanied by a short descriptive caption. The calendars measure a full 11 inches by 20-1/2 inches when opened. Going price is $6.00 each plus $1.00 or $2.00 for third and first class postage respectively. Quantity discounts are offered and you can even get the calendars with your club name and/or logo printed at the bottom—send an SASE for details.

Two great volumes of WWI scale aircraft drawings, 55 in all, from Zenith Aviation Books.

From DC Aviation, P.O. Box 98, Big Rock, Illinois 60511, phone (312)556-3729 or (708) 556-3729 after the first of November.

* * *

The folks at Byron Originals report that ever since they added the P-47 Razorback to their line of 1/5-scale warbirds, they've been swamped with requests for the bubble canopy version. Well, they listened, and the bubble canopy P-47 has taken its place with the Byron P-47 Razorback, P-51 Mustang, A6M5 Zero, F6F Hellcat, P-40 Kittyhawk, and F4U-1 Corsair.

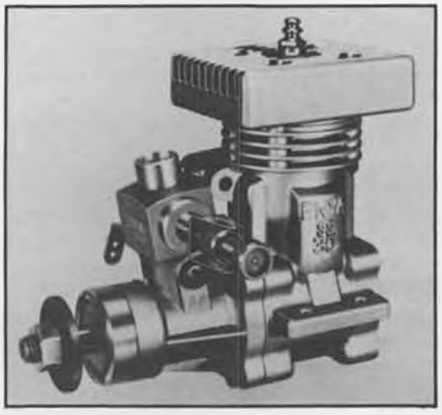
Actually, the two P-47 kits are virtually identical with the obvious exception of the molded fiberglass fuselage. Even the price remains the same: $438.90. These kits have far too many noteworthy features to tell you about in the limited space we have

Now available from Byron Originals, the bubble canopy version of the P-47 Thunderbolt.

here, so if you are interested and would like to know more about the new P-47 or the others in the Byron kit line, contact Byron Originals directly at P.O. Box 279, Ida Grove, Iowa 51445, phone (712) 364-3165.

* * *

Enya's new SS35 Heli TN engine is designed for R/C chopper fliers who want to give their .30-size machines a real performance boost. The engine features a ringed piston and the popular Enya TN 5.6mm carburetor, a two-needle design that allows extremely precise control of the fuel/air mixture. Maximum horsepower rating is 0.9, with a usable rpm range of 2,500 to 16,000. Those who are currently using the Enya SS30 heli engines will be



The new Enya 35SS Heli TN engine.

pleased to know that the new .35 has the same mounting bolt spacing, making it a drop-in retrofit that will yield maximum results with minimum effort.

From Altech Marketing, P.O. Box 391, Edison, New Jersey 08818.

* * *

Computers are playing an ever-increasing role in modeling these days, both in simulated flight instruction (the systems offered by Dave Brown and Ambrosia come to mind) and in model aircraft design. The latest example of the latter to cross our desk is called ModelCAD, a computer aided design system from American Small Business Computers, Inc. If you own or have access to an IBM PC or compatible computer and know how to use it, the ModelCAD program can help you design your own aircraft, cars, boats, train layouts, or whatever, and do it accurately and quickly.

Also included is a model airplane analysis program called ModelCALC. It allows you to specify design information such as wingspan, weight, power, etc. about an airplane design, then will automatically produce a data readout and three-view drawing. Neat, huh?

Now for the technical stuff. ModelCAD requires a minimum of 512K RAM. A math coprocessor is supported, but not required. A mouse or digitizing tablet can be used, but these are not required either. Output can be produced on a dot-matrix printer or plotter. ModelCAD supports AT expanded memory, but none is required. A hard drive is recommended but not really necessary.

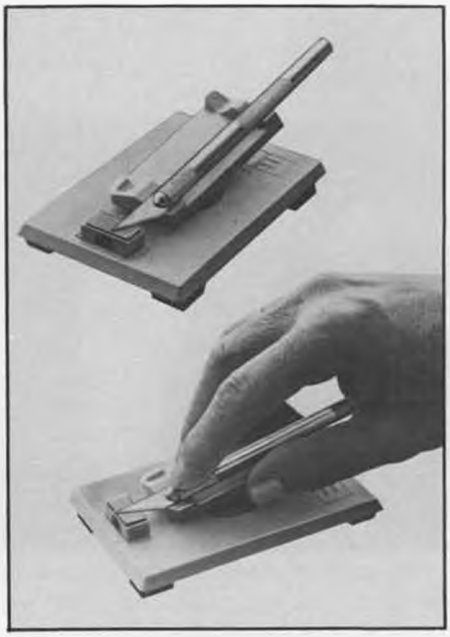
Priced at $99.00, ModelCAD is available from American Small Business Computers, Inc., 327 South Mill, Pryor, Oklahoma 74361, phone (918)825-4844.

* * *

Victor Model Products, a name that will be instantly familiar to model boaters, is branching out into the model aircraft field by offering two semi-scale kits designed for 035 to 05 electric power, a Pietenpol Air Camper and Spirit of St. Louis, the latter being called "Lindy's Lectric."

Both models are three-channel ships using rudder/elevator/motor controls. Both include machine sanded wing ribs and other components, complete hardware, supr-lite plastic wheels, formed wire landing gear, rolled plans, and written instructions. Also included is a quick change motor mount system and a battery hatch design that allows easy battery removal or charging. Lindy's Lectric features formed and trimmed plastic wing tips, cowl parts and spinner, and the instructions show how to build up the dummy cylinders and wing struts, if desired.

The Pietenpol kit is priced at $45.50, while Lindy's Lectric goes for $35.95. Shipping and handling is $3.00 for each, plus California sales tax if applicable. A detailed information sheet covering both models is available by sending an SASE to Victor Model Products, 12258-1/2 Woodruff Ave., Downey, California 90241.



The Edjer blade sharpening device is now available with a diamond stone.

* * *

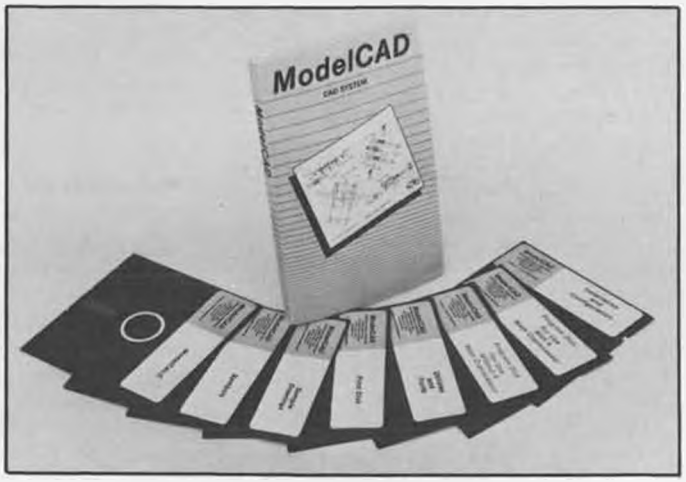
Ted Davey of Davey Systems Corporation advises that he is now shipping kits for the "Hammer 20," the popular small size "pocket pattern" ship designed by Dick Sarpolus. This is a smooth, fast flying model with generous fuselage side area for good knife-edge flight, a tapered wing planform and a fully symmetrical airfoil. The kit features die-cut and machined balsa, plywood and hardwood parts, pre-cut sheet fuselage sides and tail surfaces, hardware, detailed instructions, and rolled plans. Specs on the Hammer 20 include a span of 50 inches, wing area of 430 square inches, a flying weight of 3-1/2 pounds, and an engine size range of .19 to .30. Suggested kit retail price is $59.95.

From Davey Systems Corporation, 675 Tower Lane, West Chester, Pennsylvania 19380.

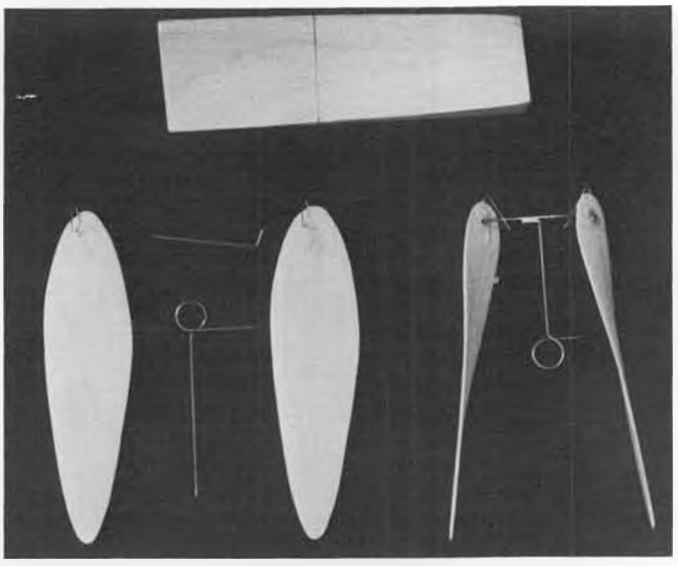
* * *

That great little blade sharpening device known as the Edjer has just gotten even greater with the introduction of the Diamond Edjer, which features a reversible sharpening block with 325 and 1000-grit diamond stones. This is the best sharpening

DC Aviation's colorful 1990 shop calendar, featuring R/C scale models.



ModelCAD computer program for designing models, from ASBC.



Folding propellers and hardwood prop blade form from Superior Props.

The new Four-Star 40 sport R/C ship from Sig Mfg. Co.

surface you could possibly have, and will yield an even sharper edge and in less time than either the Arkansas whetstone or ceramic stones that were previously offered (and are still available). The new Diamond Edjer also costs a few dollars more, but when you consider the greatly increased life you'll get out of your #11 blades by resharpening them instead of just pitching them out when they get dull, you'll recoup the $15.00 list price in no time, especially if you're an active builder. For those who are already using Edjers with the Arkansas or ceramic stones, the new diamond sharpening block is available separately for $8.50.

There are actually a number of Edger/stone combinations available, some for #11 blades and others for both #11 and #16 blades. Your best bet would be to send an SASE and ask for the Edjer info sheet and price list/order sheet. Write or call The Edjer, P.O. Box 8, Moorpark, California 93020, phone (805)529-9313.

* * *

One of our photos this month shows one of the hardwood propeller forms and a couple of the folding F/F rubber model propellers offered by Superior Props in Pensacola, Florida. The prop forms, which come in three different lengths and are pitched according to your specifications, are used to form the individual blades of a folding prop by binding a watersoaked sheet balsa blank to the form and then baking the whole thing in a 300° oven for half an hour—sounds a heck of a lot better than the popular but uncertain method of using cans and bottles to do the same thing.

Also available are ready-made folding props, in diameters of from 6 to 18 inches. We assume that these require only finishing of the blades before they're ready to use. Extra sets of matched blades can be purchased separately, either for replacements or for experimenting with different diameters and pitches. The design of these props is such that the blades can be changed in seconds, without tools.

For an information sheet that includes prices and ordering instructions, send an SASE to Superior Props, 2412 Tucson Ave., Pensacola, Florida 32526.

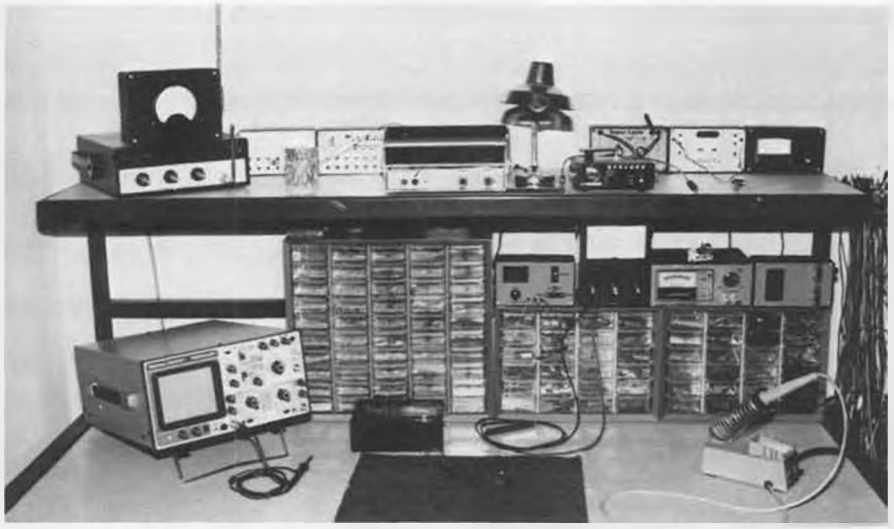
The Hammer 20, now available as a kit from Davey Systems.

Pietenpol (top) and "Lindy's Lectric" 05 electrics from Victor Model Prod.

* * *

Quarter-scale builders who are especially interested in WWII vintage warbirds will want to take a close look at the MiG-3 plans set being offered by Roamin' Research. The MiG-3 is an exceptionally clean and good-looking machine drawn to a full three-inch-to-the-foot scale and engineered for conventional balsa/plywood construction. What you end up with is a 101-inch span, 20 to 28-pound flying machine complete with operating wing flaps, sure to stand out on any flight line.

The MiG-3 plans set totals 65 square feet of paper (both wing halves are shown), are shipped rolled, and include an instruction booklet. Price is $30.00, which includes postage to anywhere in the U.S. Some prefinished parts, such as a molded plastic canopy and fiberglass cowl, air scoops and exhausts are also available, but you'll have to write for price quotes on these items. From Roamin' Research, P.O. Box 104, Yale, Michigan 48097. •



Electronics Corner

By ELOY MAREZ

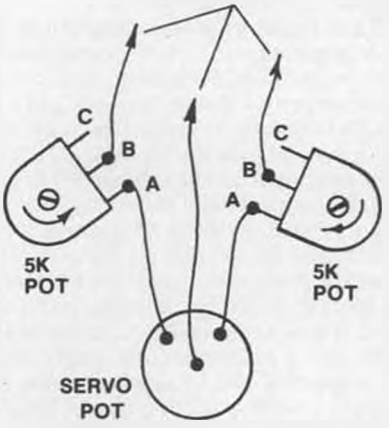
• OUR MODERN RADIOS are fantastic pieces of mechanical and electronic engineering, and you are not doing yourself a favor if you have closed your mind with the oft heard comments: "I don't need all those bells and whistles," or "too complicated for me." I'll bet there was also a time when you didn't think you needed servo reversing and throw adjustments, and look how much simpler R/C life can be with such features at hand. I guess I will have to agree that Mr. Ugly Stik Flier doesn't need any of the available refinements, but if you are flying anything more complex and realistic, you will surely find that the advances found in the newer radios will help your flying.

As for being too complicated, well, yes, I have run into a couple of fliers who would be better off without the more advanced transmitters. They are the same guys who also shouldn't have retract gears, pressurized fuel system engines . . . you know, the type of person who never takes the time to study and learn about anything, and usually spends a lot of it blaming whoever made his equipment. The second generation of programmable radios are especially "user friendly," to borrow a phrase from the computer brochures, and except for the more complex mixing functions available, after the first time, one can set or change them as desired without having to resort to the manual every time.

BUT THEY DO HAVE DISADVANTAGES! And they only apply to a small percentage of us, but I want to mention these things to save some misunderstandings somewhere along the way. The more fancy features a transmitter includes, the more complicated and sophisticated it is. And the more difficult it is to change. If at all! Very few of the current crop of PCM and "computer" transmitters can be modified even in the slightest. The reason is sometimes that the programming is fixed in a microprocessor, other times it is simply a matter of space . . . there is little to spare inside a well equipped transmitter.

Even common changes that we learned to expect back in the simpler days, things like mode and band changes, are no longer possible. Anything is possible, you say? Well yes . . . but when such things require different printed circuit boards and copious amounts of time, they are not practical or economical and most R/C companies simply do not offer them.

So, be careful while making your purchases. Don't assume that you can send your radio in and have the mode or band changed; in all cases it is always best to check with the company who makes or imports it before you buy it or send it in. Though most of the simpler, more basic transmitters can have such things as mode changes made without any problems, they too are limited when band changes are asked for. All RF work is more critical now due to the narrow band restrictions. Ask!



The temporary connections to be made to the feedback pot in a servo to determine the values of the resistors needed to increase the throw any desired amount. Complete procedure is described in text.

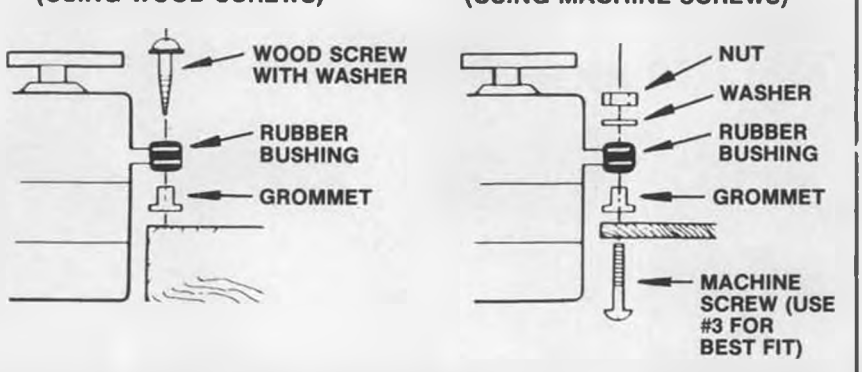
Sometimes you may be told that while the changes you ask for are not available, your transmitter will be exchanged for one taken in from someone else who asked for a change exactly opposite to yours. Sounds good maybe, until you remember that you are getting a transmitter that someone else owned and might have tried to modify, or did who-knows-what to it. In any event, it is a used transmitter; think about it carefully before you accept such accommodating sounding offers.

MOUNTING SERVOS is, and sounds like, such a simple thing, doesn't it? Well, bear with me, there are those who just recently started in this great hobby and don't have it all together quite as well as you have. Look around, you'll find a lot of improperly installed servos. Maybe you have even committed one of the oft seen errors yourself . . . that of installing those insignificant looking brass bushings upside down!

What difference does it make, you say?

Continued on page 77

SERVO MOUNTING



Those little brass bushings that came with your servos might appear small and unimportant, but there is a correct and incorrect way to install them. Discussion in text.

COSTA RICA 1989

By GEORGE P. BURDELL . . . Our roving correspondent travels down south for the seventh running of the annual Tropical R/C Fun-Fly, hosted by the Aeromodelismo Costa Rica. There's nothing quite like it anywhere else in the world!

• There's a club of about sixty-five model builders in Central America who sure know how to have fun!

Each year, they host a fun-fly that's gained worldwide status for the FRIENDSHIP and FUN that are the prizes for all who get there. "THERE" is the free, independent country of Costa Rica . . . and the club is the AEROMODELISMO COSTA RICA.

Their country has fewer than three million population . . . their president won the Nobel PEACE PRIZE in 1987 for his achievements in bringing peace and tranquility to Central America. The country has no army and puts the equivalent funding into education and health care for its people. Since the Nobel prize was awarded, Manuel Noriega (ruler of Panama, to the south) and Daniel Ortega (ruler of Nicaragua, to the north) have sure succeeded in fouling things up. But peaceful Costa Rica sits in the middle . . . neutral like Sweden . . . exporting coffee to the world . . . exporting Del Monte bananas to the world . . . and exporting model building and flying fun to the world, too.

May 2nd through May 8th was the Seventh Tropical R/C Fun-Fly in Costa Rica, and the visitors came from nearby countries as well as the U.S.A. I always chuckle when I see contests listed as "The First Annual. . . ." The intentions are always great but the accomplishments in following years often fall a bit behind. But when you realize this dedicated modeling group has been pulling off its International R/C Fun-Fly this long you get some idea of the dedication and support the group has earned from sponsors.

LACSA, the airline of Costa Rica, teams up with the Irazu Hotel in San Jose, to be key sponsors. All coordination is through the local club and El Hobby Shop of San Jose, which is the country's only hobby shop. A few magazine writers get invited on space-available tickets . . . a few modeling VIP's get invited . . . lots of people simply catch low excursion fares on LACSA

Right: The carnival-like atmosphere of the Costa Rica fun-fly is shown to good advantage in this shot of the pit area. The annual event is extremely popular with both fliers and spectators alike.

Tommy Jacomini (right) and Harold Roberts fire up Buddy Pitchett's sorta-scale Travel Air Mystery Ship, converted from a Midwest Stik kit.

This transmitter impound could be anywhere in America, except the Spanish spelling of "channel" is different.

Great Planes Model Mfg. Co., one of the event sponsors, is managed by Steve Ellison (starting) while John Newport (holding) does R&D work.

The special event for Dura-Planes were a lot of fun. Javier Soriano had a lovely pit crew in his two daughters, Alyandra and Tatiana.

The Costa Rican CD (right) frequently met with his assistants to make sure things kept moving smoothly. Neat shirts, too!

The Dura-Planes really need Cape Kennedy rocket launches in the rarified 4000-foot air. Here's Manuel Espinoza blasting one off.

and vacation at the fun-fly for the week, take in the local sights, visit the volcanoes, take the train ride out into the countryside, and get to visit and know the friendly local modelers who genuinely welcome their visitors. Test flying takes place Thursday and Friday . . . Saturday and Sunday are fun-fly contest days with lots and lots of spectators coming to see the fun and crashes on Sunday.

The fun-fly had a simple pylon race and a sequence of touch-the-spot-and-go; fly under the limbo, and break the balloon. The standard model was a .40 sized Ugly Stik type. U.S.A.'s Dura-Plane Company sent ten of their models down for the local club novices to assemble and fly . . . and they put on a spectacular show . . . dotted with some lively crashes!

The Dura-Planes suffered a combination of downwind launches, rarified thin air (reportedly we were flying about 4,000 feet above sea level), and some sick needle valve settings in beginner's hands. The crowd simply loved the crashes . . . it was kinda like Saturday night dirt track car racing.

The wildest flying adventure was a Sunday afternoon *thirty minute* airborne streamer-cutting event. You simply had to see it to be a believer. The club uses the Pacific Plan, with three flight stations for regular flying, but all stops were pulled and it was a miracle no mid-airs occurred with five and six models dog-fighting for streamer cuts. Yessir, our Central American friends in Costa Rica really know how to have fun.

There were lots of truly *human* events

Control line is alive and well in Costa Rica. From left are Orestes Perdomo of Cuba, Sergio Saboria of Costa Rica, Adolpho Perez of Santo Domingo, and Bernardo Madriz of Costa Rica.

This C/L Nobler was built from plans. Balsa grows in and is cut by Balsatico in San Jose, the capital city of Costa Rica.

Model Builder engine columnist Stu Richmond and his wife brought a Fox .40 powered original design that won the "Best Free Style Aerobatics" award. Seated with them is Guy Revel, of France, who reported on the Nuremberg Toy and Model Fair in our July '89 issue.

One of the Dura-Plane events was pylon racing, with near simultaneous launches. Power was mostly .25's, but .40's would have been better.

during the week. The club's president and his lovely wife, Julio and Maria Pastora, opened their home to the entire gang for a pool side party with food, music, and beverages. On Saturday, I spoke with an enthusiastic youngster who asked all sorts of questions about model airplanes . . . he was about twelve years old. On Sunday, he was at the field with fifty bags of candy for the entrants . . . and when I asked how he got there with the family's Gallito brand of candies, he replied in perfect English . . . "Oh, like yesterday, my chauffeur drove me here."

A standard Costa Rican souvenir is a clay bird with a hollow body. It has a series of holes and sells for about two bucks. Blow in the bird's beak and uncover the holes sequentially and it whistles. They tried to sell me one (I think it's called an ocarina). I replied I didn't want a musical bird . . . but that I wanted a musical LACSA *jet airliner*. The price was renogiated, the delivery date was set for late Sunday night, before Monday's departure from this lovely GARDEN OF THE AMERICAS country. I brought home a custom crafted ocarina . . . cover the cabin windows (holes) with your fingertips, gently blow up the airliner's tailpipe as you selectively uncover the windows and out comes music . . . custom made in Costa Rica!

The Costa Ricans had another neat human touch . . . there was a Sunday night banquet and prizes were awarded for the R/C flying events like the pylon races, spot-limbo-balloon event, streamer cutting, best giant scale, best free style aerobatics, but they really did things right . . .

Master kit manufacturer Lou Proctor's model box never did arrive in Costa Rica—so he just had fun smiling, taking pictures, and hugging the ladies!

because *every* visiting model builder received a beautiful teakwood plaque with the club emblem. The engraving is in Spanish and mine says . . . "A George P. Burdell . . . Valioso participante en el 7th Tropical R/C FUN-FLY . . . Costa Rica, 1989." Every overseas visitor took home a beautiful reminder of a pleasant few days in a far away country where fun and smiles were plentiful . . . where new friendships were made . . . where *Model Builder* is the most read model magazine . . . and where the visitors to the 7th Tropical R/C Fun-Fly will tell you that Costa Rica's main export product is fun, warmth, and lasting new friends.

If you'd like to attend the next Tropical R/C Fun-Fly I'd suggest you write to Julio Pastora, Aeromodelismo Costa Rica, Box 44-1017 San Jose 2000, San Jose, Costa Rica, and ask to be put on their next year's mailing list. If you don't speak Spanish, please don't worry . . . modeling is a universal language! •

Right: Henry Bartle and his wife Donna had their .40 Stik and ducted fan Viper jet arrive late, but they flew fast and well to delight the Sunday crowd of spectators.

FLOAT FLY!

(ACE R/C STYLE)

AL TUTTLE reports on the Second Annual Ace R/C Float Fly, one of the largest and most enjoyable water fun-flys in the country. Plan now to attend next year's event!

• The ACE R/C SECOND ANNUAL FLOAT FLY was held Saturday, June 3rd and Sunday, June 4th, 1989 at the Higginsville City Lake, Higginsville, Missouri. Some 175 modellers pre-registered, with 134 modellers actually showing up and participating. The extremely bad weather forecast for the area during the weekend was probably the reason for the less-than-expected turnout. This was a shame, and I feel sorry for those procrastinators who didn't show up, as the weather the entire weekend was absolutely perfect! In fact, it was the kind of weather that a modeller dreams about; temperature in the mid-70s, very light breeze from the proper direction, and beautiful blue skies with light, white puffy clouds. How sweet it was! This was Saturday's weather. Sunday, there was high overcast, 8/10th's low cloud cover with temperature in the low 70s, and very light wind. Again, a perfect day for flying. Add this to an enthusiastic and congenial group of modellers and you have the ingredients for one heckuva fun weekend. These ingredients were expertly blended together by, ACE R/C owners Tom and Donna Runge, the ACE R/C gang, and the Mid Missouri Modellers.

Although the float fly was to be held on Saturday and Sunday, factory tours were held Friday from noon to 3:30. For those of us who hadn't seen the new facilities, this was a real treat. ACE is growing, and their new facilities are simply second to none.

Below: An overall view of the flight line. Weather was threatening all weekend, but no rain fell.

The lineup of the ACE R/C models that were demonstrated each day. Seamasters and the ACE four-stroke models accounted for most entries.

Registration and transmitter checking took place on Friday evening at a nearby restaurant. A total of 134 fliers took part.

Genial ACE R/C owners and hosts, Tom and Donna Runge, put on a fine meet with the help of the Mid Missouri Modellers club. They're already making plans for next year's event—don't miss it!

Several busted airplanes were soon back in the air, thanks to the on-site repair station manned here by one of the Ackerman twins (either Kenny or Richard, we can't tell 'em apart).

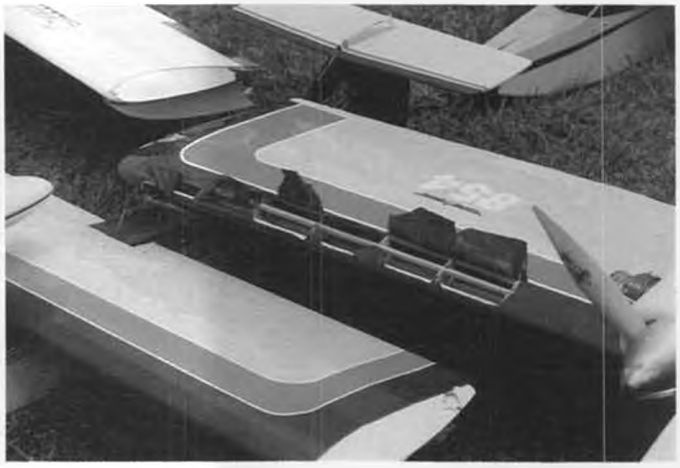
An ACE 4-120 taxis out with an R/C skydiver under each wing, "Goose" Guzman at the controls. "Goose" had his hands full when one of the skydivers refused to release; story in text.

Tom and Donna are justifiably proud of their company. Who sez nice guys finish last? If your summer vacation travels bring you anywhere near Higginsville, Missouri, stop by and visit ACE R/C. You will be glad you did.

My wife, Julie, and I arrived Friday noon after a 1300 mile drive from Port Orange, Florida. After paying our respects to Tom Runge, Julie and I headed for the lake to do some flying, as the weather was too good to pass up. Besides, I had a brand new scratch-built ACE SEAMASTER 120 which had only been flown twice the previous Sunday and I wanted to get some more stick time on it.

Upon arrival at the lake, several other modellers were already there flying. Gordon Banks, of *Radio Control Report*, was there and flying up a storm. Gordon told me it was his first experience with float flying and that his first two takeoffs were a bit on the shaky side. He was flying an ACE 4-60 bipe. Anyhow, he was having one heck of a good time and got in eight flights that afternoon. I assembled my SEAMASTER 120 and with Bud Atkinson as my spotter, put in a flight. The SuperTigre 3000

Right: Retrieval boats included one man-carrying and two electric R/C types. All three were kept busy during the weekend.



These two photos show the damage that resulted when two Seamasters, a 40 and 120, collided in flight. Both models landed safely and both were back in the air the next day, after a stop at the repair station and some attention from the Ackerman brothers.

Bud Atkinson had something different from the rest with his Miniature Aircraft "X-Cell" helicopter on fifteen-year-old Kavan floats.

A big S.T. 3000 literally blasts Al Tuttle's Seamaster 120 off the water. Ship had only a couple of flights on it before the meet.

really hauls the mail and the plane gets off the water in about forty feet. This is not surprising as the all-up weight of the model with an Airtronics SPECTRA RX, 1.2 mAH battery pack and six servos, is only fifteen and three-quarter pounds. The rest of the afternoon was spent visiting the modellers.

Pre-Float Fly transmitter processing, registration, and social gathering was held at Willis and Jeanne's Restaurant in Higginsville, from 6:00 to 9:00 p.m. This is a marvelous opportunity not only to get your transmitter checked, but to watch last year's float fly video tapes, partake of the restaurant's excellent food and drink, and sit around swapping war stories and lying a lot. The weather reports kept coming in all during the evening and the forecast was downright depressing; violent thunderstorms, high winds, rain, etc., which was to continue all through the weekend with a slight chance of clearing possibly late Tuesday! The weather channel radar showed all kinds of nasty bright colored things! Higginsville was surrounded by real bad stuff. It sure didn't look good. Poor Tom Runge was trying to keep a stiff upper lip and with a few attitude adjusters under his belt he did manage to flash his famous smile, albeit rather weakly.

I have to admit that the weather didn't look too promising as we drove the forty miles from Higginsville to John and Carol Britt's home in Lees Summit that evening. The late evening weather forecast still had the same disastrous storms, etc., with no chance of fair weather until the following week. John and I said what the heck, and prepared the models for the following day. In spite of all the modern space age instrumentation, these guys could be wrong! A thunderstorm did go through the Lees Summit area about 1:00 a.m., but that was it. Much to our surprise, Saturday morning dawned bright and clear and the weather channel was still forecasting bad things. So much for science! Upon our arrival at the lake, we were greeted by Tom Runge who had the biggest smile you ever did see!! Talk about one happy guy!! We told him it wouldn't dare rain until Sunday night cause he (Tom) was on a roll!!

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Something really unusual, a Bonded Models "Roun' Tuit" on home-brew floats, by Ed Morrow.

Sig's latest kit is the "Four-Star 40," a taildragger that also performs beautifully on floats, as designer Bruce Tharpe demonstrated. He and Dave Falkenhagen represented Sig at the float-fly.

The "Higginsville Hornet," an original design by Bill Dickey, reflects his interest in Old Timers. Note that the floats are built-up stick construction with MonoKote covering. Power is a K&B .20 Sportster.

Davey Systems' 1/5 Scale Piper Super Cruiser

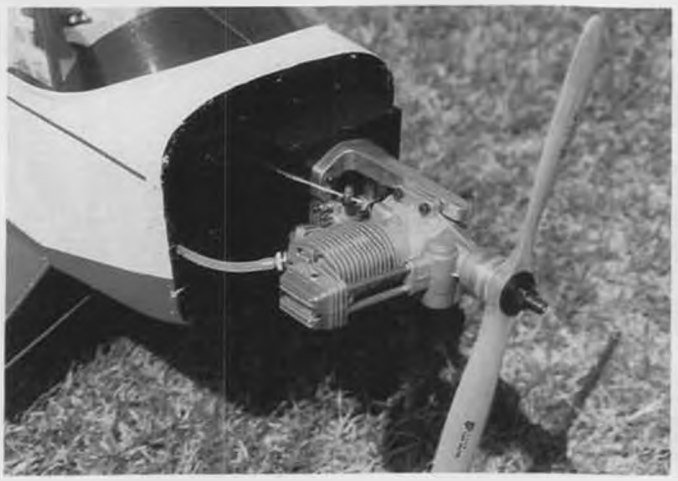
By GORDON RUFF

• A little history of the Piper Super Cruiser. . . . The prototype first flew as the Cub Cruiser in 1939, powered by a 75 HP Continental. After a large number of different variants were built before, during and after WW-II, the PA-12 Super Cruiser was introduced in 1947 with a Lycoming 0-235 of 100 HP. A total of nearly 3800 PA-12s were built, with 70 per day being produced at one point, before the model was phased out in 1948. Back then, the airplane cost $3,000 new and could be flown at a gasoline cost of 1-1/2¢ per mile. Today, the Super Cruiser is still an extremely likeable aircraft to fly and its classic lines are admired by all.

Now for the model. Davey Systems Corp. has taken over production of this kit, produced in the past by Champion Model Aeroplane Co. of Woodbridge, New Jersey. At 1/5 scale, it is attractively sized and a good change of pace for someone who likes the flying quality of a Cub, but is a

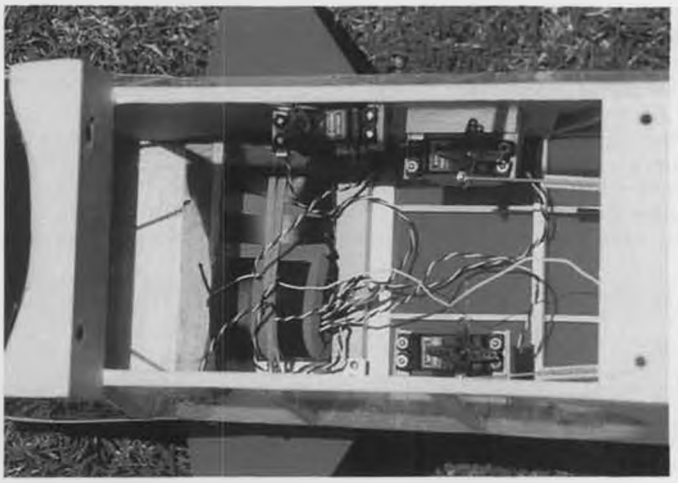
Left: Free flighters will recognize this field instantly—the kitty litter plant in the background is a dead giveaway. It's the famous site at Taft, California, and our author has it all to himself as he makes a slow pass for the camera. Gordon is the father of frequent *MB* contributor, Skip Ruff.

Construction of the Davey Systems Piper is quite rugged and will stand up to some rough handling, as our author unintentionally found out. All-up weight with MonoKote covering is 9-1/2 pounds.



O.S. .61 four-stroke is at the bottom of the recommended engine size range but does a fine job of flying the Piper in a realistic manner.

Wire bracing on the tail surfaces is scale and should not be omitted, as it adds immeasurable strength and rigidity.



A standard size Futaba R/C system is all but lost inside the Piper's fuselage. Locate the radio as necessary to help balance the model.

The Davey Systems kit includes parts for a built-up cowl, but our author chose to substitute a glass unit from Fiberglass Master (address in text).

trifle bored flying a yellow J-3 like everyone else! Heaven knows, we have enough of those kits on the market!

The kit contains all the wood needed for construction, full size plans, and a small 11-page construction manual. Very little hardware is provided. The plans and manual are pretty sparse and possibly, for this reason, the lack of hardware. The manufacturer does not recommend this kit for the beginner (says so on the box). I'll have to concur with that. The wood and die-cutting were good enough not to require any substitutions, although I did come up short on 1/16 sheet balsa and some cap stripping material. One nice feature was the balsa wing spars which came from the factory capped with hardwood.

Though not the simplest of models to build, construction follows fairly normal procedures, except for the fuselage. Being wider at the center than at the top or bottom, the fuselage has to be assembled, more or less, in your hands. The manual recommends a building jig and, after building models for 50+ years, you'd think I'd have one!

Suffice it to say it can be done without a jig, but it sure would be easier with one! With the 1/8-inch piano wire and the 1/8-inch plywood used in the cabin area, the fuselage is very strong (and unbeknownst to me) this would be demonstrated on the third flight.

The wing and tail surfaces are conventional, with the wing being one piece when finished. The tail surfaces are wire-braced, as on the full size machine, and these wires should not be omitted. Although the pieces are provided for a built-up cowl, Fiberglass Master Inc. produces a glass cowl for this kit. You can save yourself

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Right: The red-and-white scheme on Gordon's model was copied from the full-size Piper Super Cruiser owned by Chris Kidd and based on a farm at Cuyama, California.

The 38th PARIS AIR SHOW

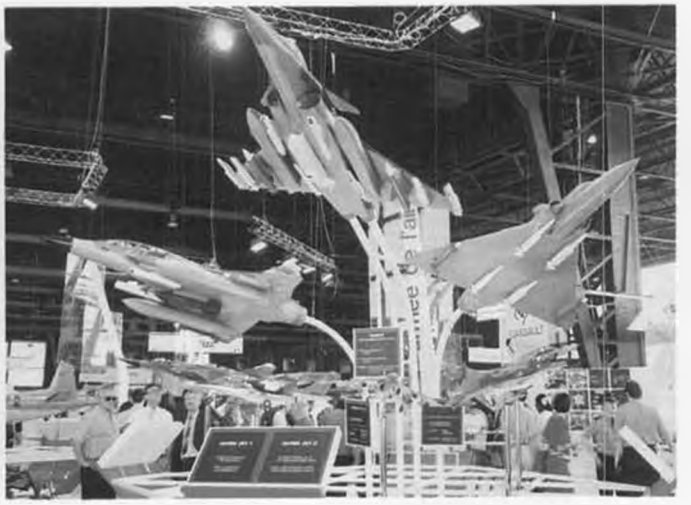
By JAMES WANG . . . Our "Chopper Chatter" columnist took a break from his helicopter research duties to attend the world's largest and most glamorous air show. Come along as he gives a brief rundown on some of the state-of-the-art flying machines that were exhibited.

• Folks who read my "Chopper Chatter" column regularly probably know I am a gung-ho aeronautic researcher. The Paris Air Show is the Mecca for me and a million other aviation buffs. It is a bi-annual show, the largest and most glamourous. State-of-the-art, full-size aircraft, spacecraft, helicopters, and missiles, are showcased for interested buyers from around the world to see. Billion-dollar deals are made at each show. Each firm sets up a dazzling indoor display of their new aerospace products. To attract potential customers, there are dazzling female beauties at each booth to give you brochures, decals, company information, or to arrange a meeting for possible purchase of that new A9L Sidewinder missile you might need. About 100 chalets are lined up along the runway. The big cheese of the manufacturers come to Paris to give fancy lunches at private chalets to help sell their wares. Potential buyers and sellers drink champagne while sitting on patios outside the chalets, and enjoy flight demos of their products. However, you don't have to be a big shot to come and enjoy the show. Let me take you through a

The I.A.63 "Pampa" is Argentina's new subsonic ground attack aircraft, shown here with its awesome array of weapons.

The USA Pavilion had an 80-foot model of the National Aerospace Plane on display outside. Many U.S. aerospace companies showed their wares.

These "Aspic" R/C drones are produced by the French CAC company. Engines are 25-hp, two-cylinder, 275cc Limbachs, built in Germany.



The French Dassault booth. The center model is our cover plane, the Rafale, with Mirages on either side.

quick tour of the best air show on earth.

The Paris Air Show is a 10-day event held in June of every odd numbered year. The next one will be in 1991. The show takes up the entire Le Bourget Airport. There are acres and acres of indoor displays. Over a thousand aerospace firms from around the world gather here to compete for orders. Everyday, from noon to 5 p.m., there are nonstop flight demonstrations. Fighter jets, commercial jets, helicopters, prop planes, gyrocopters, you name it, you'll see it. Each aircraft is allocated about six minutes to show off. Hi-tech fighters routinely pull 6-g turns with full afterburner to impress potential customers. Full-size helicopters are doing loops and rolls right in front of you. Russian Mig-29s and Su-27s perform

No article by James Wang would be complete without at least one helicopter photo. Here an Aerospatiale Ecureuil demonstrates its power by lofting another Ecureuil.

low altitude tail slides, high-alpha-low-speed passes, vertical climb out after take-offs, etc. All the flying demonstrations are breathless, and ear deafening. During weekdays, the show is for trade visitors only (but anyone with a business card who pays 60 francs . . . about $9.00 . . . can get in). On weekends, the show is open to the public, and the flight demos extend from morning to evening. Furthermore, the entrance fee reduces to 30 francs! Drink plenty of water before you go, a can of soda is $3.00! Over half a million people visit the Paris Air Show. Now you can fulfill your wife's wish to visit romantic Paris, and

The Soviet Union's presence at western air shows has increased tremendously. On the left is the Sukhoi Su-27 fighter, and the Russian space shuttle, Buran, on the right.

at the same time, give yourself a treat.

To thoroughly see the show, one would need at least 10 full days. At the end your feet ache from walking miles through indoor aisles and outdoor displays; legs cramp from standing to watch the daring flight demos; and arms tire from lugging 20 pounds of free brochures and posters. Due to my busy schedule this year, I could only spend two and a half days at the show. Surprisingly, I met a Frenchman, Paul Zeboulon, who recognized me through reading my chopper articles. We spent the afternoon doing plane talk. Soviet Union and China were the chatting topic at the show. China, because of the student democracy revolution going on at that time, and Soviet because of the incredible flight demo by the Russian Su-25, Su-27, Mig-99, and the crash of the Mig-29 on the first day of the show.

An eyewitness to the crash described the Mig-29 being at 500 feet altitude when pilot Anatoly Kvotchur pulled into a 30-degree climb-out at about 100 knots. Suddenly, a 15-foot long orange flame shot out from the right engine. Then the Mig rolled right. At 250 feet altitude, Anatoly ejected from the plane. Two seconds later the Mig crashed into the ground. Former British Harrier chief test pilot, John Farley, says he has personally witnessed nine

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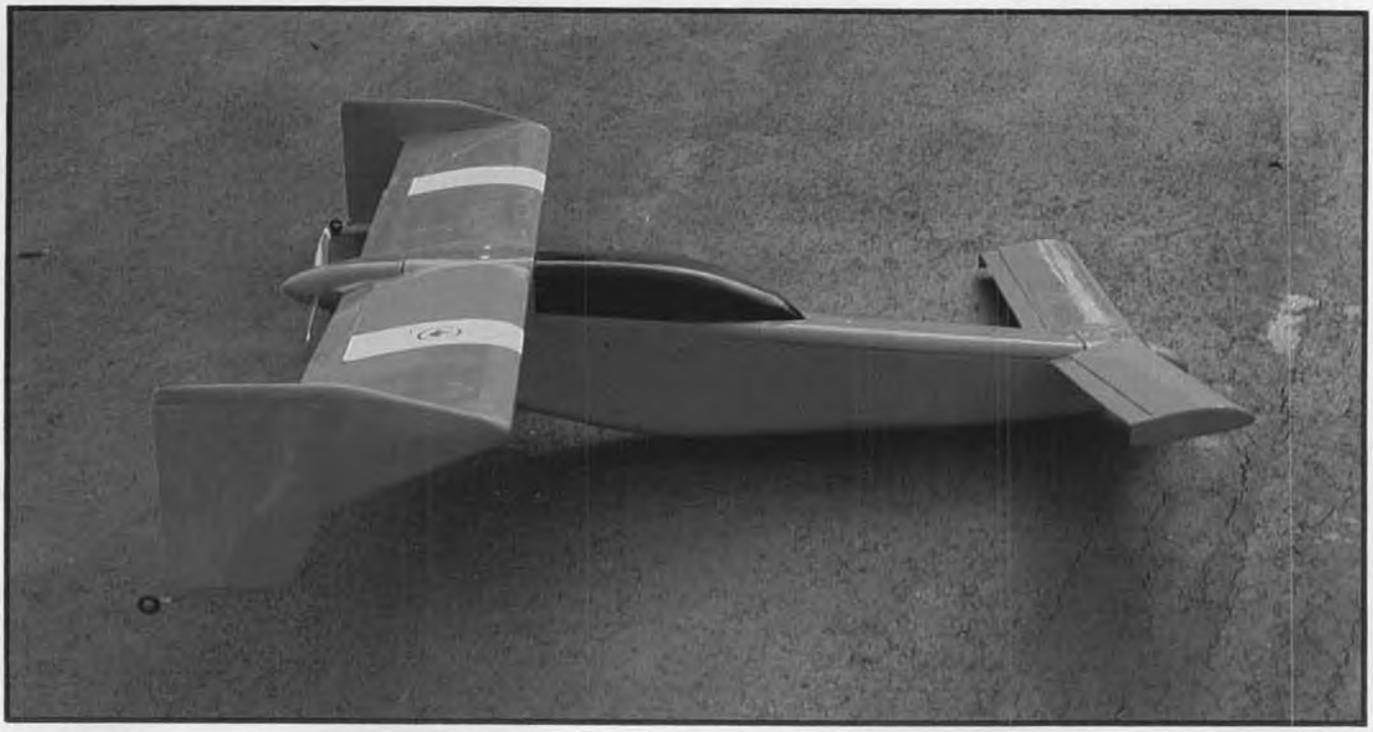
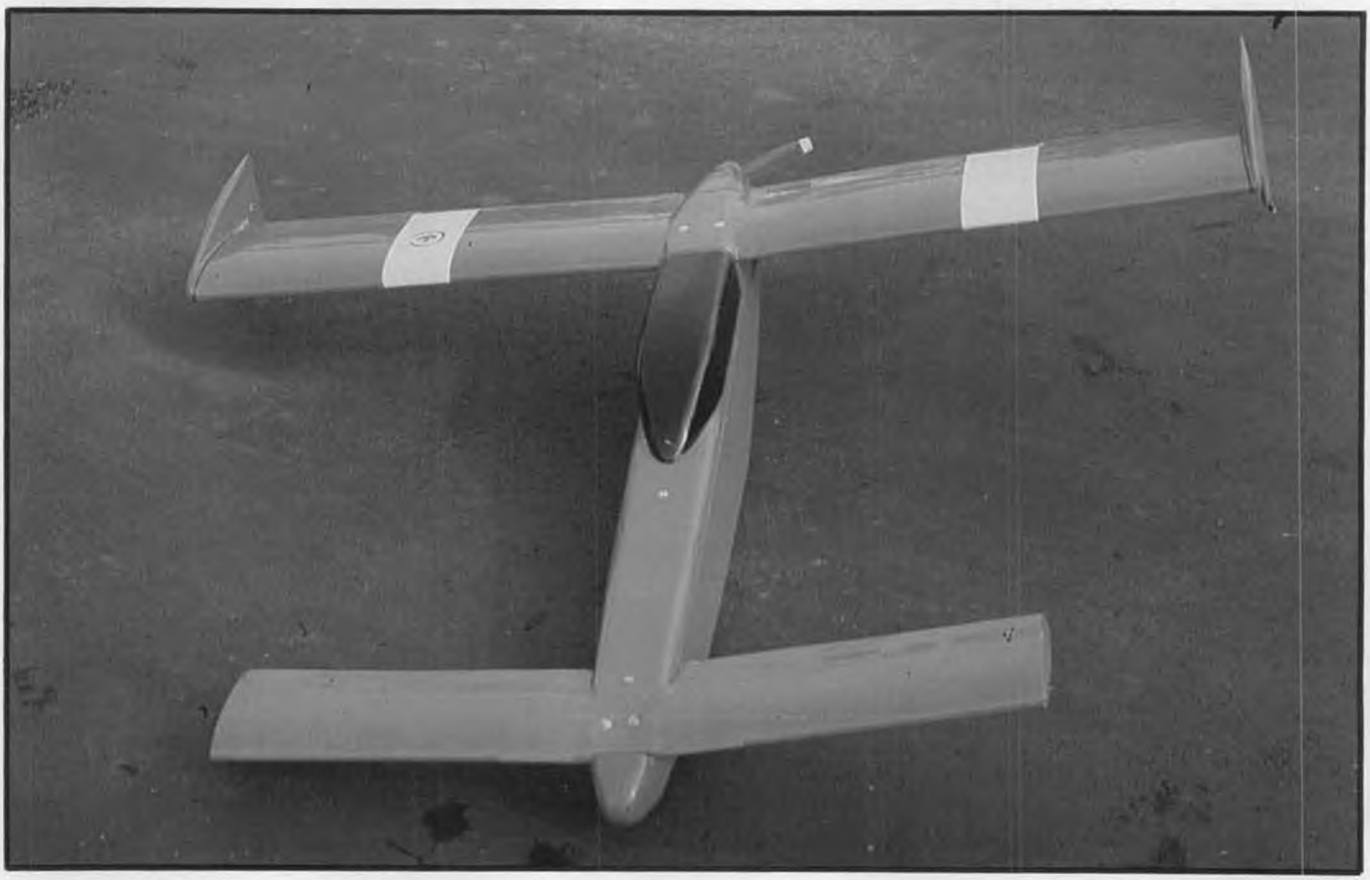
Pretty photographer 'rom *Flight International* shows the proper CG position and elbow-in-the-gut technique for steadying that monstrous 800mm zoom lens.

The Soviet Mig-29, of the type that was involved in a spectacular crash on the first day of the show. Pilot Anatoly Kvotchur escaped death by the narrowest of margins. About the size of an F-16, the Mig-29 is considered by many experts to be the highest performance jet fighter ever designed.



SWAN



By A.G. LENNON . . . This month we're presenting an unusual .45 size pusher canard that features, among other things, flaps on both the fore and aft flying surfaces. It's an excellent flier and is guaranteed to turn heads at any flying field. The designer is a noted aerodynamicist and author of the book, *R/C Model Airplane Design.*

INTRODUCTION

• The Swan was designed in the winter of 1984-85, and was built in the spring of 1985. The following summer was devoted to test flying, modifications, and the inevitable repairs. Finally, in October 1985, this model aircraft flew to the author's satisfaction.

During test flights, takeoffs were good, climb was excellent, directional and longitudinal control and stability superb; flap deployment (of both fore and aft flaps) was adjusted to provide a good glide, flaps down. Surprisingly, deploying the flaps had no effect on longitudinal trim; the model seems to "levitate" as it slows down. This is in sharp contrast to conventional models which require down-elevator trim to avoid nosing up when the slotted flaps are fully deployed. The annoying and persistent problem was a gentle "wing-rocking" at low speeds. The model seesawed around itslongitudinal axis about 10° each way.

This mild instability did not increase in amplitude or become uncontrollable, and disappeared when the aircraft accelerated under power.

Experienced canard fliers advised that this wing rocking was characteristic of canards; the cure was to speed up the model. This, the author did not accept. Landings at high speed are difficult and potentially damaging, and had no place in flapped canard design philosophy.

A variety of cures were attempted. First, the CG was moved forward 1/4 inch, by addition of ballast, and the foreplane's incidence upped by 1/4°, the rocking persisted.

Next, chordwise wing fences of 1/32-inch plywood were installed at the outboard ends of the flaps and test flown without beneficial results . . . and were removed.

NASA drooped leading edges ahead of the ailerons were installed; again to no avail . . . and were removed.

Finally, the author did what should have been done originally. He checked the incidence of both fore and aft wings and found the aft wing at a full 1° *above* design incidence.

The incidences were adjusted to those shown in the drawings, and the CG moved forward slightly to the drawing position; by addition of a small amount of ballast.

In subsequent test flights, the model flew beautifully with no wing rock. Flaps were effective and slow speed, nose-high touchdowns on the aft wheel were made. Half-flap deployment resulted in shorter take-off runs and higher rates of climb.

The original linkage for lowering both fore and aft flaps simultaneously (which is mandatory) but still permitting overriding pitch control, proved reasonably effective, but not ideal. Several types were tried during the test flying period. Finally, the arrangement shown in the drawings proved very satisfactory.

The elevator servo is mounted on a slide and is moved back and forth by the flap servo which both lowers the aft flap as it rotates counterclockwise and moves the elevator servo backward, thus simultaneously lowering the forward flap. However, the elevator servo operates independently but under radio command, to raise or lower the forward flap for pitch control, without regard for its location on the slide.

Forward flap deployment of 20° balanced 35 to 40° of aft flap deployment and resulted in a slow, slightly nose down glide, which could be steepened to roughly 45°, nose down, without much acceleration due to the high flap drag. This permits slow approaches and slower, nose-high touch downs under good control. This arrangement permits considerable flexibility in adjusting the deflection angles of both sets of flaps, through the use of different holes in the flap and elevator servo arms, and in the inboard aft flap horn.

The Swan will not stall or spin; the only other limitation is its limited ability to fly inverted. This is characteristic of canards using cambered (as distinct from symmetrical) airfoil sections on both fore and aft wings. The foreplane section is NACA 4415 and the aftplane NACA 2415.

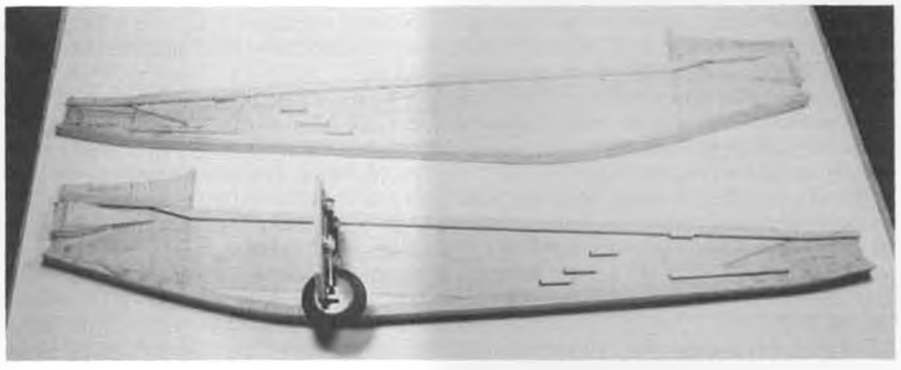
CONTROLS

The author uses a six channel Futaba transmitter, receiver and five S128 servos. The flap servo is controlled by the slide switch that permits flap deflection proportional to the switch's movement. A retract snap-switch would necessitate only two flap positions; full up or full down.

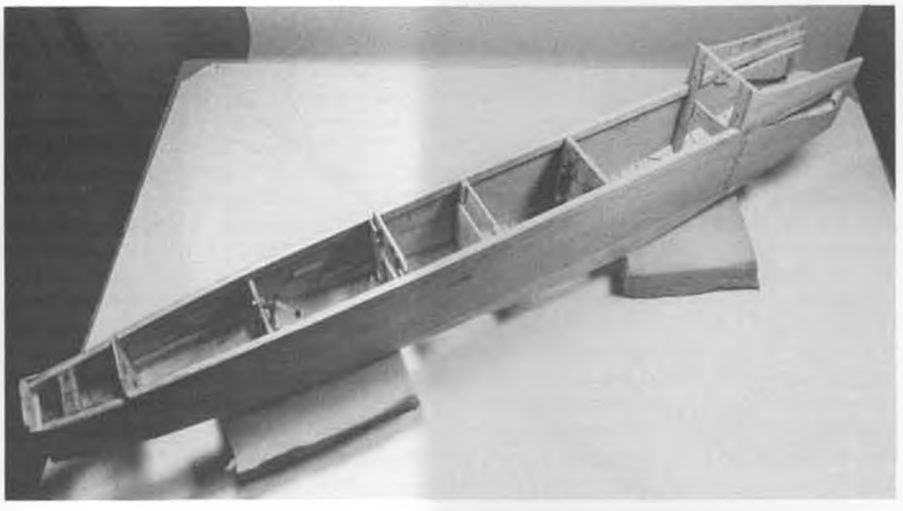
To minimize the amount of ballast to properly locate the CG, all servos, a 700 mAH battery and the receiver, are located as far forward as possible in the fuselage.

The connection from servos to ailerons, aft flaps and engine are Sullivan flexible "Gold-N-Rods." The rudder servo and rudders are linked by fine nylon stranded cord that permits outward rudder action only. The elevator servo is linked to the foreplane slotted flap by ball joints and push rod.

The drawings show Futaba S128 servos. The servo mounts may require modification to suit other servo types.



Fuselage construction starts by building up the left and right side sub-assemblies. Shown here are the two finished parts with bulkhead No. 7 in place on the left side.



The basic fuselage assembly with all bulkheads in place. Note that the landing gear hardware is permanently attached to bulkheads No. 4 and 7 before the fuselage sides are joined.

LANDING GEAR

This is "Bicycle Type," and both wheels have spring action for shock absorption. The forward wheel is steered by the rudder servo for directional control on the ground.

Small wheels below and behind the rudders stabilize the model as it taxis.

ENGINE INSTALLATION

An inverted, pusher, OSMAX .45 FSR, with Tatone exhaust manifold, is employed. This arrangement permits fully cowling the engine. The easily removable lower portion of the cowling provides ready access to the carburetor and glo-plug. The fuel tank is a 6-ounce Du-Bro which fits precisely.

The low-drag, recessed NASA "scoops," plus the exit below the spinner provide adequate engine cooling. With the model stationary, a full tank of fuel was consumed, at high engine rpms, on a hot summer day, with no adverse affect.

The glo-plug is provided with an on-board circuit for both engine starting and for glo-plug heating at low rpm, for consistent inverted engine operation. While this latter feature is optional, the on-board 1-1/2-volt battery and its holder reduce the amount of ballast needed.

Inserting the plug in the jack, well away from the prop, for engine starting is both safer and more convenient.

ENGINE COWLING

The original cowling of the Swan was a fiberglass-and-epoxy lay up. This proved to be too flexible and difficult to fit properly. A more satisfactory balsa and plywood version is shown in the drawings, that consists of six pieces of 1/2-inch balsa, plus 3/8-inch triangular stock. It is split horizontally, the upper half epoxied to the engine bulkhead, and the lower retained by three Goldberg flat holddowns, permitting its easy removal by hand.

This built up balsa version has been used on several models very successfully. Note the 1/32-inch ply formers that control cowling inner and outer contours at the parting line and stiffen the balsa edges.

FUSELAGE

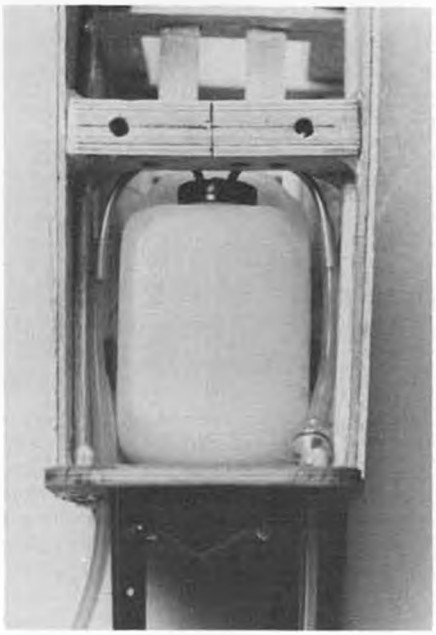
The readily removable canopy extending from the foreplane to the aft wing is very convenient. It permits access to servos, control linkages, landing gear and on-board glo-plug battery.

FOREPLANE

This is a built-up balsa structure, and is stress skinned. The slotted flaps (flapevators) are torque-tube actuated and serve as both elevators and flaps, in conjunction with the aft wing slotted flaps. Ply end plates act as modified Hoerner tips, and protect the foreplane on the ground.

AFT PLANE

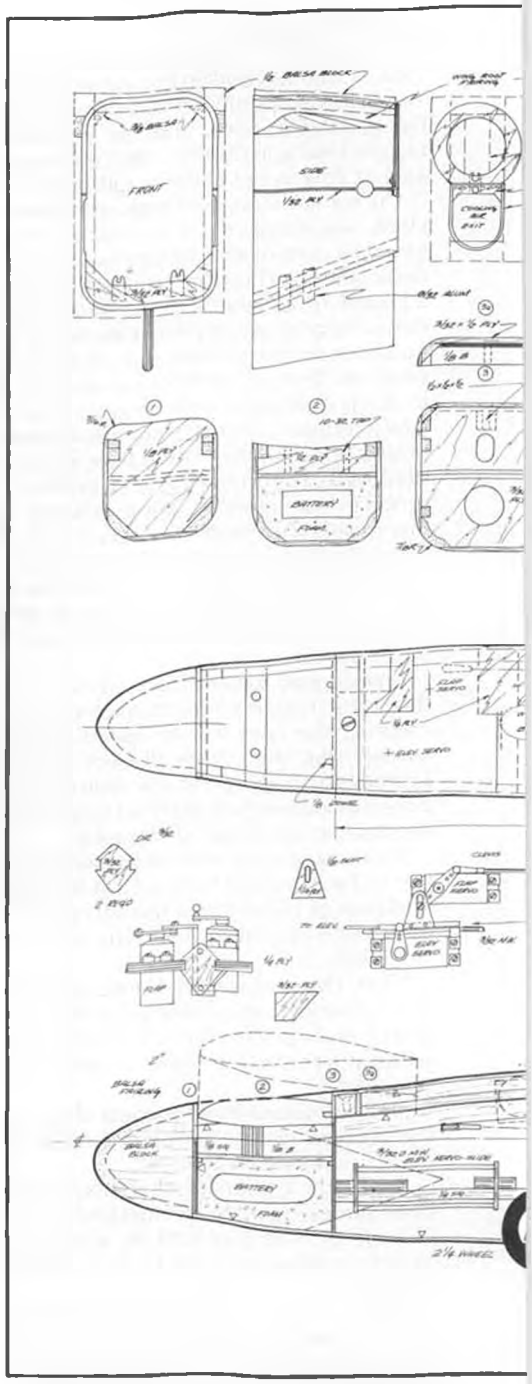
The trailing edge of this built-up, stress skinned surface is taken up with ailerons and slotted flaps, both actuated by torque tubes.

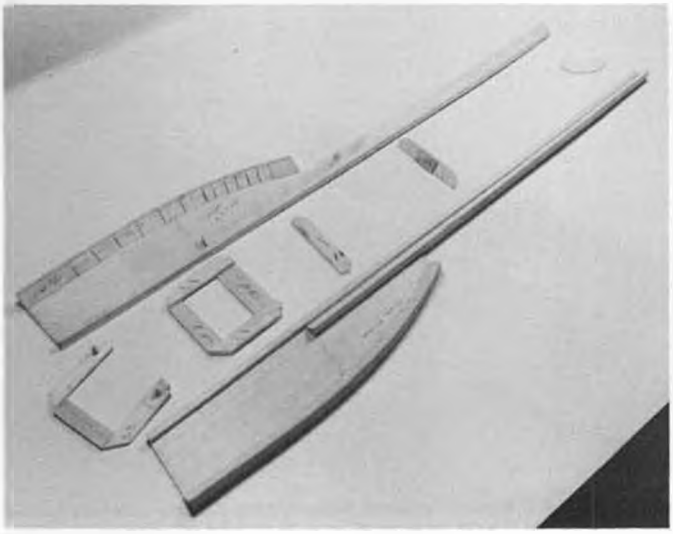


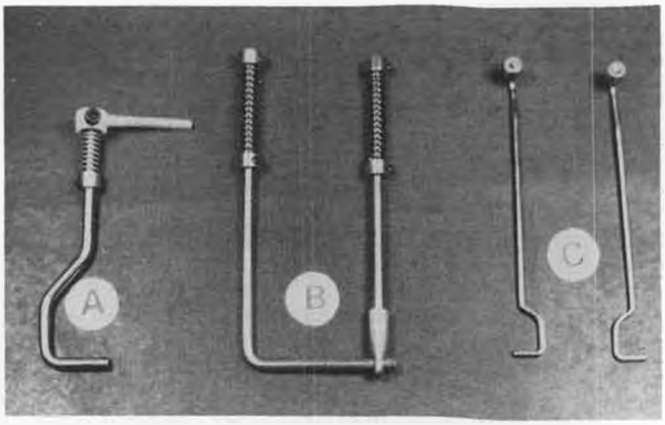
Fuel tank installation.

Ailerons are differential in action; have double-MonoKote, gap-sealing hinging, and are static balanced with lead wire to avoid flutter. The flaps have external hinging in streamlined enclosures.

Because the inner portion of this wing operates in the foreplane's downwash, it is at a higher angle of incidence (2.5°) than is the outboard portion (1°). To accomplish this, the spars, both main and aft, are jogged; the change in incidence taking place between ribs E and F. Jigging, to be described later, permits easy and accurate assembly.

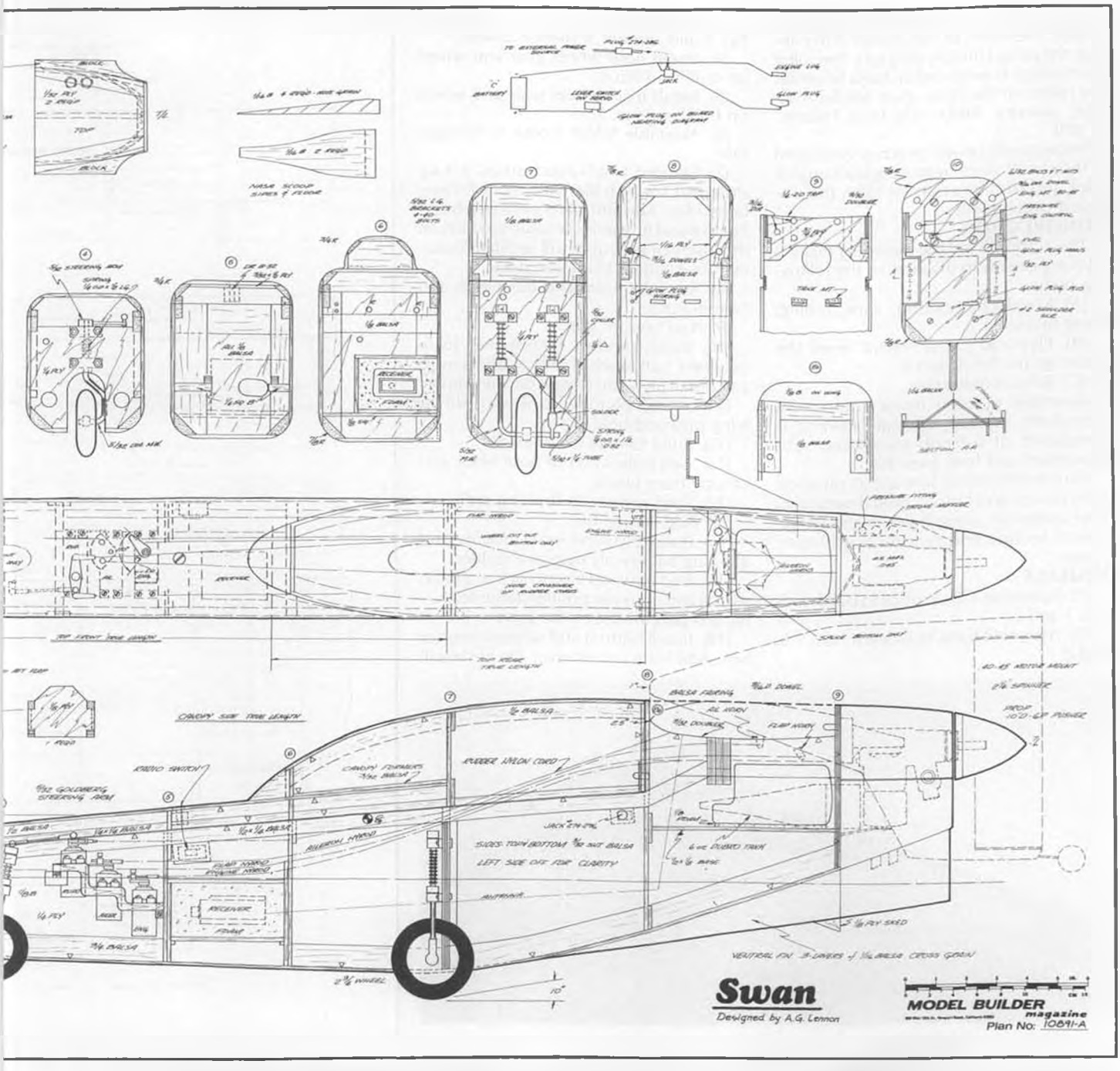






Above: Music wire landing gear struts. A is the nose gear, B is the main, and C is for the two tip rudder wheels.

Left: The individual canopy components ready for assembly on the fuselage. Canopy is part of the removable radio access hatch.



FULL-SIZE PLANS AVAILABLE—SEE PAGE 106

FINS AND RUDDERS

These are located at the aft wing tips and toe-in 2°. They are stressed skin structures with 1/32-inch sheet balsa skins, are light, and surprisingly strong.

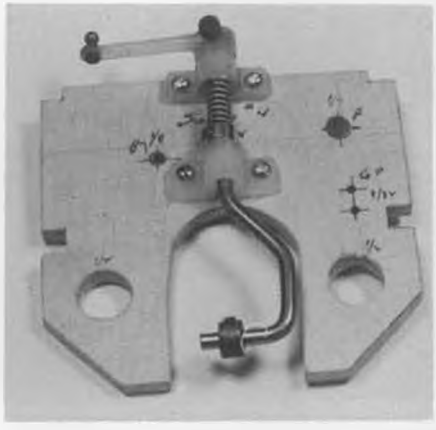
Rudders open outward only, the one on the inside of the turn. The servo cord pulls the rudder out against a small spring that neutralizes the rudder when the rudder control stick is centered.

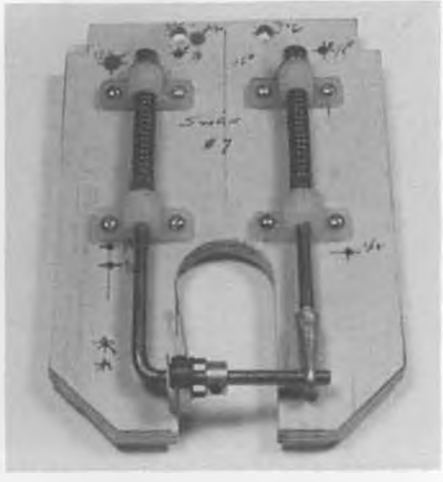
BALLAST

The Swan, with its upswept aft wing requires roughly 10 ounces of ballast in the hollowed-out balsa nose block, in the form of lead shot. The model's CG should be at the location shown . . . with a full fuel tank.

GLO-PLUG HEATING AT LOW RPM

The engine servo's two-armed lever is





Close-ups of the nose gear strut hardware mounted on bulkhead No. 4 (left) and the main gear strut parts on bulkhead No. 7 (right).

cut from a round 1-3/8 inch diameter servo wheel. The width of the shorter arm controls the period the glo-plug is lit. The roller lever switch is mounted on balsa to center the roller on the lever. (See *Model Aviation*, January 1988, "Glo-Plug Heater" P. 103)

No separate on-off switch is employed in this circuit, since by moving both engine stick and trim lever down fully, the on-board circuit is cut.

CONSTRUCTION

The author "kits" the model by making all components to drawing, in the following order:

(A) Metal components, wire, tubing, sheet brass, etc.

(B) Plywood parts, traced from the drawings on the plywood.

(C) Balsa components.

Assembly of each major component (foreplane, aftplane, fuselage, cowling) is composed of sub-sub-assemblies, sub-assemblies and final assembly.

Do not drill and tap fore and aft plywood hold downs and canopy hold downs until final assembly, using holes in the wings' center section and canopy as drill templates.

FUSELAGE

(1) Assemble 1/8 sq. strips to bulkheads No. 1 and 3.

(2) Assemble balsa bulkheads Nos. 5, 6, and 8

(3) Install motor mount on bulkhead No. 9 and cement 3/16-inch dowels.

(4) Install nose wheel gear and wheel on bulkhead No.4.

(5) Install main wheel gear and wheel on bulkhead No. 7.

(6) Assemble NASA scoops to fuselage side.

(7) Cement 1/4x1/2-inch strips, 1/4 sq. strips and 3/4-inch triangular stock to fuselage sides. Add doublers between bulkheads 8 and 9. A series of small saw cuts on the inside of the curve will facilitate bending the 3/4-inch triangular stock.

(8) Assemble sides and bulkheads and tank mounts.

(9) Add bottom skin.

(10) Install receiver battery and foam between bulkheads 1 and 3, add cover, and install plywood foreplane hold-down.

(11) Install plumbed tank and add aft wing plywood hold down.

(12) Build canopy on fuselage.

(13) Add hollowed out nose block and canopy front block.

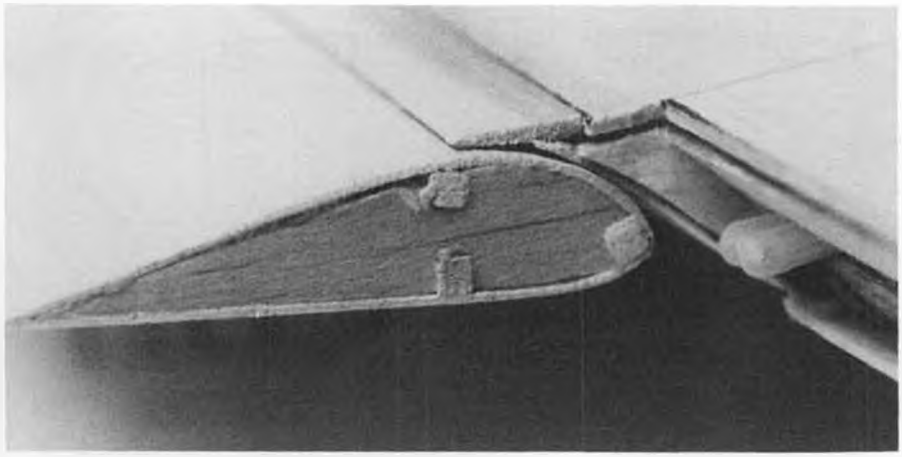
(14) Sand corners to drawing radii.

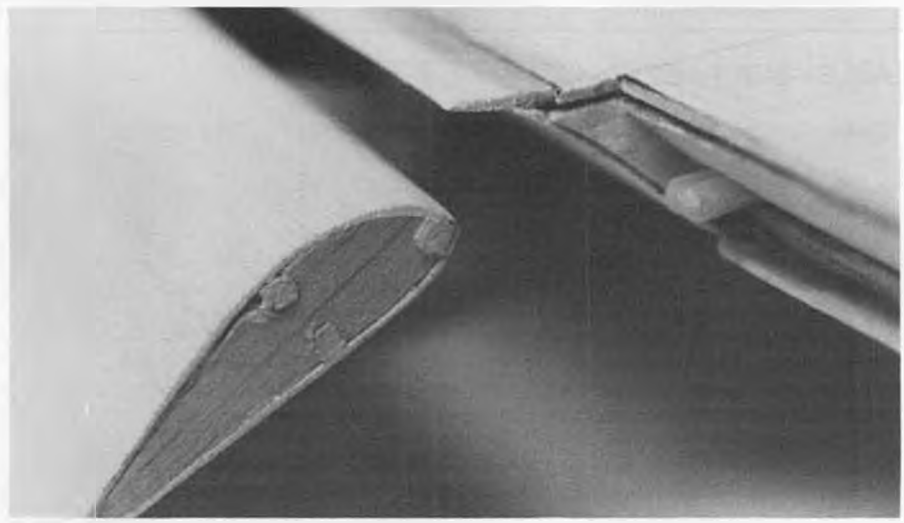
(15) Add ventral fin.

(16) Install plywood servo mounts, and glo-plug battery ply base and holder.

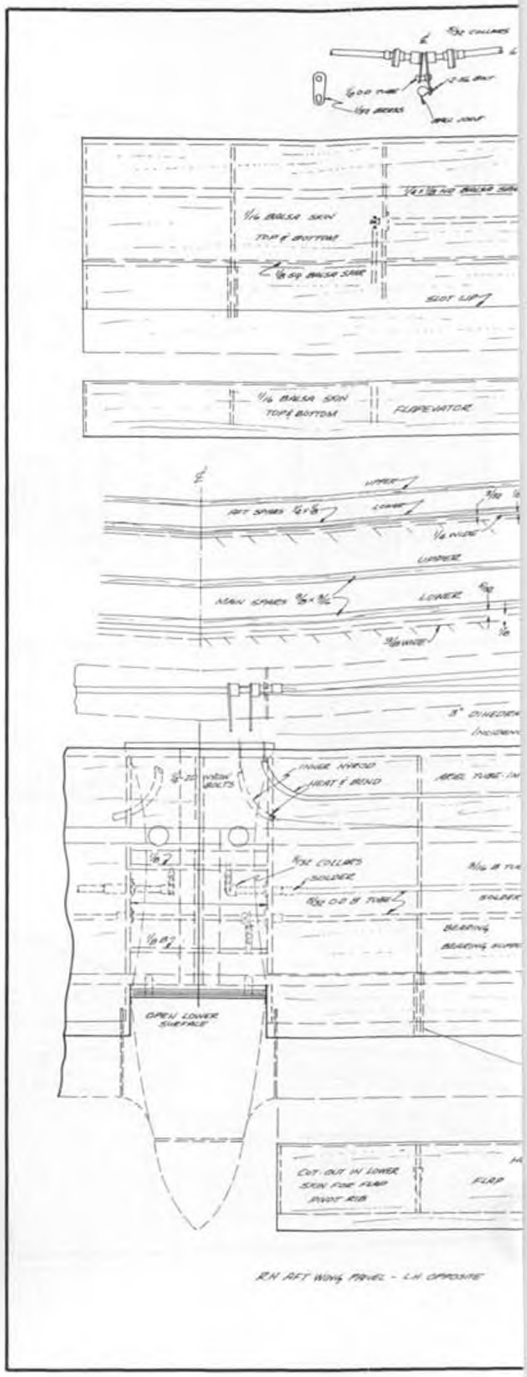
(17) Add plywood base to jack and radio switch and epoxy in position (after soldering glo-plug wiring to the jack).

(18) Install bottom and sides of receiver box. Add foam and receiver. Do not install





End views of the aft wing flap in the retracted position (top) and deployed position (above), where the slot and slot lip show to good advantage. These photos are of the prototype model; the plans show a simpler and more rugged flap construction.



top until servos are installed and connected to the receiver. Run the antenna through holes in bulkheads 6, 7, and 8.

(19) Complete glo-plug wiring as per diagram.

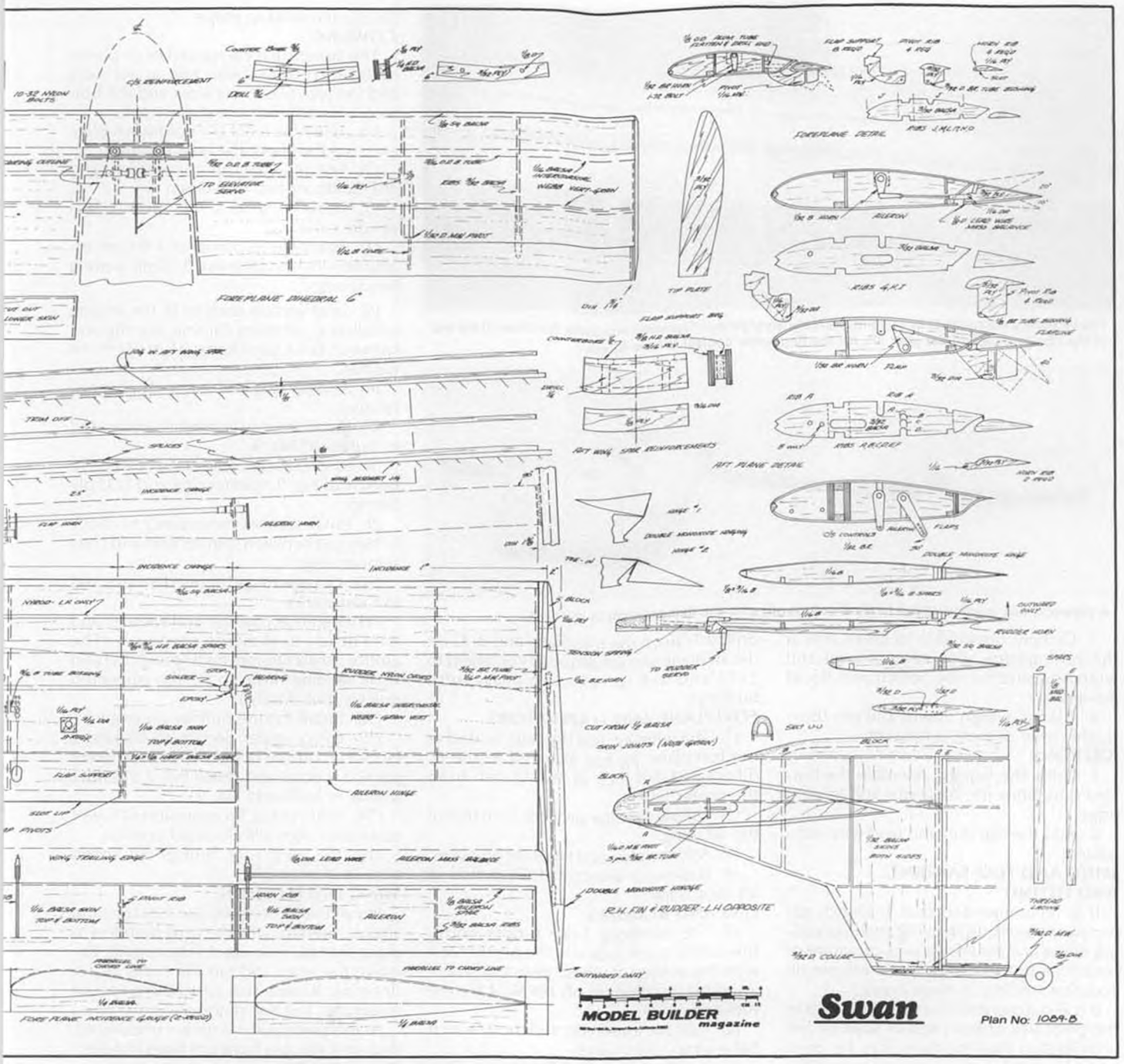
AFT WING ASSEMBLY

(1) Assemble the two aileron torque tubes, and the flap torque tube, adding bearings, ply bearing supports, stops and horns, with collars. Note that the flap torque tube is one piece.

(2) Assemble ply flap supports to ribs C and E over the drawings to accurately locate the pivot hole. Sand to streamline cross section.

(3) Assemble right and left hand main and aft spar components over the drawings. Correct alignment is critical.

(4) Build a wing assembly jig composed of two pieces of 1/2-inch plywood, 5 inches wide by 27 inches long. Butt the inner ends



FULL-SIZE PLANS AVAILABLE—SEE PAGE 106

together and elevate the outer ends 1-3/8 inch to provide the 3° dihedral.

(5) Install the strips under the spar locations as shown in the drawings. The aft spar strips should be on the edge of the plywood base so that the flap supports overhang.

(6) Position the flap torque tube assembly on the jig.

(7) Install the lower left and right, fore and aft spars.

(8) Add the ribs, and upper left and right, fore and aft spars and leading edge spars.

(9) Install the aileron torque tube assemblies. Epoxy ply bearing supports to the appropriate ribs for both flap and aileron torque tubes.

(10) Install the inner nyrod ariel tubing in the L.H. wing only.

(11) Add the plywood aft wing center section reinforcements for both main and aft spars.

(12) Add the intercostal balsa webbs to both fore and aft spars.

(13) Add inner nyrod rudder cord guides and install cord assembly (clevis with cord CA'd or epoxied in it) and flap and aileron push rod assemblies.

(14) Ensure that at all times the spars are in firm contact with the building jig, using weights to insure alignment.

(15) Add the upper skin. Use liquid ammonia brushed on the top surface to aid in bending the balsa to contact the ribs, E and F particularly. Pin the skin to the leading edge, main and aft spars, and use weights to insure good contacts. Allow the cement to dry thoroughly overnight,

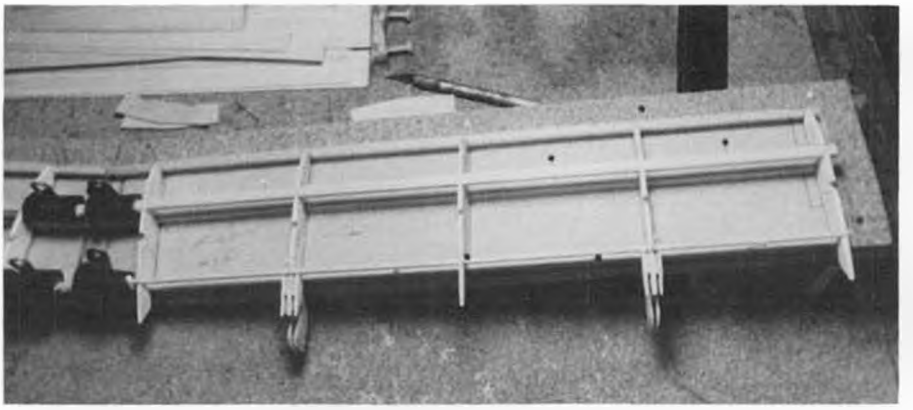
(16) Remove the assembly from the jig, and add the bottom skins (notched to clear flap supports). Replace the assembly on the jig, weighted down, and again allow the cement to dry thoroughly. Check to insure that bottom skin contacts the jig properly.

(17) Install the slanted webb ahead of the aileron (see aileron cross section on plates).

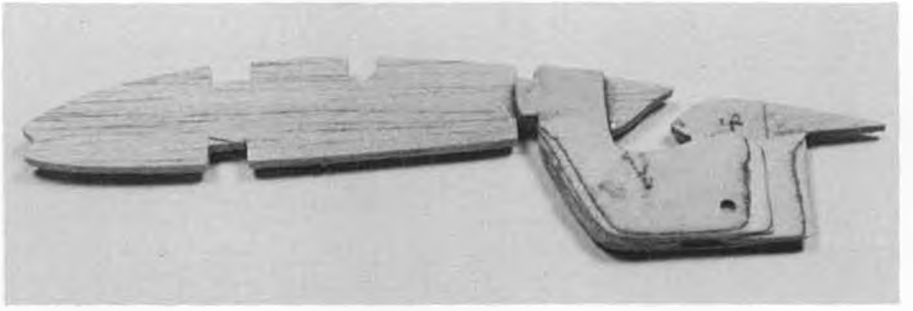
AFT FLAP ASSEMBLY

1. A jig of 1/2-inch plywood 3 inches wide and 15 inches long is required. Cut slots 1/4 inch wide x 1-1/2 inches long on one edge to accommodate the plywood pivot ribs at ribs C and E.

2. Install the lower skin on this jig, add pivot ribs, horn rib and balsa end ribs. Insure that the pivot rib spacing agrees with that of the flap supports.



The foreplane assembly in its building jig. Note the plywood flapevator supports. Notches on the top of the ribs just behind the spar are for the flapevator control torque tubes.



A plywood flap support glued to rib C (aft wing), with the flap pivot rib in position.

3. Cement upper skin to lower skin at the leading edge, allow cement to set, and wrap it around the ribs. Soften with liquid ammonia.

4. Clamp, weigh down, and pin thoroughly until cement is fully set.

AILERONS

1. Using the flap jig, assemble the bottom skin, horn rib, balsa ribs and leading edge.

2. Add the top skin and lead wire mass balance.

WING AND FLAP SANDING AND FITTING

It is recommended that 1/32-inch ply templates be made for wing and flap leading edges and for the shroud curvature of both fore and aft wings. These will permit accurate sanding of these areas.

It is also suggested that the pivot holes in the pivot ribs of both sets of flaps be left undrilled so that the flaps may be positioned in the flap supports accurately. The incidence gauges will assist this operation. Once located, the pivot holes may be drilled 1/16 on the foreplane and 3/32 on the aft plane and subsequently enlarged to 3/32 and 1/8 to take the brass tube bushings.

FOREPLANE AND FLAPEVATORS

(1) The wing jig, less the rails, is used as the foreplane jig but elevated to the 6° dihedral (1-3/4 inch at 16-1/2 inch from the center line.)

(2) Follow a similar procedure to that of the aft wing.

(3) Add the plywood Hoerner tip plates.

(4) Flapevator assembly follows that of aft wing flaps.

FINS AND RUDDERS

(1) The triangular brass rudder horns, the rudder push rods and the ply rib No.4 with the outboard wheel gear and wheel assembly installed on ply rib No.4 are the sub-assemblies.

(2) Add the inner skin and the 1/4-inch balsa wing-to-fin joiner.

(3) Rudder assembly follows that of the ailerons.

(4) Add nose block and top and bottom blocks and sand to shape.

COWLING

This structure is composed of six pieces of 1/2-inch balsa sheet; two upper sides and the top, two lower sides and the bottom, plus 3/8-inch triangular stock.

(1) Assemble front ply holddown plate and two Goldberg flat hold downs.

(2) Assemble rear ply components and 3rd Goldberg flat hold down.

(3) Install engine on its mount, less needle valve.

(4) Assemble six pieces of 3/8-inch triangular stock and the two 1/32 ply parting line facings.

(5) Sand vertical ends to fit the engine installation, allowing for rear ply ring and spinner skirt overhang of prop drive washer.

(6) Add ply ring and lower aft ply cowl retainer.

(7) Install the cowling lightly cemented to bulkhead No. 9.

(8) Sand outside contours of cowling to bulkhead No. 9, spinner ring and 1/32 ply facings.

(9) Install spinner temporarily to check 1/16th gap between spinner skirt and cowl spinner ring.

(10) Cut openings for needle valve and exhaust stacks.

(11) Remove cowling and spinner and trim inside to drawing contours. (The author uses a Dremel high speed drill and small sanding drum to do this operation quickly, but dustily.)

(12) Install Tatone muffler on engine.

(13) Epoxy upper portion to bulkhead No. 9. Epoxy front holddown plate to lower portion. Locate and install No. 2 shoulder screws in bulkhead No. 9.

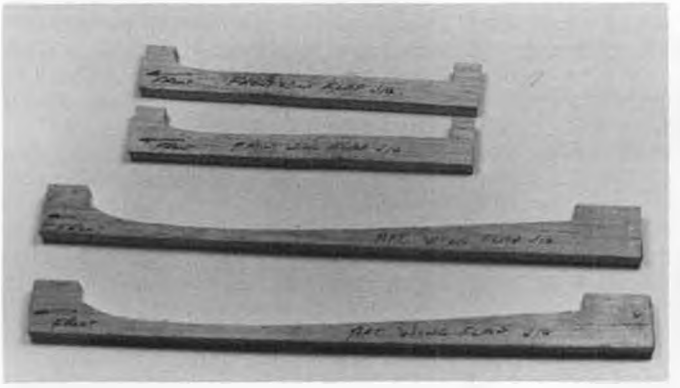
(14) Add ventral fin extension to lower cowl, and align with forward portion.

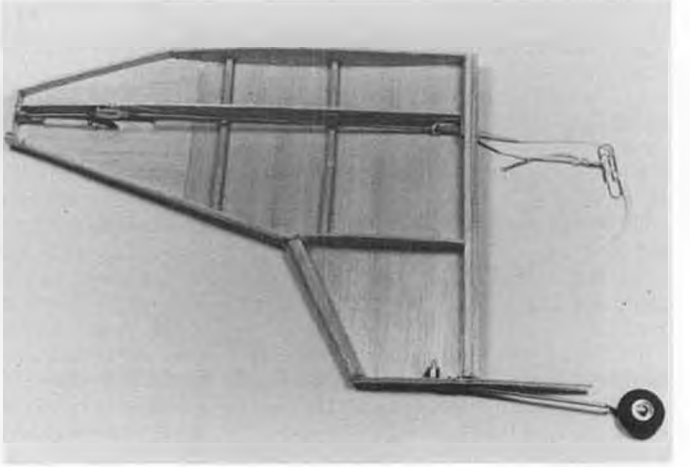
(15) The wing root fairings are added after final assembly.

WING INSTALLATION

Install the aft wing on the fuselage and align it carefully. Drill the wing holddowns using the spar holes as drill templates. Remove the wing and tap the holes as per drawing. Repeat this procedure for the foreplane, and the canopy.

At this point both wings are uncovered, flaps and ailerons have not been installed. Remove both wings from the fuselage and install the center section fairings, replace the wings on the fuselage, install the





Above: Fore and aft wing incidence gauges, built up from scrap balsa.

Right: Partial assembly of the right fin. The return spring and rudder linkage are visible. Inner balsa skin is yet to be added.

canopy and sand the fairings to fit the fuselage contours.

SERVOS AND CONTROL LINKAGE

Install the elevator servo slide and all five servos. Install the four outer sheaths of the Sullivan nyrods for aft flap, engine and ailerons. Install and connect the inner rods and clevises. Installation of the rudder cords will take place during final assembly (they should now be in the aft wing). Connect rudder servo to the nose wheel steering arm. Note that the rudder cords crossover between bulkheads 7 and 8.

FLAPS, AILERONS AND RUDDERS INSTALLATION

MonoKote was used to cover this model. Ailerons and rudders were hinged during the covering process using the double MonoKote hinge shown. This provides a gap seal as well as a strong hinge.

All four flaps were covered before installation. Insert the pivot ribs in the flap supports and install the pivot pins. A dab of epoxy on the pin ends will retain them securely. Connect the push rods to all four flap horn ribs as shown.

FIN AND RUDDER INSTALLATION

These covered surfaces are epoxied to the aft wing end ribs after connecting the rudder cords to the brass rudder horn.

The shaped wing-to-fin joiner permits easy alignment.

COVERING AND PAINTING

As mentioned, MonoKote was used for covering. The following surfaces were painted: nose block, cowling, foreplane end plates, and fin block tops and bottoms.

ALIGNMENT

Assemble the model, and place it on the stand. Install wing root fairings, on the cowling.

Adjust the model's position, fore and aft, on the stand so that the forward canopy is at 5.5° to the horizontal (see fuselage side view).

Install the foreplane incidence gauges on the foreplane with elastic bands.

Similarly, install the aft plane gauges on the flapped portion of the aft wing.

The author uses a Robart incidence gauge; resting the lower ends of the two vertical legs on the raised ends of the balsa incidence gauges.

The incidence should be those shown on the drawings. (The notches in the Robart gauge are designed for symmetrical wing sections and will give incorrect readings on semi-symmetrical wing sections.)

Repeat the process for the outboard portions of the aft wing. (The incidence blocks are useful for adjusting ailerons and flaps to neutral.)

It is important that these incidence readings agree with the drawings.

Add ballast to the nose block to bring the CG to the design location . . . tank full of fuel.

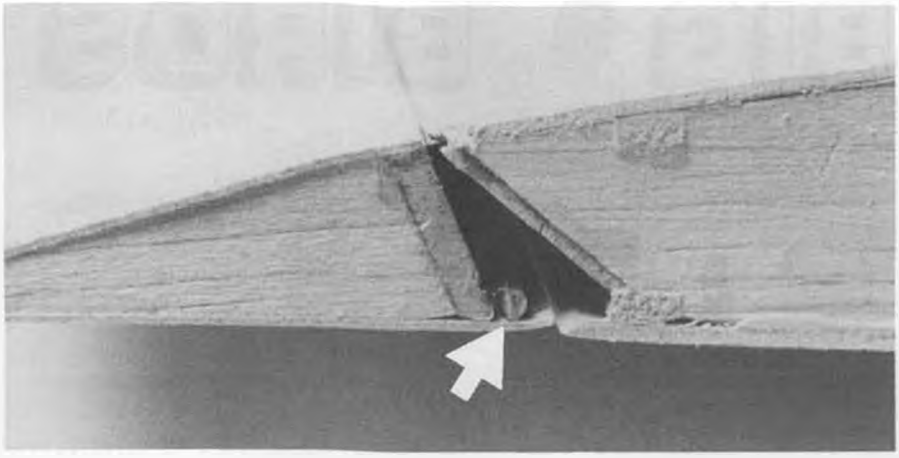
FLIGHT TESTING

Adjust the flap deflection, so that when the foreplane flap is at 20°, the aft flap is at 30 to 35° deflection.

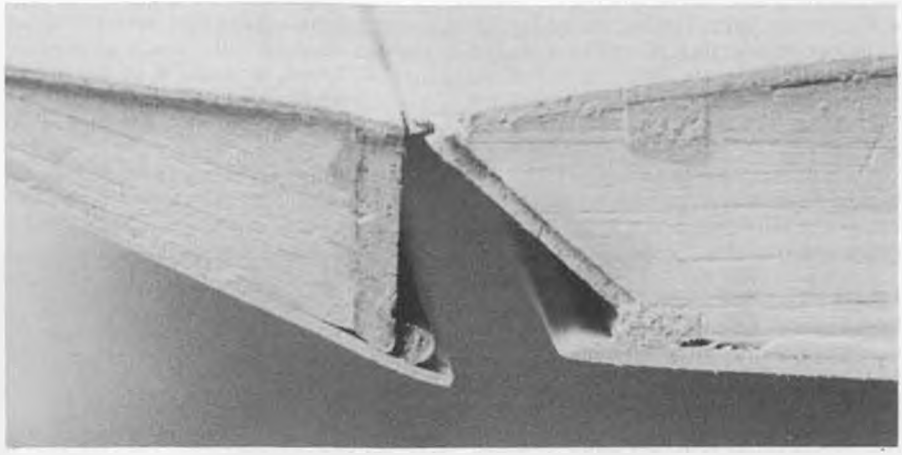
With model at a fair altitude, engine idling, deploy the flaps, gradually. There is enough overriding action on the foreplane flap via the elevator servo to keep out of trouble.

If a slightly nosedown glide is achieved, well and good. If not, adjustment of the aft flap deflection should be done after landing the model, flaps up.

Control response is that of a "normal" airplane . . . the only problem is adjusting one's response to the "backward" flying airplane. •



Aileron end view. Arrow indicates the 1/8-inch lead wire mass balance.



Aileron in the full up position. The lower lip projects below the underside of the wing, creating drag that overcomes adverse yaw.

Left: The Swan is an exercise in aerodynamic design. Those who would like to learn more about design fundamentals would do well to send for Mr. Lennon's book, *R/C Model Airplane Design*, available from Zenith Aviation Books, P.O. Box 2, 729 Prospect Ave., Osceola, Wisconsin 54020. Order book No. 111070AP, priced at $16.95.

BIG BIRDS

By AL ALMAN

• It's a kind of paradox that although this column and yours truly don't pretend to do anything but dabble when it comes to scale, letters keep coming in asking for guidance in selecting aircraft to model in quarter or third scale size . . . and, not too surprisingly, all these letter writers are looking for hitherto unknown and unsung aircraft.

So, in answer to the many queries for me to pontificate about "something different," I'm going to profile a rare flying machine every few months.

And, just to make all you scale buffs happy, I'll start this month with one of the best kept secrets in aviation history, the true story about the redoubtable. . . .

HUMLBY-PUDGE GALLIPOLI HEAVYISH BOMBER

Lewis guns blazing, flour bags cascading down, the pachydermic Gallipoli terrorized practice target ranges across the empire from 1933 to 1939. Four Varley "Panjandrum" engines screwed her up to a cruising altitude several feet over the legal minimum of the day.

Relatively few were built, but more than enough Gallipolis were delivered to the RAF which handed them over to the Royal Indian Air Force, which handed them over to the Royal Malayan Air Force, which promptly found itself plagued by wholesale desertions by its flying personnel.

As with those few aircraft destined to become legends, the Gallipoli's moment of glory came and, lightening swift, vanished during the surprise Japanese invasion of Singapore in early 1942. Hordes of Nips swarmed toward the RAF aerodrome . . . and out went the call, "Warm up the Gallipolis!" And, indeed, 36 of the breed might have risen to meet the foe had not their special boarding ladders turned up missing.

The sobriquet, "Sitting Duck," has clung to the Gallipoli ever since . . . truly an unjust cut in view of this perfectly harmless old war horse's clearly worthwhile intentions.

The last survivor serves today as a chicken house . . . albeit an impressive one . . . for the Maharani of Gunjipor. It crash landed on her lawn in 1944, but the RAF, despite numerous reminders, simply keeps forgetting to come around and pick it up.

One additional note to potential builders: you'll have to wing it because not even a 3-view is available. It seems that shortly after this last Gallipoli deposited itself on the Maharani's front lawn, all Gallipoli plans and data were purposefully destroyed and all Gallipoli engineers were given new names, new faces . . . and sanctuary.

RAT A TAT TAT

Have you seen RAM's clever new ad? It starts off with "RAT A TAT TAT" and then asks, "Who would know more about machine guns than a company from Chicago?"

RAM's Ralp Warner is touting his new Machine Gun Module (RED #46), and I discovered that it's a dandy.

As soon as I got my hands on one, the module was connected to a transmitter battery pack and an old, tiny speaker . . . and in spite of the relatively low voltage and crummy speaker it sounded great. I had a ball playing with the rate adjustment and the three sound adjustments, making all kinds of machine gun sounds.

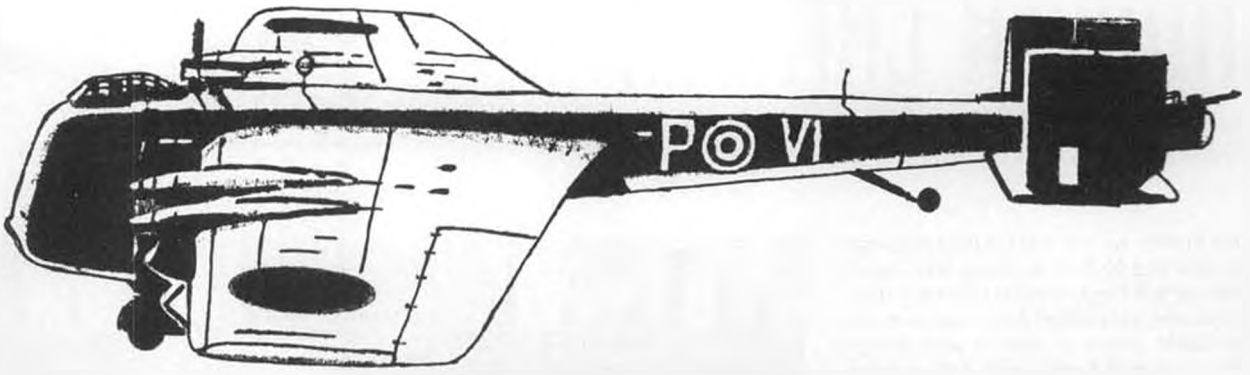
Rich Evans is the fellow responsible for this great looking Laser 200. The red and white eight-footer tips the scales at 21 pounds and is a real show stopper with a 3.7 cu. in. Kiorltz up front.

The latest plan offering from Emil Agosta of Dry Ridge Models is the Bucker BU-133C Jungmeister, for 3.7 to 4.2 cu. in. engines. Span is a couple of inches over seven feet. More info in text.

I've come to expect quality from RAM and wasn't disappointed this time either. The module is well built and includes excellent instructions for hooking up to power and a speaker (or two).

I think the magazine ad had a typo about the voltage requirements because it specifies that 6 to 14.4 volts are needed . . . whereas the instructions point out, and illustrate, that two 9-volt Alkaline batteries, in series, will provide maximum power with minimum weight.

The instruction sheet also clearly explains how to obtain an optimum speaker installation for best sound effect. I haven't tried this mini-module in the air yet, but hearing that great "RAT A TAT TAT" won't be a problem in my BIG Fokker D-VIII because:



The little-known Humbley-Pudge Gallipoli Heavyish Bomber in all its glory. One of the true classics of aviation history.

A) 18 volts and the right speaker (at least a 5 watt rating at 4 to 10 ohms is specified) are gonna make that sound boom out; and . . .

B) I'll be using a Davis Dieselized OS 1.08 swinging a BIG 20x6 prop, so she'll sound mellow and won't drown out the machine gun, not even on a "high speed" pass.

Because four pots are used to tune the sound to your particular speaker, battery and installation, RAM's RED #46 can be used to simulate just about any kind of firepower in just about any kind of bird.

It comes less a power supply and a speaker (you tailor the installation to your particular needs), but does include a wired-in micro-switch and a nine-volt snap-on pigtail, making it easy to set up and use two nine-volt alkaline batteries.

The new modeler's tool kit from SR Batteries contains hex socket attachments in just about any inch and metric size you'll ever need, plus two slotted and three Phillips screwdriver attachments, all in a very robust yellow case.

For more info about the Machine Gun Module (or any other RAM product), contact RAM, 4736 Milwaukee Avenue, Chicago, Illinois 60630.

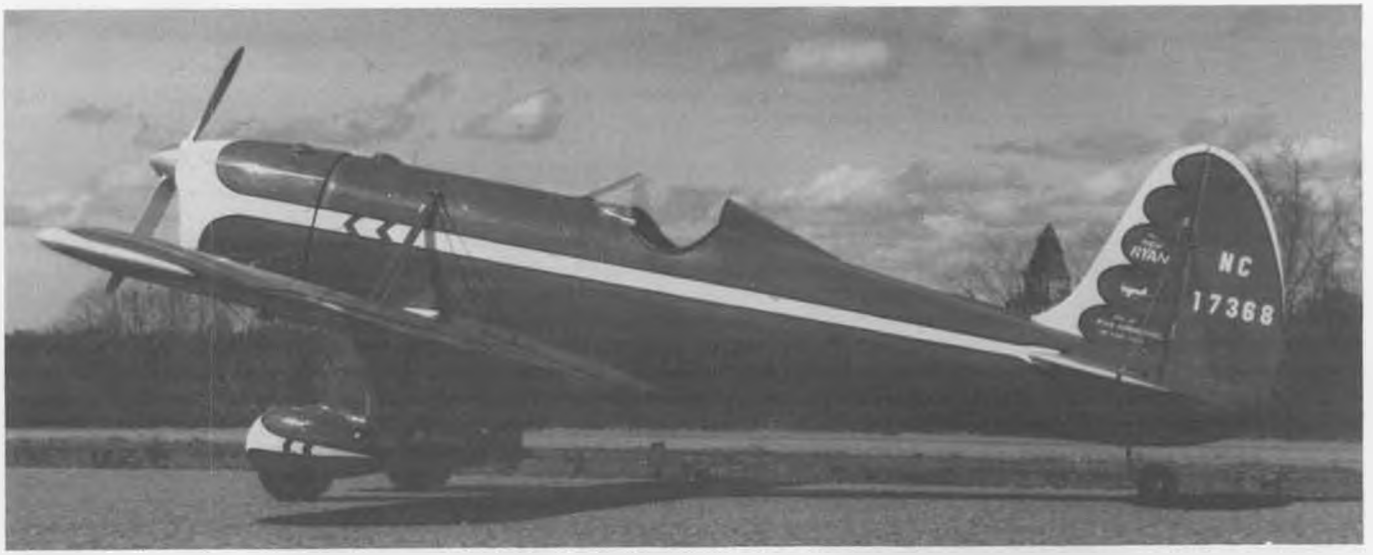
THE REAL GEE BEE STORY

A few days ago Henry Haffke's new book, "GEE BEE, The Real Story Of The Granville Brothers And Their Marvelous Airplanes," finally became available after 15 years of research.

Today, on the Sunday afternoon presentation of "Wings Over The World," all of the Gee Bee Racers were mentioned rather unkindly during an hour called, "Cancelled Projects." This program was devoted to aircraft that were losers in every sense of the word.

And this is exactly why Henry started his book and put so much time and effort into detailing the true history of the Gee Bee's. Because, for too many years, writers have distorted and discounted the facts about Gee Bee aircraft and the Granville Brothers who designed and built these great racing machines.

Continued on page 75



The name Fred Reese is one most modelers associate with small 1/2A size models, but Fred has become involved in the other end of the size spectrum and is now producing complete kits for this gorgeous 1/4-scale Ryan ST-A under the name of Golden Age Models. More info in text.

CHOPPER CHATTER

By JAMES WANG

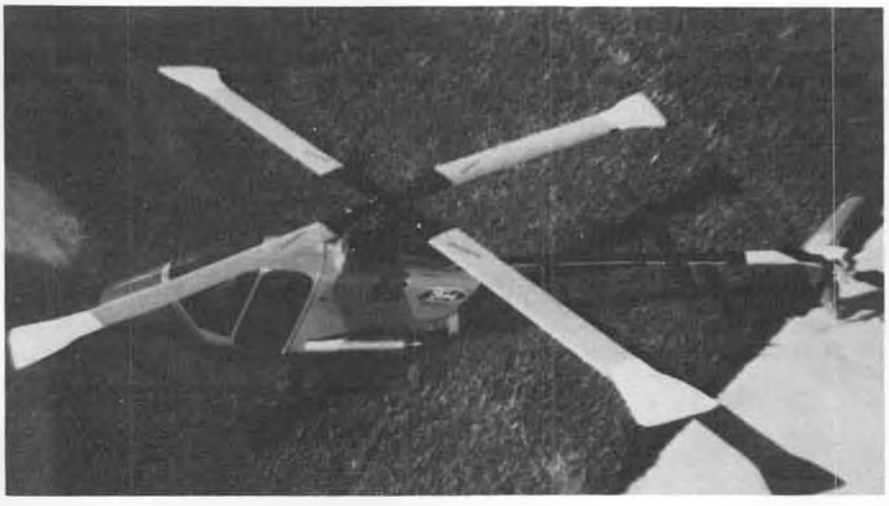
• This month we will have a hodgepodge chat relating to R/C helicopters. Next month we will begin a series of heavy-duty discussions on model helicopter main rotor blade practical aspects and design theory. We will begin with fancy rotor blade tip design theory, and look at the available fancy tipped fiberglass model blades on the market. Then look at the existing airfoils used by major R/C model blade manufacturers, and I will offer what would be optional design airfoils for models from my experience in full-size helicopter research. Finally, we will analyze the effects of performance variables such as blade length, chord width, weight, chord-wise CG, and twist. We will see how high-speed forward flight, hover efficiency, autorotation, etc., each requires different blade design.

We will not have a helicopter review this month. Instead, I have prepared a report on the recent Paris Air Show, which would be of interest to our aircraft readers, too. Next month, we will resume reviewing such items as the Hirobo Shuttle, Schluter Magic, Enya 60, Futaba 9ch 1024 PCM, and GMP Rebel and Cricket, and Airtronics Vanguard 6 radio.

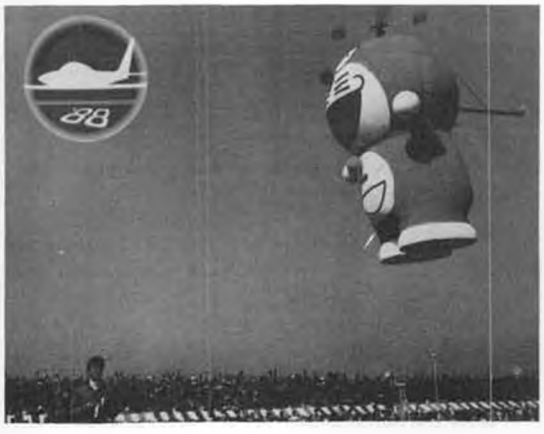
Now, let's run through some chopper news. The second Schluter Cup helicopter contest will be held September 16th and 17th at the West Winsor model field near Princeton, New Jersey. Novice, intermediate, and FAI categories will be held. Call Robbe Model Sports at (901)359-9115 for more information.

The third F3C World R/C Helicopter Championship will be held in Virginia in September. Tom Dooley, Robert Gorham, and Tim Schoonard will be representing the U.S.A. They were chosen after a grueling team trial selection conducted on June 3rd and 4th, in Ohio. I hope they take the gold, silver and bronze for the U.S. The Japanese team won the past two championships. It's interesting to note that two

Eric Dustrude makes his living doing low-level aerial photography with this camera-carrying R/C chopper. It's a biggie with a 78-inch rotor diameter and Tartan Twin power.



Our columnist's fancy rotor blades are just one of a number of trick items incorporated into this cleaned-up Schluter Champion, built by Mike Johnson for a World Speed Record attempt.



Japanese modelers sure are creative. These two photos show what's being done on the other side of the Pacific. More in text.

of the three team members are representatives of two major U.S. model helicopter importer/manufacturers; Robert with GMP, and Tim with MAS. I guess having an unlimited supply of new parts certainly helps! Most of the serious world class R/C chopper competitors are related in one way or another to the model business. For example, Len Mount, the top British team pilot, owns a model helicopter parts business, and practices five hours every morning, five days a week. On weekends he provides free clinics for GMP helicopters in England. With my busy schedule, I can kiss world class competition goodbye. However, if you want to be a top dog in competition, don't despair, as long as you are willing to follow a regimen practice schedule and do nothing but the dozen maneuvers, then you too can be in a position to win. My flying buddy says most chopper pilots have what it takes to win

Do you know what the rakes above and below the canopy on this Bell Jet Ranger are for? The answer may surprise you!

FAI, but lack the determination to stop hot dog flying and do nothing but practice the same dozen maneuvers. He believes that with determination, six months of intensive practice will do it, though you will become a very mechanized flier. With luck, I will be at the World Champs to cheer for the U.S.A. and report for MB's "Chopper Chatter" column.

In the July 1989, GMP Legend review, and August 1989 Stork review, I mentioned that the stock 11 oz. fuel tank can only provide 10 minutes of flight for a .60 engine. Charles Leonard, of Seattle, called and said Hobby Lobby sells a 17.5 oz. German-made Graupner gas tank that fits perfectly inside Legend and all GMP helicopters. Call Hobby Lobby at (615)373-1444 and order part number GR-237. It costs $9.20. Tell them *MB* sent you! Soon, I will have a report on how to convert your old Cobra, Competitor, and Schluter machines to a flybarless helicopter like the Legend, and explain the principle of that ubiquitous Bell stabilizer bar.

Small helicopters like the Kyosho Concept 30 and the Hirobo/GMP Shuttle are extremely popular at small fields such as this one in Santa Monica, California.

For Schluter Magic owners, be sure to send in your owner registration card because they have a new, free, replacement gear for you. This only applies to those who bought their Magic before August 1989. David Ramsey, of New Jersey, made a very good suggestion for people who own R/C helicopters with lots of plastic parts. People who fly R/C planes should always boil plastic propellers before using them, to relieve the molding stress. Similarly, plastic helicopter gears and parts can be boiled in hot water for one half hour to relieve molding stress. Otherwise, gears may be brittle and break under any small mishap.

Eric Dustrude, of Bellingham, Washington, sent some excellent color photos of his scratch-build R/C helicopter that can carry a 35mm or video camera. The model rotor diameter is 78 inches. The only commercial part is the Hirobo/GMP DDF rotor head, and special ordered X-Cell blades. The frame, boom, skid, gears, and four-bladed tail rotor hub are all handmade. It weighs 97 pounds, and is powered by a 1.5cc, 4.5 hp, Tartan Twin two-stroke engine. The video signal is transmitted in real time to the ground and broadcast on TV UHF channel 14. Eric kindly sent me a video tape of his aerial work. He has a company called Aerial Visions that does low level aerial photography and video using this model. Eric is the pilot, and James Smith is the camera operator. The camera is mounted on a remote controlled gimbal, so it can be pointed in any direction. Anyone interested can contact them at (206) 734-4682 or 734-4833.

Last month I saw a neat idea in a Japanese model magazine. A modeler converted a Kyosho Concept helicopter into a slope soarer glider! He removed the engine, gyro, flybar, tail rotor, and shortened the

Continued on page 70

Here's a neat idea for chilly windy weather flying: a transmitter box made from thin plywood and supported by a neck strap. Use the photo as a guide to making your own, or buy one ready-made. Text has details.

ENGINES OF THE WORLD
...by Stu Richmond

Jiri Patrman's Marvellous .5cc Miniatures

• One of East Europe's ingenious makers of miniature engines is Jiri Patrman (Jiri is pronounced Yee-chee). He never makes more than two or three pieces of the same design. This month's pair of Jiri engines share identical crankcase castings, piston/cylinder assemblies and crankshaft design. Their intake systems are totally different.

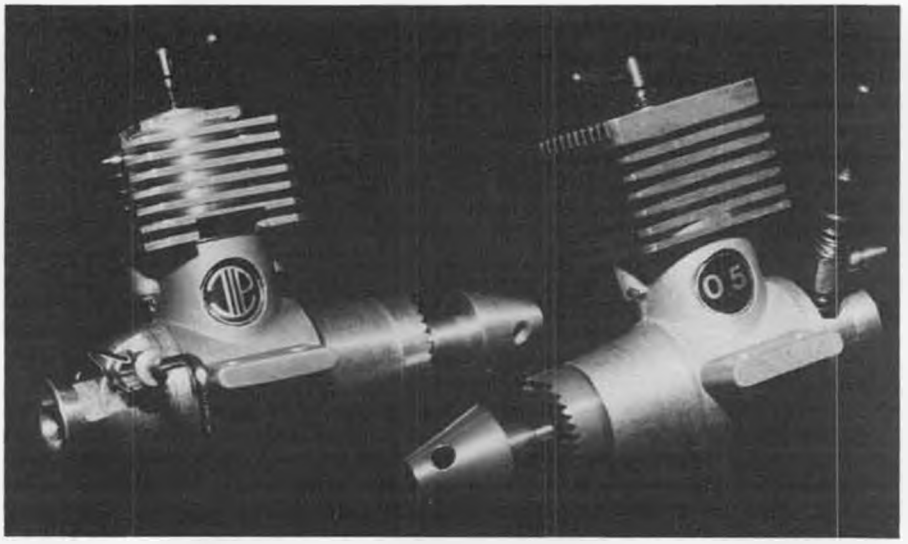
Cosmetically the engines appear different due to variations in cooling fins and if this column were in color you'd see the elox (electric oxidizing that we call anodizing) work is gold and natural for the reed valve engine . . . and blue and natural for the drum valve engine.

The Europeans mostly work in displacement units of cubic centimeters. A 2.5 cc engine is a .15, which is considered the international class size for several events like free flight, team racing, etc. A 1.5cc is a .09 . . . a 1cc is a .06 . . . and a .5cc is then a .03 cubic inch engine. This month's engines are small in displacement and the size is ideally suited to fly 30-inch to 45-inch free flight models with limited fuel runs.

VITAL STATISTICS: 1-7/8 inches long to the prop driver, 1-1/4 inches across the mounting lugs, 1-3/4 inches high to the top of the cooling fins. Each engine weighs 52 grams (just under two ounces) and is .5cc displacement.

UNIQUE FEATURE: Engine with front-to-back head cooling fins uses drum valve induction, which is virtually unknown in the U.S. Other engine uses reed valve intake similar to Cox production engines.

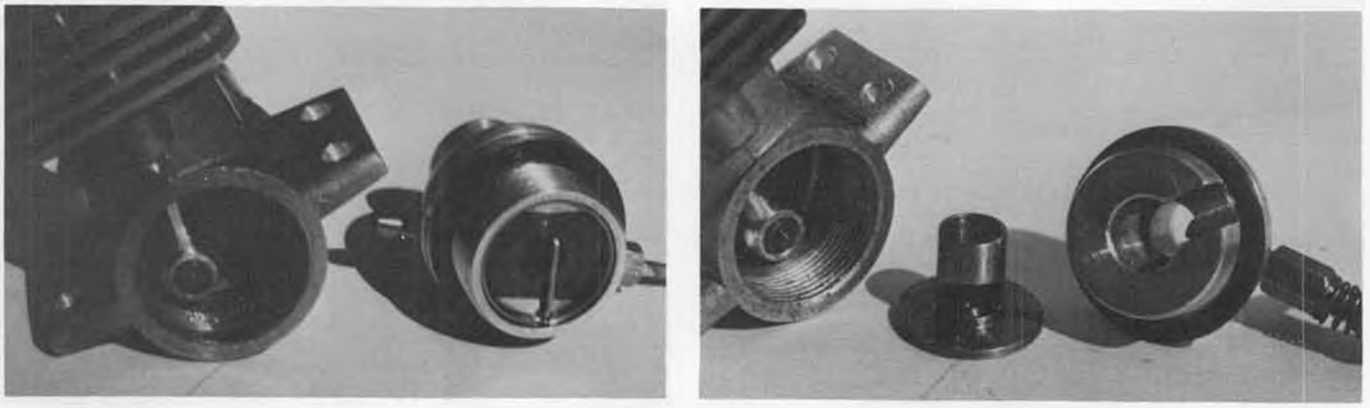
But let's talk intake systems. In the late 1940s, Jack Coppage, of Atlanta, was experimenting with reed intake valves for his Dooling .61 powered tethered race cars . . . and setting records in the process. Cox Hobbies popularized the reed valve intake system in the 1950s and practically all model builders are now familiar with its simplicity and success in Babe Bee and Pee Wee Cox engines. Today the reeds are usually frosted Mylar. As the piston rises in a two-cycle engine cylinder on the compression stroke, the space below the piston "goes negative" . . . a vacuum forms below the piston. The vacuum is normalized as the reed rapidly flexes forward and allows atmospheric air to rush in (and draw fuel) to satisfy or relieve the negative pressure in the crankcase caused by the rising piston. This indrawn air (and fuel) is the charge that then bypasses the outside wall of the piston and is forced upwards toward the combustion chamber as the piston descends on its power stroke. The reed intake system is simple to manufacture and use. It requires a clean, smooth mating surface with the carb's intake venturi where the rear surface of the reed makes contact so that the crankcase is sealed on the piston's downward power stroke. The seal is required to ensure good pumping action of the fuel/air up the bypass and into the combustion chamber. The only inefficiency of the reed system is in the small/short distance the reed moves (particularly at high speeds) to admit combustion air.



Although this month's engines look pretty much the same, they feature entirely different intake systems. Both are handmade .03 cu. in. diesels.

The drum valve on Jiri's other .5cc engine (with the front-to-back head fins) is totally different and is virtually unknown in the U.S.A. Bill Atwood, in the 1940s, sold the Atwood Champion ignition engines which featured both a front and rear intake induction system. The front intake was through a window on the side of the crank's journal as we commonly use today

Continued on page 66



With the backplates removed, you can see that the engine on the left makes use of a reed intake valve similar to those used on small Cox engines, while the one on the right features the unique drum valve favored by East European speed enthusiasts. The drum (shown removed from the backplate) adds complexity and weight but allows large fuel/air openings that would seriously weaken a regular crankshaft.

MODEL DESIGN & TECHNICAL STUFF

BY FRANCIS REYNOLDS

• Having dealt with Wing Cube Loading, Displacement Loading, and Performance Factor last month, it is time to catch up an a lot of items I've been saving for you lucky modelers. I know you believe you understand what you think I write in this column, but I'm not sure you realize that what you read is not what I meant. Especially the characterization of overriding time wise constraints with supporting rationale and criteria for the evolutionary development and optimization of functionally-superior miniaturized remote-controlled recreational and competition-oriented aeronautical systems. Now, if I still have readers:

R/C MODEL DESIGN BY PERSONAL COMPUTER

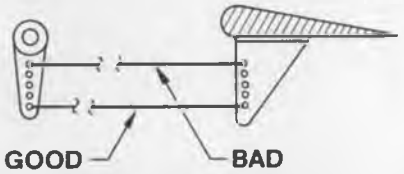
Your columnist recently acquired an R/C model design program. Hey! Fun, educational, and useful. It was developed by a young, smart and ambitious aeronautical engineer/model builder, Denis Mrozinski. The project is an outgrowth of earlier work he did at Penn State University. It is currently available, it works, and the price is only fifteen dollars complete! This is surely a labor of love. It is being improved constantly, so the version you will get will have fewer minor problems than the one I have.

I have had a computer for just over a year, and know little about it except how to crank out this column on the word processor. Fortunately, Denny includes detailed use instructions that even I can follow. The program also includes a well-written, complete, and very useful 42-page manual with lots of information, formulas, tables, and curves that I hadn't seen before. I took Aerodynamics 101 forty-nine years ago. Much has been added since. Denis' manual is so good that I immediately knew I would want a copy of it even if I didn't own a computer. At my urging, Denny has agreed to make the manual separately available to computer-free modelers for ten dollars, postpaid. The program itself is currently available for IBM-compatible computers on a 5-1/4 inch disk.

This is a *model* design program, with data at model Reynolds numbers. There are two separate sections, a preliminary design program handy for trade studies, and a detailed stability and performance program. We don't have the space to get into specifics, but it covers a lot of theoretical low-RN airplane preliminary design areas. I have used it myself on one of my own designs, and found it to be instructive, useful, and interesting. I'm sure that I will continue to design models largely by the

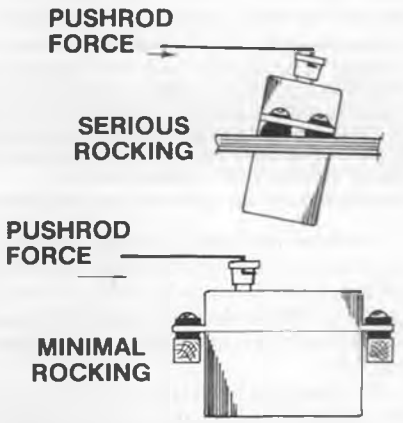
Continued on page 93

FIGURE 1



Either of the pushrod locations shown here will give the same amount of control surface deflection, but the farther the pushrod is from the pivot axis, the better. Text tells why.

FIGURE 2



Servos should be mounted with the long dimension parallel to the pushrod to minimize servo rocking.

Our author's "Seatract," built back in 1975, was an experiment to determine the feasibility of twin retracting floats. The small scale model shown here, with the floats extended and retracted, was built first to develop the retract mechanism geometry. Discussion in text.

PLUG SPARKS

By JOHN POND

• This writer has been queried many times as to why he takes in as many contests as he can. Most of the time, it is simply to photograph and write up the meet. Secondly, it is to fly and enjoy the competition. However, the big item in this columnist's book is the camaraderie and bull sessions generated when meeting old friends who live too far to see more than occasionally.

Such is the case of the recent NFFS/SAM 57 Championships held at Lawrenceville, Illinois, over the June 19-23 week. Five days of flying! One of the highlights was again meeting the SAM 7 boys from New England: George Armstead and Tom Lucas, the two stalwarts of the "Yankee" club.

1 (right). Seldom seen Bob Toft design, the "Snuffy VI," as reproduced by Frank Fay of Hartford, Connecticut. Model uses a hot Cox Tee Dee .09. Of special note is that Frank has the airplane set up to fly both F/F and R/C! Photo was taken in 1982 at Westover AFB, Massachusetts.

In discussions with George Armstead, who has been the Contest Director for the last two SAM Champs located in the eastern area, 1990 looks fairly good for the use of Westover AFB near Springfield, Massachusetts.

The base had been resurfaced to accept the load of the C-5 (Fat Charlie) planes. The base will no longer be regarded as a tanker (refueling) center. There is no confirmation yet for the use of Westover, tentatively scheduled for June 2 through June 5. Remember, this is still in the air, as some training groups overlap to July 8. This will take some effort and politicking by George. Hopefully, we will have definite word by the October Las Vegas SAM Champs.

During the bull sessions, it came out that this writer has been receiving the "Yankee Flyer" and has not reported their activities to any great degree. Biggest problem is the lack of suitable photos; however, this writer has carefully hoarded a few for just the occasion.

For those who have not been to Westover AFB, Photo No. 1 shows Frank Fay with a Snuffy VI on the runway. This is a great place to fly; however, if a crosswind develops, one can see the trees surrounding the base. The problem of trees has

2. Tom Lucas, one of the SAM 7 spark plugs and editor of their *Yankee Flyer* newsletter, about to send his Atwood Champion powered Sherman "Rambler" up for another max.

developed a fable printed in their newsletter which we are sure will strike a familiar chord in every free flight modeler's mind. Here is what Tom Lucas has to say:

"I can remember thinking to myself what a great day it was for a contest. We were all gathered together for the Memorial Day outing. The weather was great, mostly sunny and no winds to speak of. My Dynamoe was beginning to show that it might fly over ten seconds. After I took another test flight (nearly thirty whole seconds), I adjusted the trim and flew it again to verify that my adjustments worked.

"Bolstered by my seeming success, I tied up another more powerful motor, gave it plenty of lube, wound it up, and flew a

3 (left). Not the prettiest model but a good flier nevertheless, is this Frank Ehling 4 Hour Flier built by George Murphy. Drawings were published in the 1935-36 Zaic Yearbook.

4. Seen at the Vintage C/L Stunt Championships held earlier this year at Whittier Narrows, in Southern California, was this "Red" Reinhardt Plymouth Stunt Winner by Lou Wolgast of Tucson, Arizona.

5. Olde-Tyme Stunt winners, from left: 2nd, Russ Graves with Ringmaster; 1st, Ted Fancher with All American Sr.; 3rd, John Wright with Barnstormer. This and the two other C/L photos by Mike Keville.

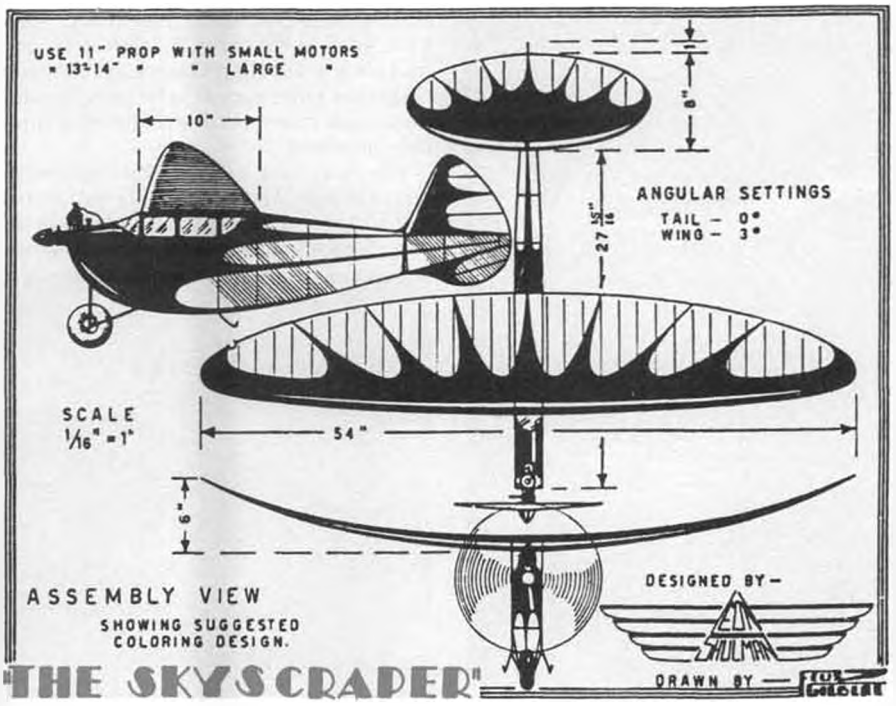
6. Nostalgia Stunt winners, from left: 3rd, Kaz Minato with All American Sr.; 1st, Bob Whitely with Panther; 2nd, Tom Dixon with Lark. Kaz was also awarded the Concours d'Elegance trophy.

7. A Shulman "Skyscraper," sometimes referred to as the "Tambe" (an acronym for The Airplane Model Builders Exchange), as built several years ago by SCAMPS member Al Richardson.

short test flight. Much to my surprise, it flew as it was supposed to. By now, my confidence had grown beyond all the bounds of good sense, and I proceeded to give the ship a full complement of winds. This is where I should have realized things were going too well, but I ran to the middle of the field, lit the D.T. and launched.

"It climbed beautifully, just like a corkscrew. The power ran out and the prop ticked to a stop. It didn't take long to realize the plane wasn't turning. It took about a minute to find its way into the jungle across the field. I had tracked it faithfully so I knew just where to walk right in and pick it up (or so I thought). I jogged over to the trees and as I approached them, one of the other fliers was walking out with his plane, so I asked him if he saw my plane while he was looking for his, but he told me he didn't really have to look for his, because it always lands in the same spot.

"He wasn't much help so I trudged on. I went right to the spot where my plane should have been and started looking. After searching for nearly an hour, I heard a noise a short distance away and went to investigate and found a man about seventy, halfway up a tree. I asked him where his



This three-view drawing of the Skyscraper, drawn by Felix Gilbert, appeared in the November 1938 issue of *Model Airplane News*. How about a double-size (nine foot) version for R/C Texaco? Wow!

8. Leon Shulman with his Hall of Fame Award and his very successful Zomby design.

model was, because I couldn't see it, and he said it was at the top of this tree. He quickly disappeared and after a few minutes, he reappeared holding what looked to be a large leaf.

"As he climbed closer to the ground, I could see more clearly that he was carrying a small Peanut scale model, leaf green in color. I asked him if he thought green colors might have posed some added difficulties in looking for them in the trees. He replied, 'Sure, for most people it is a real pain, but I build green models partly as an amusement. You see, I am color blind and this color looks orange to me. I understand some of the guys still bet on whether I am going to find my little green plane. I'll bet the guys who bet against me don't know I am color blind.'

"With that statement, he grabbed his hat

10. Paul Vignone, who lives on Spook Lane in Reading, Pennsylvania, couldn't resist building a Spook 48 for R/C 1/2A Texaco.

off a nearby tree and walked off toward the flying field. By this time, it was starting to get late, so I reluctantly gave up the search for this day. While on my way back to the field, I met another modeler who was carrying pieces of a model (totaled), mumbling something about 'Hot Stuff' and one more max. . . ."

For a shot of the author, we present Photo No. 2 of Tom Lucas ready to launch his Gil Sherman Rambler utilizing an Atwood 60 for power. This excellent combination never fails to win for Tom.

Another of the active SAM 7 boys is George Murphy of Schenectady, New York, seen in Photo No. 3, ready to launch his Ehling 4-1/2 Hour Gas model. Atwood Champ engines appear to be popular with these club members as this model is similarly powered.

We don't have a shot of the Head Honcho, George Armstead, as 25 exposures were made on a camera containing no film. Tough loss as there were numerous shots of interesting stuff. As this writer sez, "As you get older, you don't get smarter, you just get older." Rats!

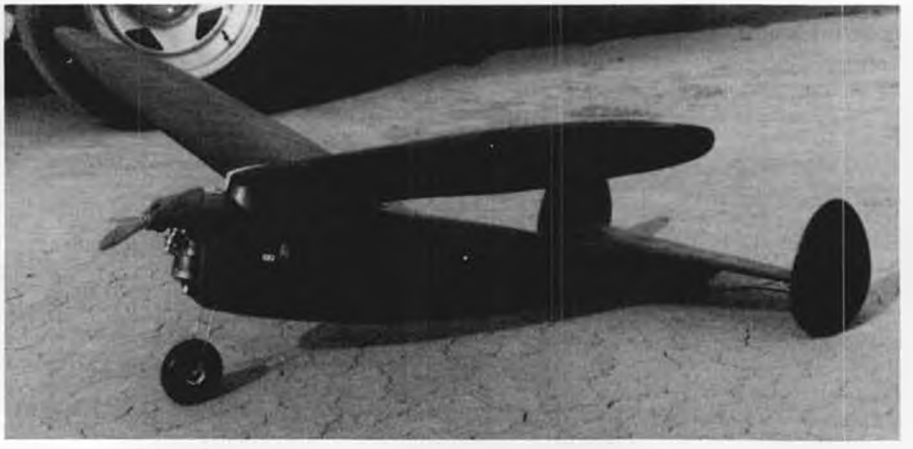
VINTAGE STUNT CHAMPIONSHIPS

This contest report may be a bit dated but in this columnist's mind, anything of interest in the old timer movement is worth reporting. We are indebted to Mike Keville for photos and results of the Vintage Stunt Championships staged at Whittier Narrows, California, early in 1989.

Keville notes this columnist was not on hand. (I was in Australia for the IMAA Nationals at Amberly AFB, Queensland . . . report on this later.) Mike points out the Champs were extremely successful with modelers from everywhere. Typical examples were; George Aldreth (Texas), Joe Wagner (Pennsylvania), Atal Yamazaki (Japan), and other notables such as Bill Netzeband, Bob Palmer, Dale Kirn, Ced Galloway, Tony Naccarato . . . oh, the list was tremendous!

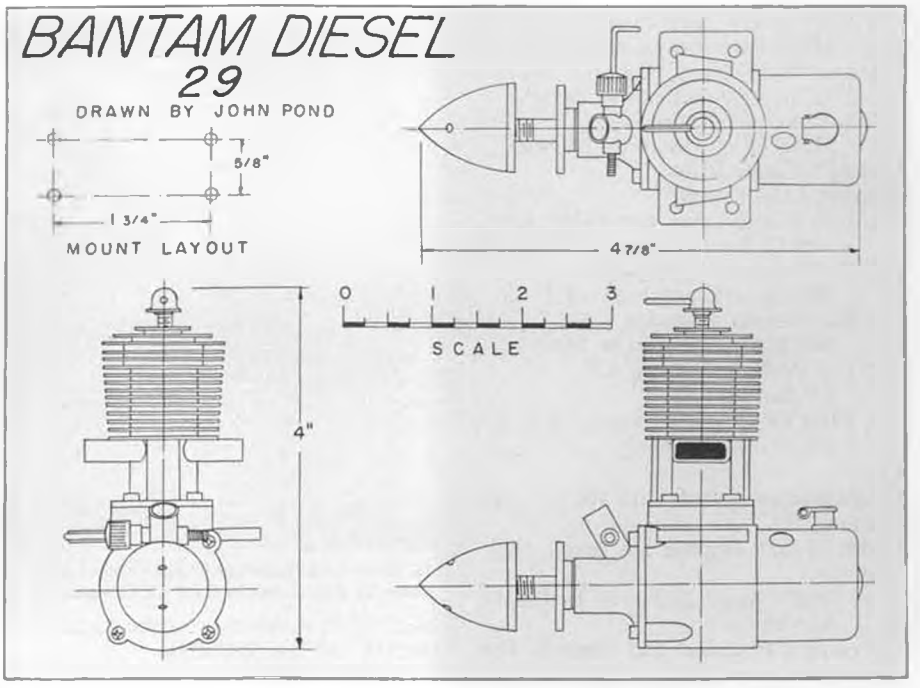
Photos are the best way of showing what

9. Ohio's Bucky Walter shows the enclosed cabane version of Chet Lanzo's R/C Stick model. According to Chet, this is the way the model was originally built, before the R/C gear was added. This "cabin" version of the R/C Stick is currently waiting for SAM's official blessing.

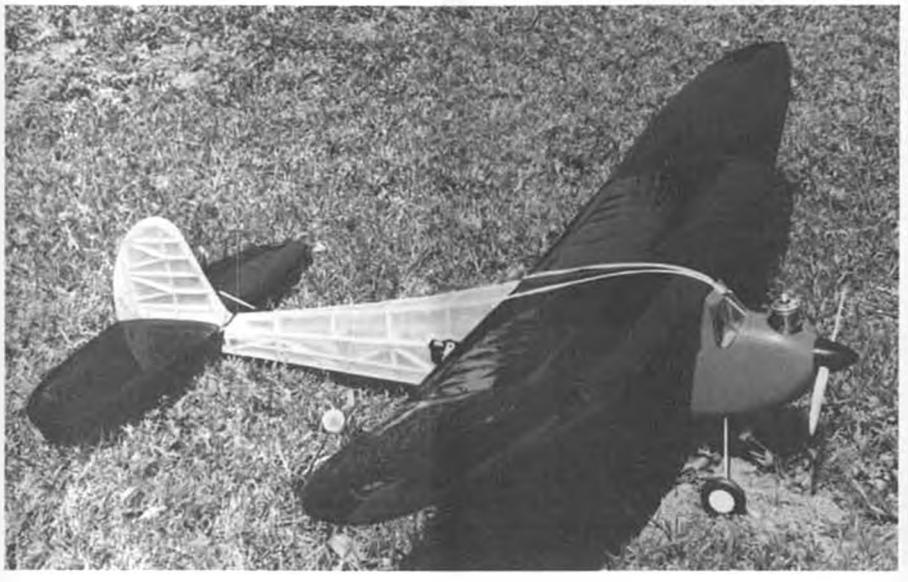


11. Very rare "Falcon," a Paul Plecan design, is the work of Gerald Martin, of Texas. An Atwood 49 on ignition hauls it up just fine. Must have been fun figuring out those rudder linkages!

12. Pretty black and purple Powerhouse, displayed by Mrs. Jerry Rocha and designer Sal Talbi, won 1/2A Texaco at SCAMPS Annual.



13. A real rarity is the Wigdor "Wasp," originally published in *Aeromodeller*. Col. Bowden influence is evident. This scaled-up copy uses an Enya four-stroke and was built by Albert Fisher of Australia.



was flown as evidenced by Photo No. 4 of Lou Wolgast, Phoenix, Arizona. Seen is a "Red" Reinhardt Plymouth Internationals Winner with a Fox 35 for power.

Photos of the winning models are always interesting. Photo No. 5 depicts the "Old Time" Stunt winners: Russ Graves, second place with a Sterling Ringmaster, Center; Ted Fancher, first place with a Debolt All American '9' Fox 35, and third place winner John Wright, with a Lou Andrews Barnstormer and McCoy 40 for power.

The Nostalgia Stunt Winners seen in Photo No. 6 were Bob Whitely with a Kenhi Panther; Tom Dixon (from Georgia!) with a "Lark"; and Kaz Minato with an All American Senior (Fox 35).

Mike Keville enthusiastically writes that the meet exceeded all expectations. Weather was fairly nice, judging was great, 36 contestants from Massachusetts to Arizona showed up and flew. Best part of all was the typical old timer contest with the relaxed and low-key atmosphere, a wide variety of models on display . . . as Mike says, it looked like the way O/T free flight did in the early days. Spectators, cameramen, and reporters all over the place. Nothing succeeds like success!

Kudos should go to Mike's wife, Joann, for an excellent job of Contest Director. Joann also says this is the time to acknowledge the unselfish work of the Stunt judges who were inadvertently overlooked at the awards. Sorry, men!

Let's take a look at the results (only to 5th place):

Olde-Tyme Stunt (G.S.C.B. Rules)

1. Ted Fancher, Foster City, CA
   625.00 All American Sr. Fox 35
2. Russ Graves, Long Beach, CA
   570.00 Ringmaster, OS 40FP

14 (left). This beautifully built Megow Super Quaker belongs to Bob Gourdon of Arabi, Louisiana. Features MonoKoted flying surfaces, silk on the fuselage and fin. A good running Super Cyclone makes this a tough one to beat at contests.

3. John Wright, Long Beach, CA
   558.00 Barnstormer, McCoy 40
4. Lou Crane, Sierra Vista, AZ
   547.00 All American Sr. Fox 35
5. Lou Wolgast, Tucson, AZ
   533.00 50 Plymouth Int. Winner

Nostalgia/Classic Stunt (Current AMA Pattern)

1. Bob Whitely, Fountain Valley, CA
   1048.50 Panther
2. Tom Dixon, Marietta, GA
   1013.00 Lark, Magnum 40GP
3. Kaz Minato, Torrance, CA
   998.00 All American Sr. Fox 35
4. Lou Wolgast, Tucson, AZ
   937.50 Smoothie
5. Chris McMillin, Huntington Bch., CA
   898.50, P-63 Profile

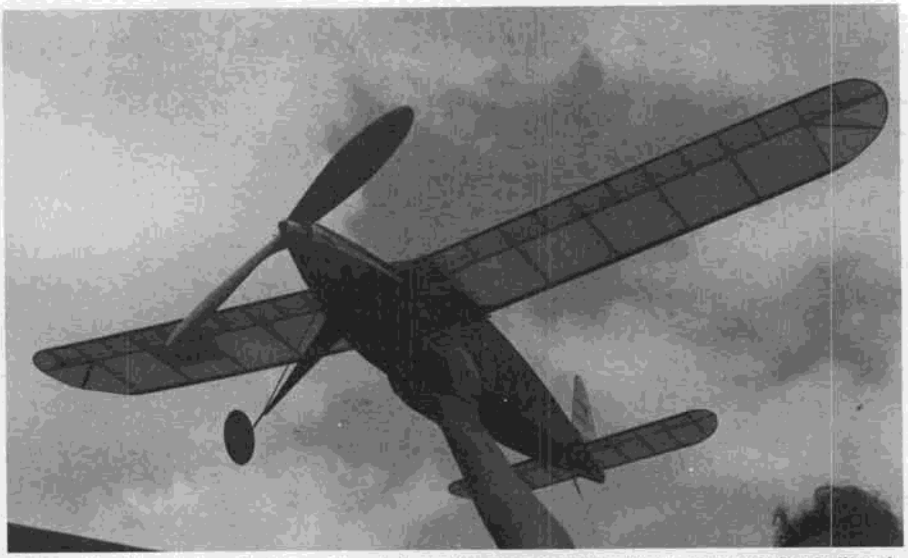
Also:

Long-Distance Award: Dick Wolsey - No. Reading, MA

"Spirit of '52" Trophy: Jim Levell, Highland, CA
1947 "Super Zilch," kit by Galaxie Model Co.

Concours d'Elegance: Kaz Minato - Torrance, CA
AA SR., Fox 35 (Yeah, the inboard panel is a bit short, but ya had to see the finish . . .)

By the way, if this O/T stuff turns you on, Mike Keville sez to mark your calendar for the 2nd Vintage Stunt Champs on February 24-25, 1990, at Whittier Narrows again!



15. Good looking vintage English rubber design with a peculiar name, the "Fairy Facula," as built and flown by Bob Jones of SAM 41. Covering is silk and tissue. Photo by Jim Alaback.

ENGINE OF THE MONTH

For this month's rare engine, we are again indebted to our old friend, Karl Carlson of San Jose, California. In addition to this, we must acknowledge Gus Munich and Art DeKalb as sources of information.

As far as can be ascertained, this larger 29 Bantam engine was the product of Ben Shereshaw's inventiveness. Although some production was undertaken, about 12 to 24 castings (at most), were made up. When the Herkimer Tool Co. (manufacturers of the OK engines) bought up the rights to the famous Bantam 19, all materials were transferred to the new owner.

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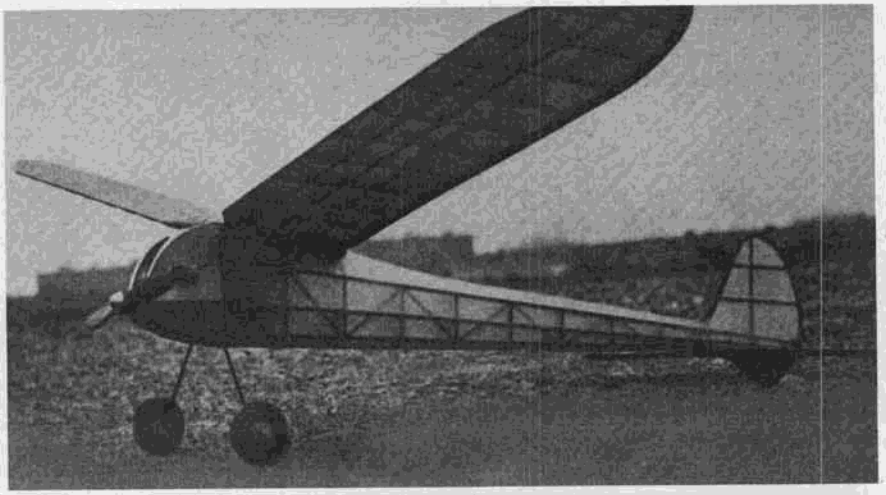
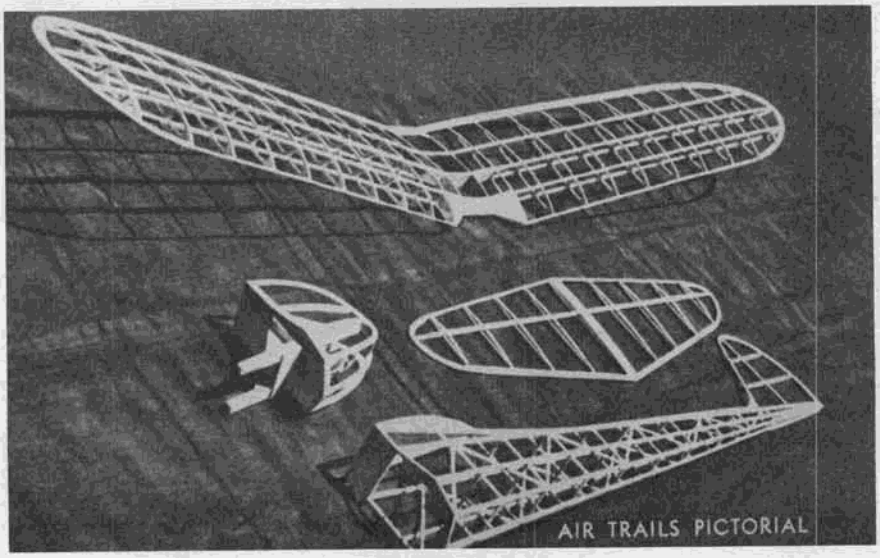
OLD TIMER Model of the Month

PINCH HITTER

Designed by Paul Plecan and Gil Shurman. Text by Bill Northrop.

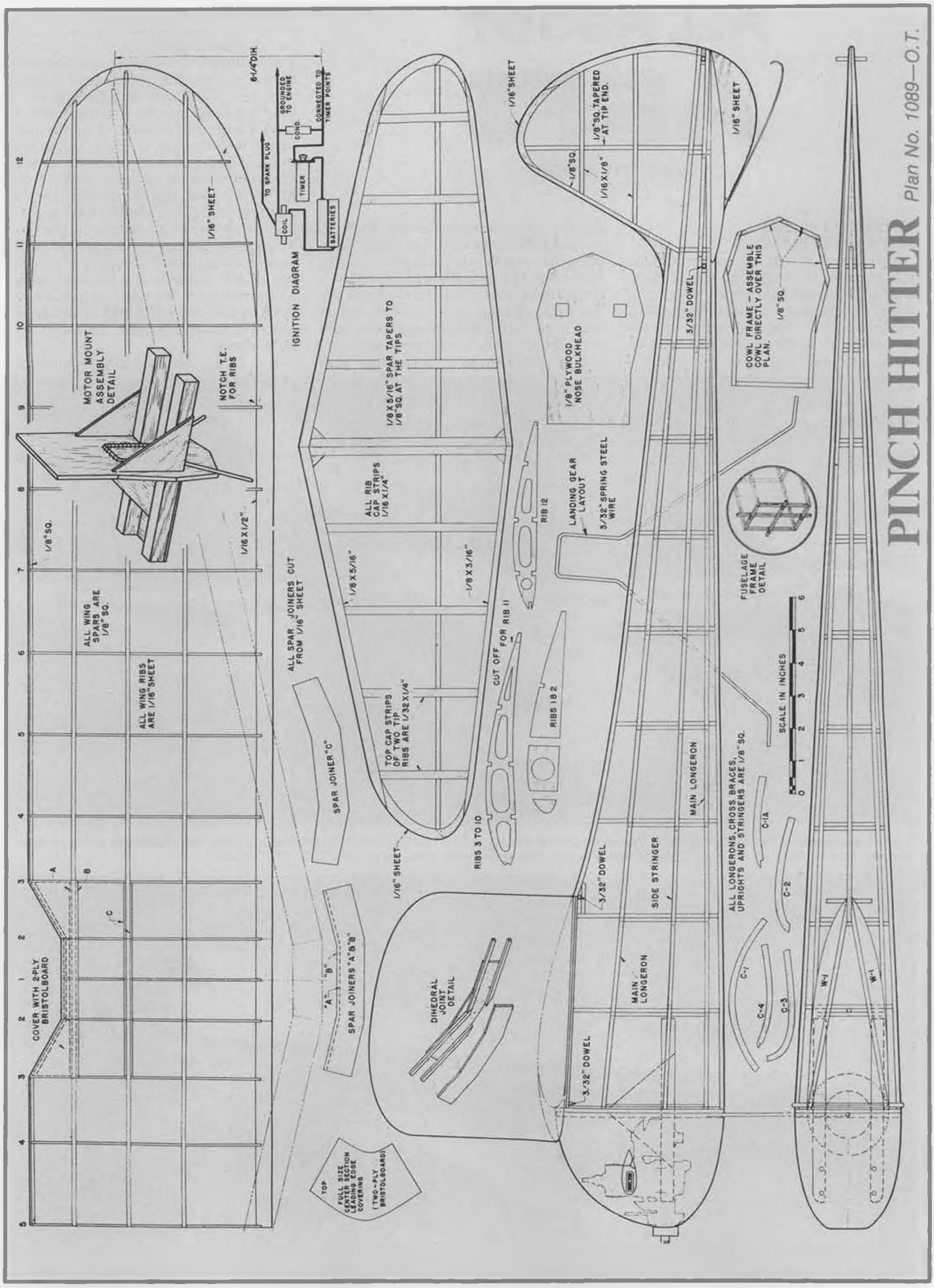




• On page 28 of the November 1942 issue of *Air Trails* there was an article written by Claude McCullough, whom you possibly have heard of, entitled "Exit Balsa—Enter Basswood." We were in the midst of World War II, and it was a time of rationing . . . butter, gasoline, tires . . . balsa . . . some items were really in short supply because of wartime priorities . . . others items the government purposely rationed just to make sure everyone felt some effect from the situation . . . "There's a war on, you

Continued on page 66

Photos at right were shot directly from the original magazine, as was the plan on the facing page. With its clean lines and simple construction, the Pinch Hitter could be a real sleeper for F/F and R/C O.T. competition. Span is 56 inches, wing area is around 390 square inches, and the overall length is 36-1/2 inches.


PINCH HITTER Plan No. 1089—O.T.
COVER WITH 2-PLY BRISTOLBOARD
ALL WING SPARS ARE 1/8" SQ.
ALL WING RIBS ARE 1/16" SHEET
1/8" SQ.
1/16 X 1/2"
1/16" SHEET
MOTOR MOUNT ASSEMBLY DETAIL
NOTCH T.E. FOR RIBS
6-1/4" DIA.
IGNITION DIAGRAM
GROUNDED TO ENGINE
COND.
CONNECTED TO TIMER POINTS
TO SPARK PLUG
TIMER
COIL
BATTERIES
ALL SPAR JOINERS CUT FROM 1/16" SHEET
SPAR JOINER "C"
SPAR JOINERS "A" "B"
"A"
"B"
1/16" SHEET
TOP CAP STRIPS OF TWO TIP RIBS ARE 1/32 X 1/4"
1/8 X 5/16"
1/8 X 3/16"
ALL RIB CAP STRIPS 1/16 X 1/4"
1/8 X 5/16" SPAR TAPERS TO 1/8" SQ. AT THE TIPS
CUT OFF FOR RIB 11
RIBS 3 TO 10
RIB 12
RIBS 1 & 2
DIHEDRAL JOINT DETAIL
TOP
FULL SIZE CENTER SECTION LEADING EDGE COVERING
(TWO-PLY BRISTOLBOARD)
1/16" SHEET
1/8" PLYWOOD NOSE BULKHEAD
LANDING GEAR LAYOUT
3/32" SPRING STEEL WIRE
1/8" SQ.
1/16 X 1/8"
1/8" SQ. TAPERED AT TIP END.
1/16" SHEET
3/32" DOWEL
COWL FRAME — ASSEMBLE COWL DIRECTLY OVER THIS PLAN.
1/8" SQ.
FUSELAGE FRAME DETAIL
SCALE IN INCHES
0 1 2 3 4 5 6
3/32" DOWEL
SIDE STRINGER
MAIN LONGERON
MAIN LONGERON
ALL LONGERONS, CROSS BRACES, UPRIGHTS AND STRINGERS ARE 1/8" SQ.
C-1A
C-2
C-1
C-4
C-3
W-1
W-1

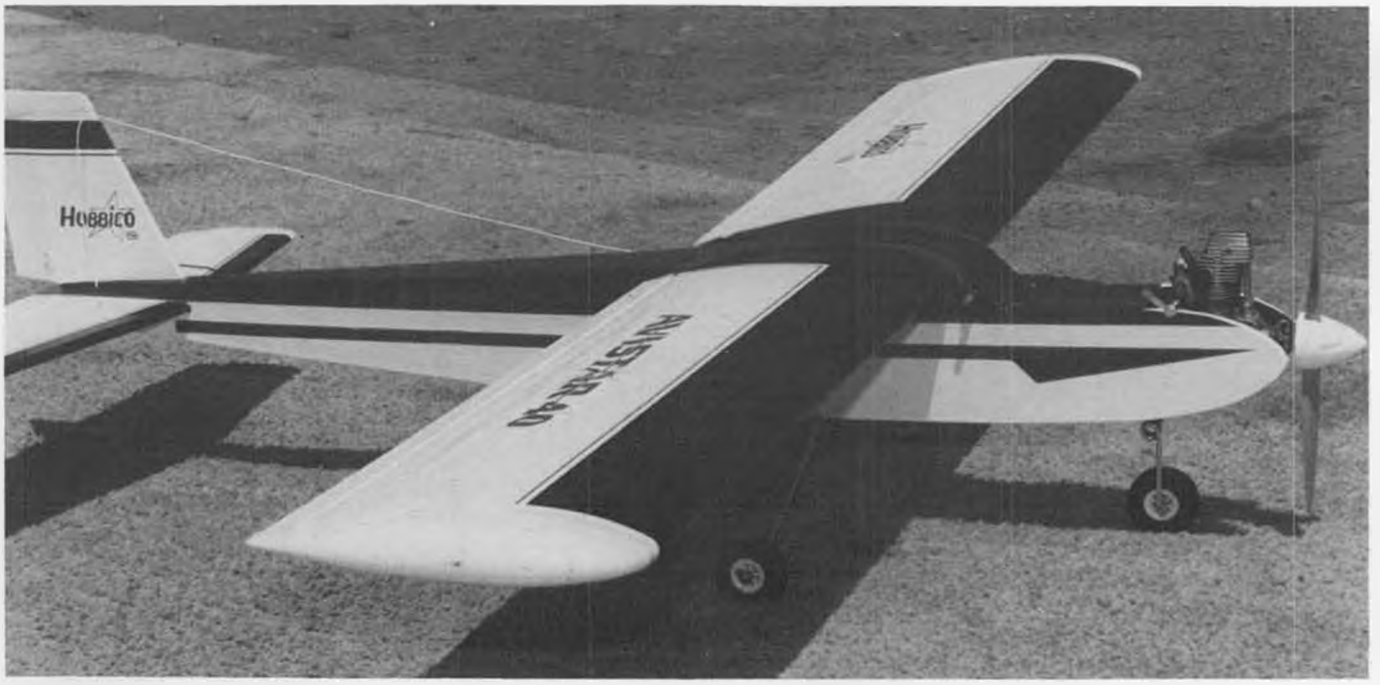
ALL ABOUT ARFS

By ART STEINBERG

TWO GREAT PLANES FROM GREAT PLANES

This month Great Planes Model Distributors virtually leaps into the limelight with a couple of ARFs which are among the finest examples of prefabricated R/C models available today. The first one we will focus on is the Hobbico Avistar 40. What is so gratifying about this model is that the beautiful picture on the box top is not just some artist's flight of fancy. What you see is exactly what you get! Actually, this is true of practically all ARFs today, a situation very much different from the usual run of built-up kit models. When you check out the advertising photographs of the conventional kit offerings, what you end up with may be a far cry from what you dreamed of when you purchased and laboriously constructed the model. The manufacturer's prototype is undoubtedly a meticulously built model, put together by an accomplished professional builder, with a knockout of a color scheme and a fabulous finish. So the average modeler buys the kit, and depending on his individual skill, he may produce a dog of a model, or an astounding work of art. However, when it comes to ARFs, there isn't much room for exaggeration, as the contents of the box tend to look exactly like the pictures in the ads or on the box. Yes, the day has come when any tyro with an ounce of mechanical ability can quickly put an ARF together and get busy flying, and as icing on the cake, he gets a very attractive model which will probably be just as handsome as any comparable hand-built model.

The Avistar .40 is certainly a foremost

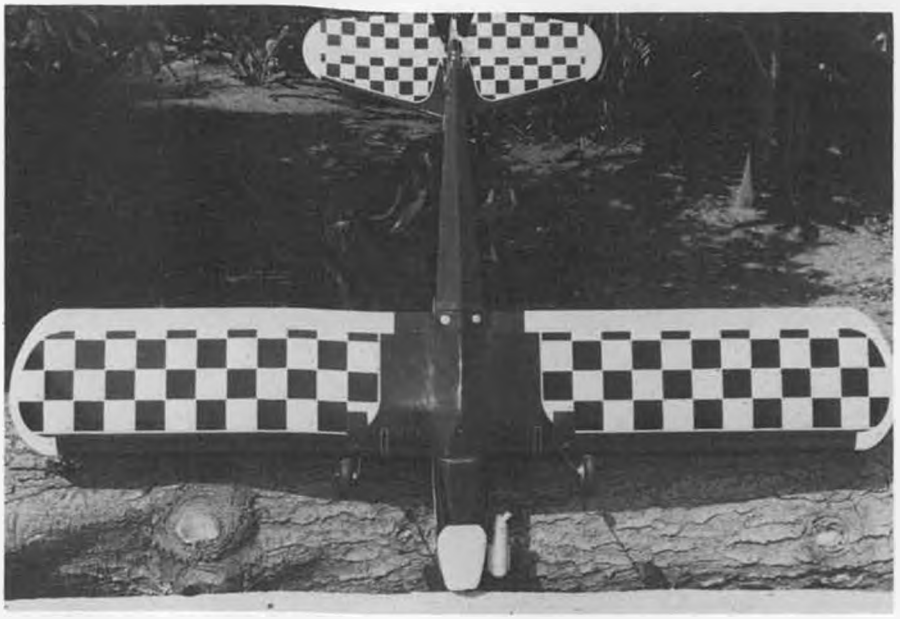


Two especially nice ARFs offered by Great Planes Model Distributors are the Hobbico Avistar 40 (above), a .40 size sport/trainer, and the O.S. Ryan (below), based loosely on the Ryan STA and available both with and without a factory installed O.S. .40FP engine.

Left: Our columnist's flying buddy, Chuck Thompson, did the assembly work on the Avistar 40 for this month's review. The only notable recommendation offered is to add some striping or some other color trim to the bottom of the wing, as the all-white underside sometimes makes for marginal in-flight visibility.

example of a really snappy looking model which pops out of the box needing a minimum of assembly. The specs are really impressive, with a generous sixty-inch wingspan and a ten-inch chord, which results in a hefty 600 square inches of wing area. Coupled with a finished weight of 4-1/2 pounds, the wing loading is a light 17 ounces/sq. ft., and I knew even before the flight tests that we had a sure winner on our hands. To help its handling characteristics even further, a sturdy tricycle gear is supplied, and that favorite touch of mine is also included, a removable tank hatch cover. One of the first things I noticed was that the wing had a semi-symmetrical airfoil, and my first thought was that this model was intended to be an advanced trainer or sport trainer. To be fair, the manufacturer only refers to the Avistar .40 as a "trainer" in a very low key manner. Anyway, a strict classification would come later with flight testing.

Rich Anderson did the initial test flights on Art's O.S. Ryan and was very enthusiastic about its lively performance.



No visibility problems with the Ryan! Checkerboard underside assures there will be no confusion telling the top from the bottom.

Assembly was made easy with a highly comprehensive set of instructions, profusely illustrated with topnotch photographs and drawings. It was immediately apparent that this set of instructions was written in lucid English by someone who speaks our language as his native tongue. Too often the foreign manufacturer digs up some so called "expert" in English to write the instructions, and the poor builder finds himself trying to decipher a lot of gobbledegook. I often wonder if it costs so much to hire an English speaking person to write instructions. Hence, I hereby offer my writing services free of cost to any foreign manufacturer willing to furnish me with transportation.

Chuck Thompson, one of the members of my assembly team, did the work, and he was quite pleased with the kit. However, he did complain that there was a reference to teaching one's self to fly, and Chuck feels that no reference should ever be made to self-teaching on a bird of this type, and I heartily agree with him! On the other hand, the instructions do make it clear that you should try to obtain the help of an experienced R/C pilot, and even advises the beginner to contact a local club for help.

The wing and stabilizers had some nifty plastic tips pre-installed, but the hinges required gluing. Except for the tips of the flying surfaces, all construction was of balsa and a light variety of plywood, and whenever the use of such materials is at all possible, that is the most desirable way to build a model, ARF or not. Chuck had a little trouble assembling the fuel tank until he used some Vaseline to get the rubber stopper into the neck of the tank. Conversely, push rods were completely ready to use, with threaded wire ends on strong wooden dowels. This is the way I like my pushrods, as I believe them more reliable than the nylon tubing affairs which seem to expand in the hot sun, undoing all my careful trims. Absolutely every bit of required hardware was supplied, down to the last screw, bolt, and collar, and the wheels were of the lightweight foam variety which has proved to be an excellent way to go. Once again, there was a surplus of nylon fittings, enough for possibly two or more models. One of these days I am going to add up the over-the-counter cost of the hardware provided in one of these ARFs, and I am positive it will run as high as twenty-five dollars, and that is something you usually have to go out and buy when putting together standard hand-built models.

All covering is of the plastic film type, good and strong, but super light in weight. The color scheme is basically white with

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ELECTRIC POWER

By MITCH POLING

• Battery cycling is a perennial topic. By now, most know that cycling a battery is important. A cycled battery produces and stores more power. Since we usually run our batteries down to almost nothing, we are in effect cycling them, but sometimes a pack gets left aside for a month, or we would like to know just how good a pack is. Until recently, I cycled a pack by running it down with a motor and prop, and took readings each minute to get an ampere x minute rating for the pack. I still do, but this is time consuming. The car racers do it slightly different; they use a semi-constant load and time the pack to discharge. Instead of ampere x minute, they use seconds (no amperes). This method is easy to do automatically, and I made a very simple discharger that reads the discharge time and displays it. Now all I have to do to check the battery pack condition is plug the pack into the discharger and read the time later.

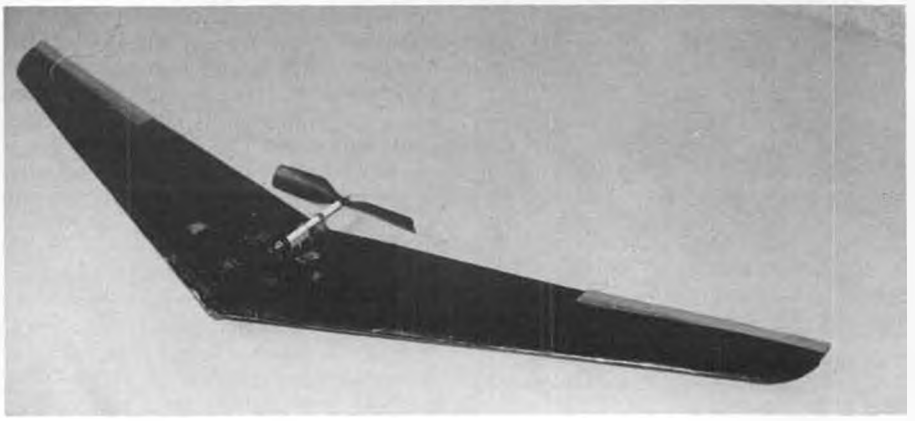
The discharger is very inexpensive and simple to make. You will need two silicon diodes (1N914 or 1N4148 do well), a 6-volt VW headlight bulb (6006), a 470 ohm, 1/4 watt resistor, some .005" brass or copper shim stock (K&S), and a battery clock that uses a single AA cell (most do). The diagram shows the construction. The two diodes supply a 1.5 volt drop for the clock, the 6006 headlight bulb draws 9 to 10 amperes on a six or seven-cell sub C pack. If you want a lighter load, use an 1157 taillight bulb for 3 amperes. The metal shim is for the contacts to the clock. Leave the AA battery in the clock. Tape one side of the shim, and slide the shim in between the battery and the contact in the clock, with the tape side towards the battery. Now the battery cannot run the clock, the discharger will. Set the clock at 12 noon, plug in the discharger, and away you go! The clock will stop running when the voltage across the diodes drops below 1.5 volts. Read the time and note it on the pack, along with the date. My Astro SCR sub C pack reads 8 minutes, 30 seconds using the 6006 bulb, a seven cell SR Batteries sub C pack reads 7 minutes, 30 seconds.

The battery pack voltage does drop quite low with this setup, less than .5 volts per cell. There is also no auto cutoff, the pack will continue to discharge residual charge as long as it is plugged in. I have had no problems with discharging packs to essentially zero volts despite many warnings to the contrary from other writers. I have found one car driver who thought he might have damaged a pack after six months of routinely leaving his packs on discharge overnight. Cell reversal just does not seem to be that much of a problem. However, to be on the safe side, do not leave the pack plugged in overnight. You can have an auto shut off if you use a relay in series with the resistor, I have done so and it works well.

It is also a good idea to check packs cell by cell to see how well they are matched. It is easy to make a discharger for this too, and it is even simpler. The diagram shows the assembly. You need the clock, shim material, battery clamps, and four feet of #22 magnet wire, or telephone solid core

Below: How many scale electrics have you seen with this caliber of workmanship? Jeff Kelety is to be commended for the fine job he did on this 1/6-scale Volksplane, powered by an Astro 05 Cobalt on seven cells. Nice finishing touches include a fully detailed instrument panel and dummy VW cylinder heads.

Right: Also from Jeff Kelety comes this photo of his "Terrier," powered by an Astro 40 Cobalt on 18 cells. Jeff originally built it as a landplane with a .25 size glow engine, later converted it over to an electric seaplane.



Right: Half-size Klingberg Wing by Tom Davis was the hit of the show at the recent Boeing Hawks electric fly-in up in Seattle, Washington. To say that our columnist is quite enthusiastic about the model's performance would be a gross understatement!

wire, for a load. The discharge rate will taper from about 10 amperes to 6 amperes (at the clock cutout) for a single cell. Cut holes in the cell insulation so the battery clamps can reach the cell. Take a look at the code chart to see how the plus and minus connections go for a pack. If you get the plus and minus connections reversed, you can burn out the clock. Set the clock on 12 noon and discharge each cell. The readings I got for each cell in the Astro SCR pack (fully charged) were 8:37, 8:33, 8:40, 8:45, 8:50, and 8:45. In seconds this is 517, 513, 520, 525, 530, and 525. The average is 522 seconds, and the worst case is only 2% off, so this is a good pack. Car racers will match closer than this, to 1% or less! There you have it, an automatic cycle and battery matcher for less than $20!

Last weekend was the annual Boeing Hawks electric fly-in. Thank you, Bernard Cawley and Ben Almojuela, for putting in all the effort! The weather was beautiful, warm for Seattle, with temperatures in the 80s, and lots of thermals for the glider events. However, the plane that really stole the show was a half-scale Klingberg wing, designed and flown by Tom Davis. It weighed 8.75 ounces with three channels! It was voted the most impressive on Saturday, and it earned it! It was fully aerobatic (loops, rolls, spins), and flew in 10 mph winds with no problem at all. To cap it all, it thermaled like a feather, and easily flew for ten minutes on six 270 mAH cells! This is by far the most efficient plane I have seen, and was close to bird-like in its flying style. Here are Tom's comments on the plane:

"A year ago, a friend and I pondered the possibility of a micro-electric capable of flying in a very small field. I built a 35-inch Korda (RN models) with a Cannon Super Micro R/C system, a Tamtech 1/24 scale car motor with my own gear system, 5.75 reduction, and a 270 mAH six cell battery pack. I also built my own custom designed, super light, BEC speed control (it is tiny! MP). All up weight was 8.8 ounces, 9.5 ounce/sq. ft. loading. The performance was good, solid 5-minute flights in cool, no-thermal weather. The high drag of the Korda gave a low airspeed, the plane had to he pushed into a dive to do a loop. My friend bought a Klingberg wing for a super low-drag electric. The plans showed a half-scale top view of the wing! Several weeks later my half-scale wing was complete with

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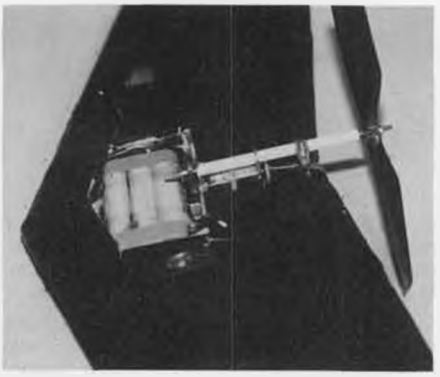
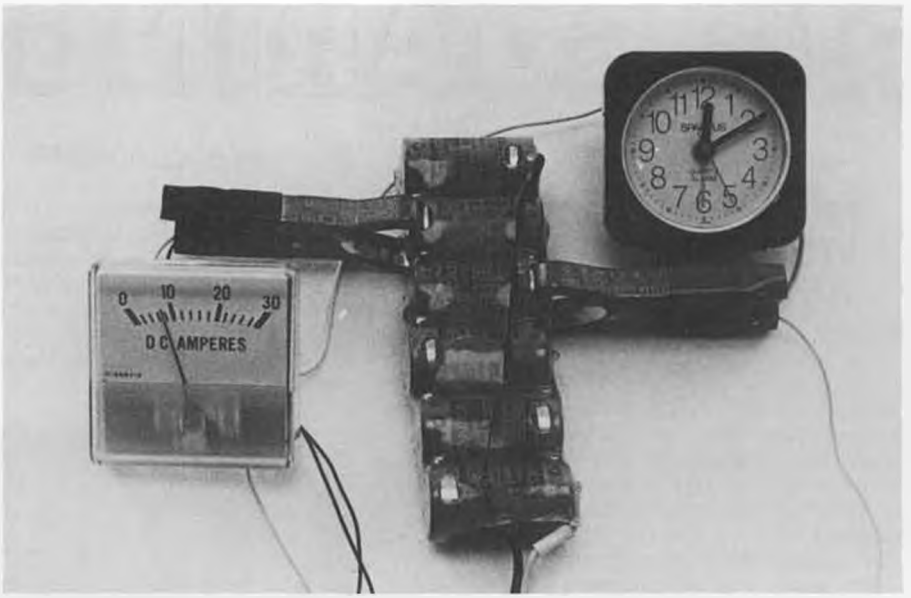
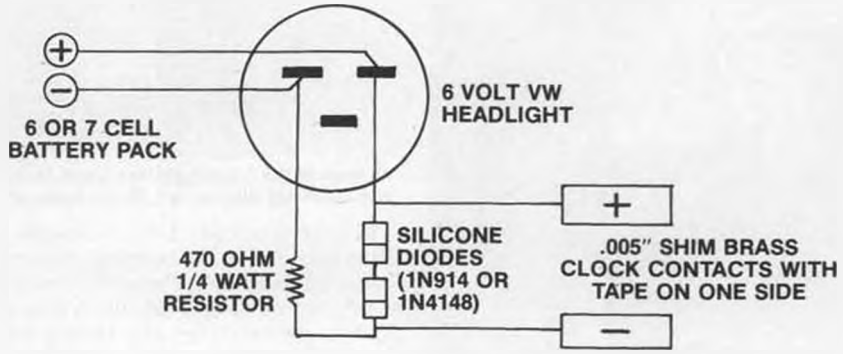


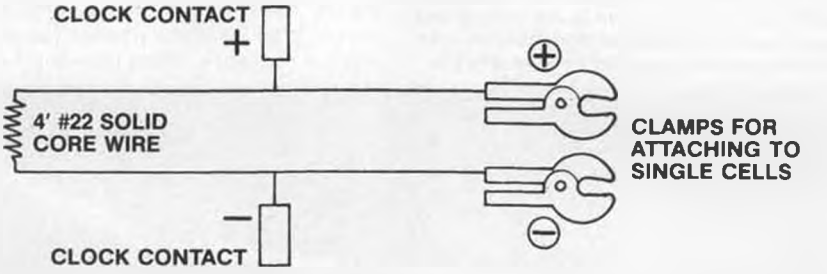
Close-up shot of the homemade power system on the mini Klingberg Wing.

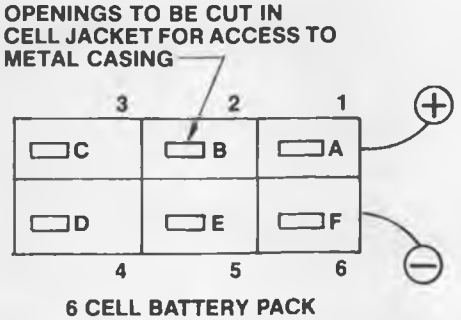


All wired up and looking like some sort of time bomb, Mitch's single-cell discharger is hard at work draining one of the cells in a six-cell pack. Note how a small section of the protective jacket on each cell has been cut away to expose the metal casing. Discharger schematics are shown below.

SINGLE-CELL AND MULTI-CELL BATTERY DISCHARGERS







CELL NO.	ACCESS HOLE +	ACCESS HOLE −
1	+	A
2	A	B
3	B	C
4	C	D
5	D	E
6	E	F

R/C SOARING

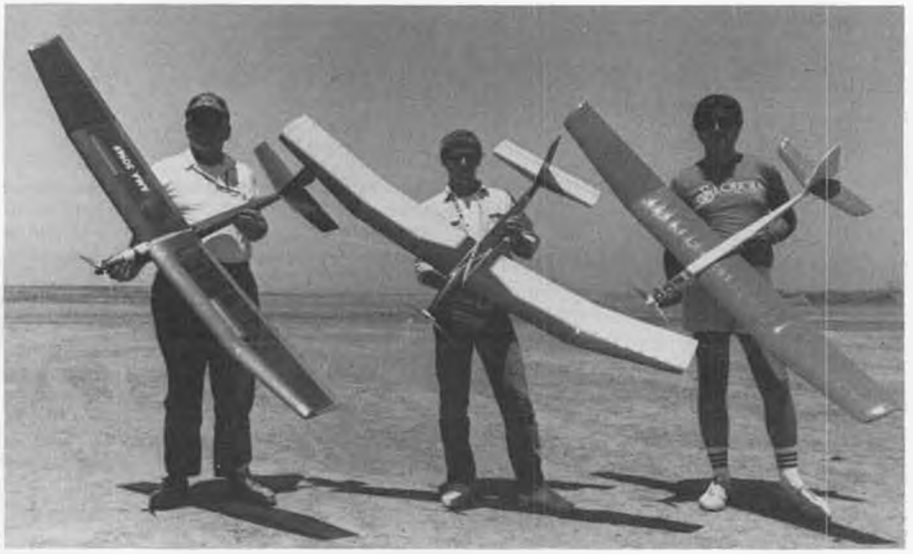
By BILL FORREY

MODEL BUILDER VISITS THE 1989 ASTRO CHAMPS

• Imagine an electric sailplane taking only 10 seconds to gain 400 feet of altitude. Imagine an electric sailplane climbing so high that in only 20 seconds it is starting to become hard to see. It's no fantasy anymore. Electric power has blossomed into an impressive form of thermal and multi-task soaring. It would seem that for electric powered soaring, the sailplane winches have moved into the motorglider's noses!

This year's 15th Annual Astro Champs was held June 17 and 18 at Costa Mesa's Fairview Regional Park. Sponsored by Astro Flight, Sanyo Batteries, Midwest Products, and Midway Model Co., the Champs are hosted by the Harbor Soaring Society. The weather was ideal, the modelers were friendly, the atmosphere was laid-back (not competitive), and there were more entries this year than in many a recent year. The Astro Champs are truly magnets which attract fun-seeking electric fliers.

Fourth place in 7-Cell went to Jim Skinner and his red hot all-balsa original. Model uses an Astro 05 with a specially modified oversize gearbox.



Winners of the 7-Cell Sailplane Class, from left: 1st, Bob Sliff and Electrifier; 2nd, Scott MacKenzie and Goldberg Electra; 3rd, Dieter Lamprecht and Pilot Harlequin.

In case you can't believe images like those pictured in the opening paragraph, let me tell you they are becoming common at the Astro Champs. Advances in power, lightweight structure, and careful model design are making all the classes (but particularly the Unlimited Sailplanes) much more exciting to watch and fly.

The Astro Champs brings out the best in electric fliers' abilities. It is a contest that people plan for many months (or even a year!) in advance, often traveling from a thousand miles or more just to participate. One family, the Larry Rudnicki family, came all the way from Golden, Colorado this year, just to observe!

ASTRO CHAMPS '89 FORMAT

Expecting performance gains over last year, CD John Lupperger decided to shorten the motor run times (again) and make the thermal duration events more of a challenge. It seems that every year this becomes necessary due to the increasing performance levels of the planes and pilots. As it turned out, his new shorter run times proved to be a bit on the "conservative" side, judging by the numerous maxes recorded. His conclusion at the close of the event was that further shortening was

Bob Sliff's first place 7-Cell win makes it two in a row, as he won last year also. His Electrifier is now two years into the design phase as a Midway Model Co. kit with no release date available.

Left: Lightest of the 7-Cells was our author's Electric Lady at 39 ounces. Bill's son, Matt, helped transport it. Mods for the electric conversion of the Goldberg Gentle Lady were detailed in the July 1985 *MB*.

ASTRO CHAMPS CONTEST FORMAT

	7-Cell Sailplane	7-Cell Old Timer	Unlimited Sailplane	Unlimited Old Timer
		ROUND 1		
Motor run	20 seconds	35 seconds	10 seconds	20 seconds
Duration	3 minutes	3 minutes	3 minutes	3 minutes
Landing	100 points	25 point in/out	100 points	25 point in/out
		ROUND 2		
Motor run	40 seconds	55 seconds	20 seconds	30 seconds
Duration	7 minutes	7 minutes	7 minutes	7 minutes
Landing	100 points	25 point in/out	100 points	25 point in/out
		ROUND 3		
Motor run	30 seconds	40 seconds	15 seconds	25 seconds
Duration	5 minutes	5 minutes	5 minutes	5 minutes
Landing	100 points	25 point in/out	100 points	25 point in/out

in order!

There are four different classes flown at the Astros. They are: 7-cell Old Timer and 7-cell Sailplane; and Unlimited-cell Old Timer and Unlimited-cell Sailplane.

Old timer designs are defined as being any gas model published or proven to have flown prior to December 31, 1942. There is no real definition of an electric sailplane (provided AMA safety limits are not exceeded), as the event is self-limiting.

Obviously, 7-cell and unlimited refer to the number of Ni-Cd cells used in the power source for the aircraft's motor. In the Astro Champs there are NO LIMITS on cell capacity. Similarly, there are NO LIMITS on motor size or type within the two cell classes. These are the rules regarding models and power plants. Believe it or not, these are the only rules there ever have been at the Astro Champs, and year after year they prove to work very well!

Regarding the flight rules, these may change a little from year to year. Basically, however, the Astro Champs are a limited motor run, thermal duration event. They always have been and will continue to be; you can count on that and build your aircraft accordingly. The requirements of climbing as quickly as possible and flying as long as possible after the climb are the only two you'll need to plan on.

A look at the contest format matrix which accompanies this report will clue you in on the motor runs and duration max times used in rounds one, two, and three. Scoring is man-on-man to minimize weather luck. Check out how little time the Unlimited Sailplanes were given! Yet, as I indicated earlier, these times were deemed more than adequate for the tasks! (Footnote: the 100-point landings are on a graduated tape.)

The matrix does not show the fourth round which took place Sunday morning. This task was called the "penalty duration" event. Quoting from the rules: "Round four will be a 5-minute penalty-duration with the same landings as the previous rounds. Time will start (on a signal from the CD, and) when the model becomes airborne. A second timer will keep track of the motor run which will be subtracted from the total flight time. Motor run time is at the discretion of the pilot, but is restricted to the initial run. Scoring will be straight points per second with all classes flying the same task."

The penalty-duration event is the real strategy round. The big question in every pilot's mind is how long should I run the motor? If I run it longer than I need to to make five minutes, I waste valuable points. If I run the motor for too short a time, I don't make the five minutes and fail to get as many points as I could otherwise. Is there a good thermal around that I can jump into allowing me to cut my motor run short? Is the air all sink, requiring me to climb longer? Man, this decision is a killer!

However, it is the same decision for all in round four, so it is fair! In this event, a fast climb is an edge over the competition. If it takes you less time to make five-minute altitude, you've got a chance at winning. An equalizer here for the slower climber can be a thermal near the launching zone. If the slower climber hits the thermal at the same time as the faster, it's a potential tie . . . provided both can work the lift to a max!

Winners of the 7-Cell Old Timer Class, from left: 1st, Gary Westland and Leisure Bomber; 2nd, Ross Thomas and Playboy; 3rd, Lowell Norenberg and Astro Viking.

MODELS FLOWN AT THE CHAMPS: 7-CELL SAILPLANE

There is a lot we can learn by taking note of the building techniques and equipment used by some of the best electric fliers in the nation. By reviewing the best performing, most interesting models from each class, we can improve the models we fly (just for the fun of it) every weekend. I'd like to begin with the most popular class, 7-Cell Sailplane. This class had 17 entries registered.

By virtue of winning the 7-cell class, the first model we'll look at is Bob Sliff's Electrifier. Bob and his Electrifier have now won this event two years in a row. (Congratulations, Bob!) Reason enough to take note!

Two years ago, Bob flew the first Electri-

Randy Wrisley shows off his interesting Flying Aces Stick Model, vintage 1936, that he flew in the 7-Cell O.T. Class. At only 35 ounces, it was the lighest model at the Astro Champs.

Winners of the Unlimited Old Timer Class, from left: 1st, Bob Sliff and Cabin Playboy; 2nd, Gary Westland and Schmaedig Stick; 3rd, Ross Thomas and Lanzo Bomber.

fier prototype. This first model was a little different than the present model. The original had an open structure wing with a 1/8x3/8 spruce I-beam spar. Its performance was a little disappointing, so Bob redesigned the wing a little.

The current wing has the same airfoil, an Eppler 193, and the same planform. However, it is now sheeted back to the spar with 1/16 balsa. It also has spoilers. To help offset the added weight of the spoilers and the servo needed to operate them, the I-beam spar caps were changed to balsa. Carbon fiber reinforcement was added between the spar caps and the D-tube sheeting in the main panels only. Bob says the new wing weighs the same as the old one, and he says the spoilers are a definite help in landing the model. Due to their higher weight, electric motorgliders are harder to stop than similar sailplanes. With up to 100 bonus points available in the landing circle, Bob didn't want to miss a bet.

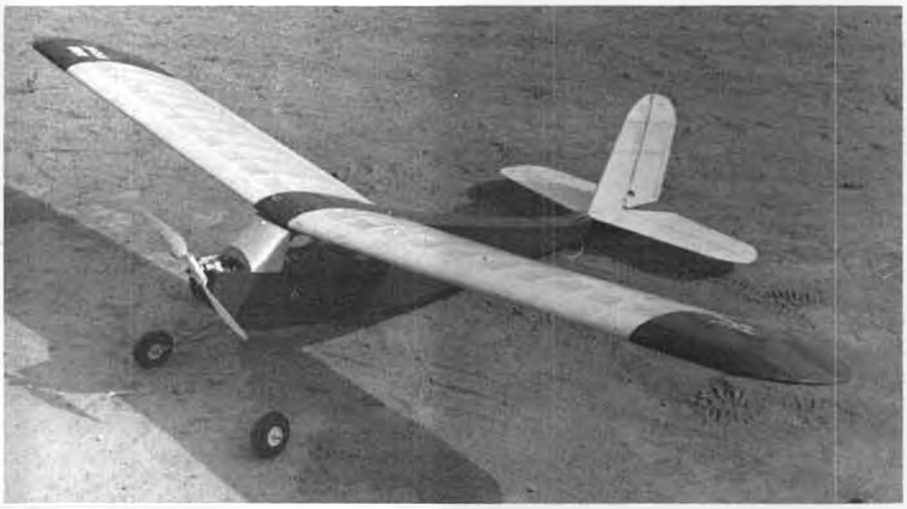
The Electrifier is actually a kit prototype for Bob's kit manufacturing business, Midway Model Co. Although no release date is available, I can give you a little more info about the model just in case you want to design and scratch build a similar one.

The one-piece polyhedral wing has a pair of constant chord main panels with tapered tips. The root chord is 9.0 inches, and the tip chord is 6.25 inches. The ribs have no rib cap strips. Laid out flat, the wing spans 82 inches and has an area of 690 squares. All up weight is 42 ounces. The fuselage is very roomy, to the point that standard size radio gear fits inside with no problem. It is also a long model at 42.5 inches from nose to tail. Bob designed the Electrifier with an upswept, almost boat-like nose on the fuselage to keep the motor shaft or gear box shaft away from potential harm (hard knocks, dirt, etc.). This design feature makes a lot of sense to me when you run the more expensive cobalt motors!

In the power department, the Electrifier uses an Astro 6-turn, FAI, cobalt 05 gear motor; a 7-cell 900 mAH Sanyo pack; a Joe Ballasch custom made speed controller with four forward FETs and two brake FETs (these are a special type that can really handle excessive current); and a K&W 12x7 folding prop with short hub. Bob uses high current flex wire and Sermos Power Pole connectors.

Overall impressions of the Electrifier are that is an all-around good flier. It climbs well under power, and it has the right combination of handling, penetration, and thermal climb to be competitive. It is perhaps not the best in any single category, but the Electrifier is well balanced enough that it is hard to beat.

The second place finisher was Scott MacKenzie with his (borrowed) Goldberg Electra. Jim Hall actually put the model together. The motor used was an Astro cobalt 05 gear motor (probably a 6-turn FAI wind). On seven cells and this kind of motor, the Electra really comes alive with performance. The transformation from "Turbo 550" to cobalt motor is dramatic, and highly recommended!



Above: Ray Westland's Turner Special didn't place in Unlimited O.T., but it sure was pretty in the air. Flew at the Champs with a geared Astro 15 Cobalt and fourteen 450 mAH cells, but has since been refitted with an Astro 25 and 800 mAH cells.

Gary Westland's Astro 15 powered Schmaedig Flying Stick is an easy Old Timer to scratch build and a good flier to boot. Original was 84 inch span, but Gary scaled it down to 630 square inches.

Third place finisher was Dieter Lamprecht and his modified Pilot Harlequin. This Hobby Shack sailplane was converted to motorglider, given thinner wing sheeting to skinny up the modified Eppler 205 airfoil, given flaps, and given balsa fuselage sides instead of the kit's light plywood sides. In spite of the fact that it is a little on the heavy side at 47 ounces, the Astro 05 6-turn gear motor hauls it up very well. The Harlequin is a very clean, low drag model.

Astro 60 powered, 27-cell original by Jerry Bridgeman is a real hot rod. It was the lightest of the F3E models at the Astro Champs, has a very fast and very steep climb. Jerry also put on quite an aerobatics show with it after the contest.

Winners of the Unlimited Sailplane Class, from left: 1st, Bob Sliff and Gnome 3M; 2nd, Felix Vivas and Astro 60 original; 3rd, Lowell Norenberg and his 7-cell original.

Dieter Harlequin uses a KO Propo RM-7 MOSFET speed controller, seven 900 mAH cells, and K&W 13x7 folder.

Jim Skinner, who placed fourth, had the most unusual 7-cell sailplane on the field, and possibly the best performing one too! In one round, I saw Jim's model climb to about 400 feet in 15 seconds. The model has no name, which is a pity considering how well it flew. Jim has an extensive free flight background which is very apparent in the careful design and craftsmanship of this model.

Looking at the model, all you see is balsa wood. Actually, you are looking through sanding sealer and clear dope on the fuselage and stabs, and clear Monokote on the wings! Summing up, the model has a 65 inch span, a 520 square inch wing area, 43 ounce flying weight, a very long tail boom, and a free flight style vertical and horizontal stab design.

Jim's model is powered by an Astro 6-turn 05 cobalt gear motor, seven 900 mAH cells, and a Joe Ballasch 28-cell, Astro 60 type, electronic speed controller with FET voltage booster circuitry. This is the same four-Z40-FET speed controller Bob Sliff used, minus the two brake FETs.

Jim did something I've never heard of before to the gear box. He replaced it with the larger Astro 25-40 cobalt motor gear box! This required the fitting of a metal sleeve over the smaller 05 motor shaft so that the bigger pinion gear would fit snugly. The 25-40 gear box ratio at 1.8:1 is higher than the stock 05-15 gear box at 2.2:1. By itself, this gearing change would have overloaded the motor, but Jim used a smaller 12x7 prop instead of the usual 13x7 to help reduce the current flow to an acceptable level. This change gained Jim 800 to 900 rpm and a noticeably superior climb out!

Other tricks Jim pulled to gain an edge were in the model's structure. The multi-paneled wing is fully sheeted in 1/16 balsa for true airfoil shape and efficiency. According to Jim, "It has a close-to-Eppler 205, self-drawn, power free flight type airfoil." The rib spacing at the root of the wing is 0.5 inches (on center), widening to one inch at the tips. This close rib spacing and the fully sheeted wing allows the

Left: Scott MacKenzie flew a Goldberg Electra in Unlimited. Modified nose houses a geared Astro 15 Cobalt on 12 cells.

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Steve Neu (left) and Keith Finkenbiner flew identical "Drone" F3E electrics, based on a Freudenthaler fuselage. Astro 60 power.

Ross Thomas builds up a good head of steam before heaving the Gnome 3M. These big ones need plenty of airspeed on launch.

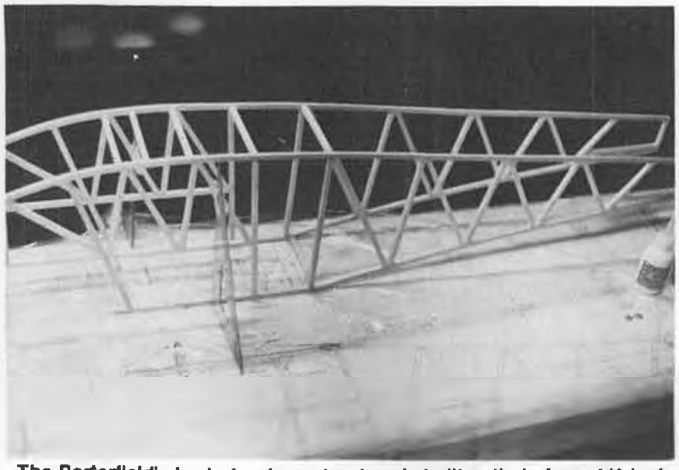
Astro Flight's PORTERFIELD COLLEGIATE

By BOB BENJAMIN

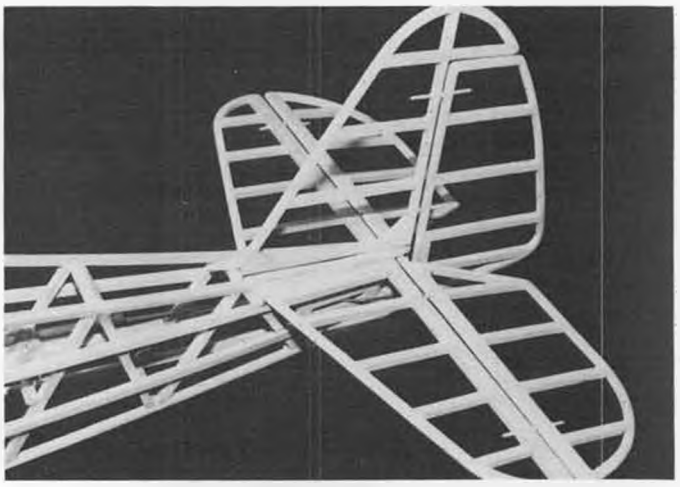
• My Astro Challenger review in the February '89 *Model Builder* recounted some of the experiences I encountered in becoming involved for the first time with electric flight. One of the points I made clear was the degree to which I have been impressed by the quality of the Astro Cobalt motor systems, so much so that immediately after test flying the Challenger I began planning a whole series of projects based on them. In the Challenger article I mentioned an interest in the Astro Viking oldtimer, and in the Porterfield. I have had a Cobalt 035 powered Viking flying for most of the past year. Built ostensibly as my wife's airplane, it has been taken out nearly every time I have gone flying and has served as convincing proof of the practicality of electric flight for more modelers than I can keep track. I mentioned the Porterfield then, and went on to build it because of my abiding interest in scale and an inclination toward larger models. What I have ended up with has turned out to be a very rewarding sport scale airplane which I can also recommend as a first "big" electric.

As many of you reading this may not yet be familiar with electric flight terminology, I'll digress a bit to explain. Most of the RTF and ARF (Ready to Fly and Almost Ready to Fly) electric combos on the market use motors in the "05" (six or seven-cell) or smaller size range, with the result that many modelers first become familiar with equipment of this size. Not surprisingly, a great majority of the battery chargers on the market are designed for such motor systems, and work with battery packs of seven or fewer cells. Motors intended for use with more than seven cells are usually referred to as "big" motors. The use of these big motors designed to run well on larger numbers of cells greatly increases the scope and challenge of electric modeling, but these systems make the use of specially designed chargers almost essential.

The equipment combination I ended up with includes the Astro Porterfield kit, the Astro Cobalt 25 geared motor system, including wiring and switch harness and a battery pack of 14 Sanyo "red" 5CR cells, and the Astro Model 200 electronic, fully proportional speed control. I also brought home one of the first of the new Astro Model 112 DC/DC Super Chargers. To do justice to all these goodies, I managed to get my hands on an advance copy of the Airtronics FM Vanguard 4-Channel radio system. Once all of the above was spread out on the work table, it became clear that the airplane deserved to be completed as

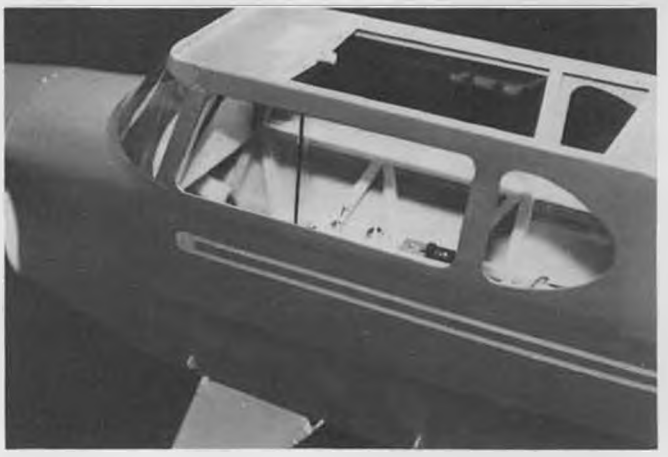


The Porterfield's basic fuselage structure is built entirely from 1/4-inch square balsa. As shown here, when joining the fuselage sides, use drafting triangles to maintain proper alignment.



Tail surfaces are also mostly 1/4 square balsa. Curved parts are cut from sheet but could also be laminated from four pieces of 1/16x1/4 balsa.

The complete Astro 25 Cobalt geared motor system. The wiring harness includes an on-off switch and charge connector, and couples the two 7-cell packs into a 14-cell flight battery.



On the full-size Porterfield, the rear half of the left side window is openable; Bob left this part open for a cooling air exit and for access to the switches and charge plug.

In this three-quarter rear view you can see the undercamber in the reworked prop, which started out as a 13x8 Top Flite Super M. This simple mod can yield a real boost in an electric's performance.

more than just another Sunday sport model, so I contacted Scale Model Research and acquired a set of scale view drawings to complement the three-views provided with the kit, and a really comprehensive "Foto Paak" which enabled me to complete and document the Porterfield as a model of a specific full-scale airplane.

The Porterfield ". . . turned out to be a very rewarding sport scale airplane which I can also recommend as a first 'big' electric."

THE FULL SCALE PORTERFIELD

The Porterfield "Collegiate" was introduced in 1940 as a fabric covered, two-seat inline lightplane powered by the then new, flat-four engines. Several variations were offered using Lycoming, Continental and Franklin engines of from fifty to sixty-five HP. The airplane had a wingspan of 34'9", a gross weight of about 1200 lbs. and a rated top speed of 108 mph. Actual cruising speed was somewhat under 100 mph. These performance figures place the Porterfield in the same class as the various models of the Piper Cub, the Aeronca Champ and Chief, the Taylorcraft and several other less well-known lightplanes using the same range of power. The Collegiate was a follow-on to earlier Porterfield models which had used small radial engines. Unfortunately for the Collegiate, demands of wartime production took precedence over lightplanes and none were built after 1942. With a total of only about 400 completed, the design never became as well known as its competitors.

Left: The transmitter for the four-channel Airtronics FM Vanguard system used in the Porterfield. Bob has lots of good things to say about this radio.

THE ASTRO PORTERFIELD

The Astro Flight version of the Collegiate is a two-inch to the foot rendition with a span of 69.5". Wing area is listed as 675 sq. in. with a weight of from four to five pounds. The design is intended as a sport scale model; some liberties have been taken with structural member placement and cross sections in the interest of straightforward construction in order to appeal to a maximum number of builders. No provision is made for ailerons. Dihedral has been slightly increased over that of the full scale aircraft to allow good control with the rudder. Designer Bob Boucher opted to use a somewhat thinner (10%) airfoil

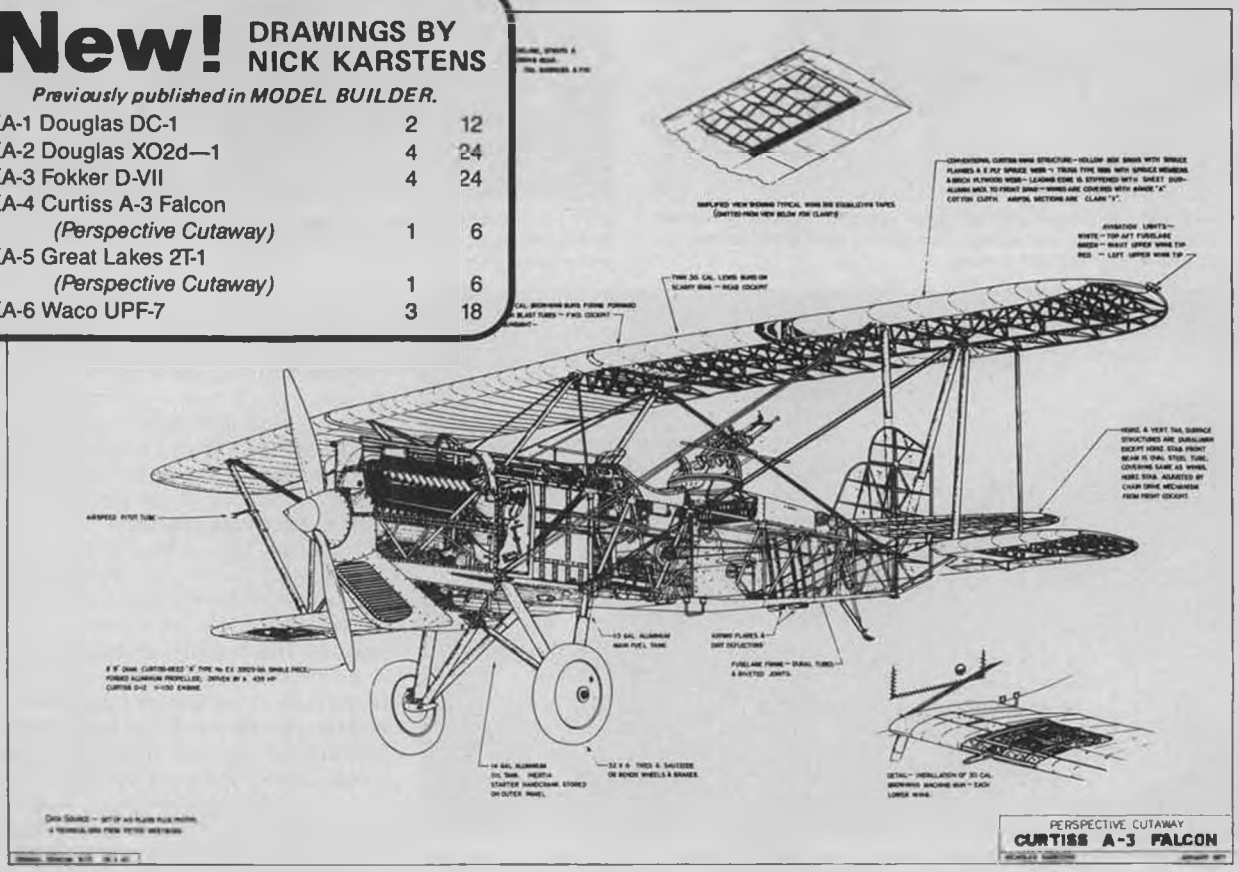
Continued on page 96

Peter Westburg's
SCALE VIEWS

New! DRAWINGS BY NICK KARSTENS

Previously published in MODEL BUILDER.

KA-1 Douglas DC-1	2	12
KA-2 Douglas XO2d—1	4	24
KA-3 Fokker D-VII	4	24
KA-4 Curtiss A-3 Falcon *(Perspective Cutaway)*	1	6
KA-5 Great Lakes 2T-1 *(Perspective Cutaway)*	1	6
KA-6 Waco UPF-7	3	18



SUPER-ACCURATE AIRCRAFT DRAWINGS. USE FOR SCALE DOCUMENTATION AND/OR FOR DEVELOPING MODEL CONSTRUCTION PLANS. ALL DRAWINGS ARE 28 x 40 INCHES BORDER- TO-BORDER, AND ARE SCALED AS LISTED BELOW.

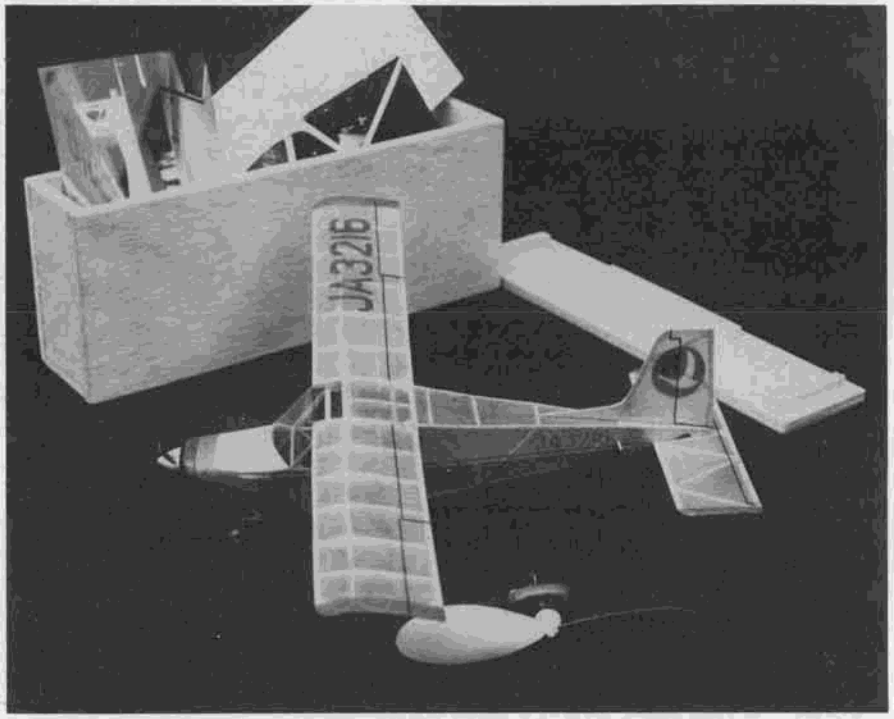
1/24 scale: ½" = 1 ft.	No. of Shts.	$
WE-18 Douglas O-35/B-7I	1	6
WE-23 Douglas XO-36/XB-7	1	6
1/12th scale: 1" = 1 ft.		
WE-2 Boeing F4B-4/-3	4	24
WE-3 Boeing P-12E	3	18
WE-4 Curtiss A-8 Shrike	3	18
WE-7 Curtiss Gulfhawk 1A	2	12
WE-8 Curtiss N2C-2 Fledgling	4	24
WE-9 Curtiss O-1B/A-3 Falcon	3	18
WE-10 Curtiss P-1B Hawk	3	18
WE-12 Curtiss XP/YP-23	3	18
WE-13 Curtiss SBC-4 Helldiver	4	24
WE-14 Czech Avia B-534	2	12
WE-15 Davis D-1K	2	12
WE-16 Douglas O-25C	3	18
WE-17 Douglas O-31A/O-31B	3	18
WE-19 Douglas O-38/O-38B	2	12
WE-20 Douglas O-43A	3	18
WE-21 Douglas O-31C/Y10-43	3	18
WE-22 Douglas O-46A	3	18
WE-25 Fokker D-17	3	18
WE-26 General Western Meteor	1	6
WE-28 Grumman F2F-1	3	18
WE-29 Grumman F3F-2	3	18
WE-34 Stearman 4E Mailplane	2	12
WE-36 Travel Air 2000	2	12
WE-37 Waco ATO Taperwing	2	12
1/10 scale: 1.2" = 1 ft.	Shts.	$
WE-1 Berliner/Joyce P-16	4	24
WE-5 Curtiss BFC-2 Goshawk	4	24
WE-6 Curtiss F9C-2 Sparrowhawk	4	24
WE-11 Curtiss P-6E Hawk	4	24
WE-24 Fiat CR-32	3	18
WE-27 Great Lakes Trainer	4	24
WE-30 Hawker Fury Mk I	4	24
WE-31 Hawker High Speed Fury	3	18
WE-32 Hawker Persian Fury	3	18
WE-33 Monocoupe 90A	2	12
WE-35 Swedish Sparmann P-1	2	12

ORDERING INSTRUCTIONS (Minimum order: $10.00)

U.S. orders, including APO and FPO, add 20% of total order for shipping and handling. Overseas orders (includes Canada and Mexico) add 50% of total order. Remit payment by International Money Order or U.S. funds, drawn on a U.S. bank. Please, no cash or C.O.D.s. Master Card or VISA include card number, expiration date, and signature. Add 5% to credit card orders. Send payment to RCMB INC., 898 West 16th St., Newport Beach, CA 92663. Phone (714) 645-8830.

CALIFORNIA RESIDENTS ADD 6% SALES TAX

ITOH 62-160



By WALT MOONEY . . . This Peanut version of a 1960's Japanese lightplane is designed to break down for shipping to Postal Proxy Peanut contests. Plans show how to make a shipping box from a single sheet of 1/4-inch balsa.

• Postal Proxy Peanut contests, originally conceived by the editor/publisher of *Model Builder,* have caught on in several parts of the world. They present an easy way to have your models take part in international competition. Making a container strong enough to survive the mails intact, while carrying a completed Peanut, and paying the postage on that sort of package presents somewhat of a challenge. This is one response to the challenge: Make the model so it can be assembled for flight at the contest site, and fit in a relatively small box (shipping crate) that can be made strong and still light enough so the postal fees are not beyond your budget.

The shipping crate built for the ITOH 62-160 cost $2.16 for a sheet of 1/4x4x36 balsa and a dime or so for cement to assemble it. The 4x9-1/2x2-1/4-inch balsa box has adequate strength, will hold the model, documentation, three-views and photos, and the Post Office will charge less than $4.50 to send it from San Diego, California to Japan by airmail, with an enclosed letter.

The ITOH is a relatively simple, good flying design and uses standard building techniques throughout, with the exception of design details to enable it to be taken apart. This disassembly for transportation is commonplace with the larger models but has not often been done with Peanut Scale models.

Two materials are used to facilitate assembly. They will not be required if the model is not to be broken down for shipping. One thirty-second diameter, round bamboo is used for the wing spar carrythru, strut leading edge, and rear spar pin. The bamboo is available from Peck-Polymers (see advertisement in this magazine). The other item is thin, one-sixteenth diameter plastic tubing to accept the carrythru, and strut ends. The material used in the model came from a plastic place mat. To the first 100 people sending me a self-addressed, stamped envelope and one dime, I will send enough of this tubing to make a couple of models. After 100, I will send the dime back. Walt Mooney, P.O. Box 231192, San Diego, California 92123. If plastic tubing is unavailable, make paper tube over .045 piano wire. Use tissue and model cement over an oiled length of wire.

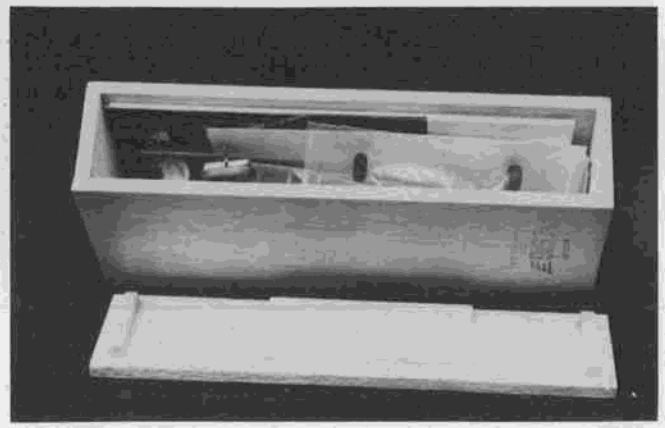
The basic model structure does not require a lot of explanation if previous Peanut models have been built, so only things required for breakdown and assembly will be covered in this article.

The fuselage has several details which need coverage: The wing centersection is attached to the fuselage as a fixed item.

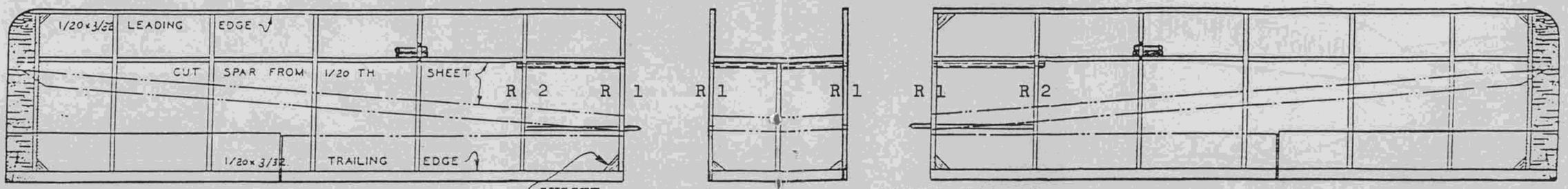
Continued on page 68

Left: The ITOH in its completely broken down state, ready for packing in its balsa box. Scale documentation goes in there too.

Below: Sure enough, it all fits! A small box like this is much cheaper to ship than a large one containing a fully assembled model.



PLASTIC TUBING TO ACCOMMODATE CARRY-THRU



LEFT WING

GUSSET

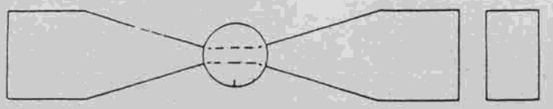
CENTER SECTION

BAMBOO DRAG PIN

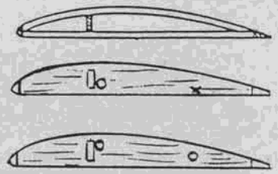
RIGHT WING

1/32 SHEET TIPS FOLLOW TOP CURVATURE OF RIB

BAMBOO CARRY-THRU



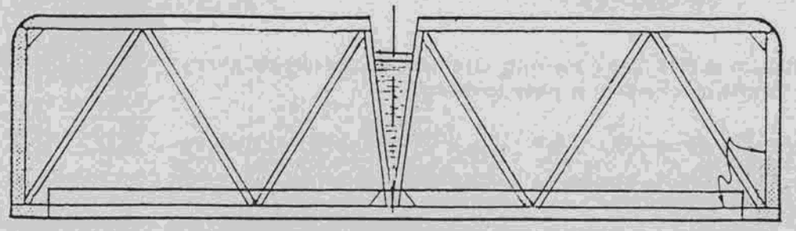
PROPELLER BLANK FOR CARVED PROP



ALL OTHER RIBS

R2 RIB (2 REQ'D.)

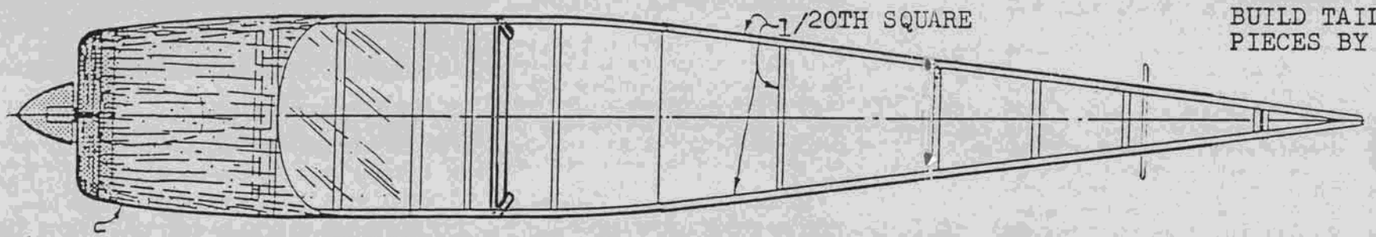
R1 RIB (4 REQ'D)



HORIZONTAL TAIL

ALL STRUCTURE IS MEDIUM BALSA UNLESS OTHERWISE NOTED.

CARVED BALSA PROP SPINNER

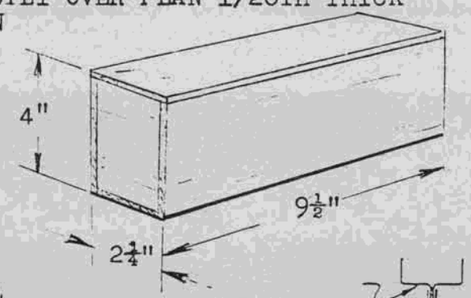


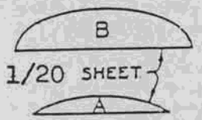
3/32 SHEET COWL SIDES

FUSELAGE PLAN VIEW

BUILD TAIL FLAT DIRECTLY OVER PLAN 1/20TH THICK PIECES BY WIDTH SHOWN

SHIPPING CRATE IS MADE FROM ONE SHEET OF ¼x4x36 BALSA.





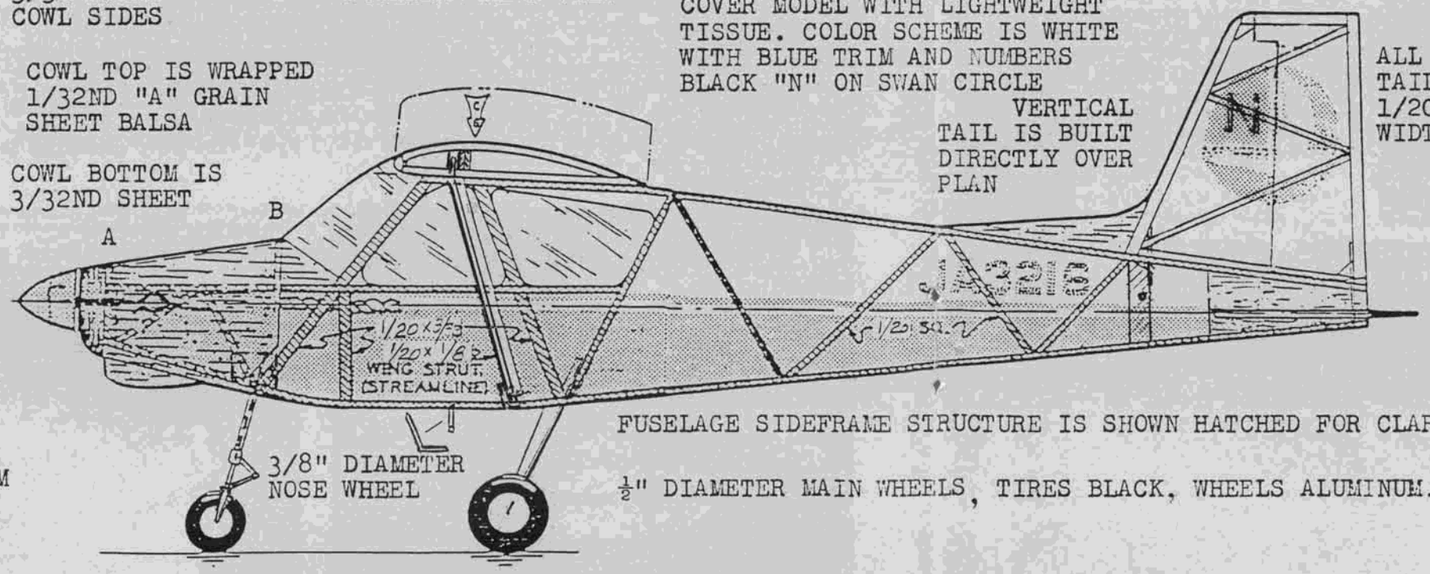
FORMERS

COWL TOP IS WRAPPED 1/32ND "A" GRAIN SHEET BALSA

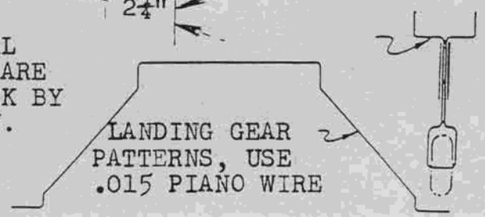
COWL BOTTOM IS 3/32ND SHEET

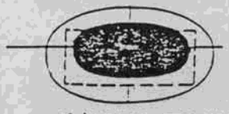
COVER MODEL WITH LIGHTWEIGHT TISSUE. COLOR SCHEME IS WHITE WITH BLUE TRIM AND NUMBERS BLACK "N" ON SWAN CIRCLE

VERTICAL TAIL IS BUILT DIRECTLY OVER PLAN



ALL VERTICAL TAIL PARTS ARE 1/20TH THICK BY WIDTH SHOWN.





5/32ND THICK NOSE BLOCK AND BACKING PLATE. 1/16" DIA. ALUMINUM TUBE THRUST BEARING

3/8" DIAMETER NOSE WHEEL

FUSELAGE SIDEFRAME STRUCTURE IS SHOWN HATCHED FOR CLARITY

½" DIAMETER MAIN WHEELS, TIRES BLACK, WHEELS ALUMINUM.

"Simplicity means less to go wrong. Gremlins do not like simplicity. Also, a simple mechanism is easy to make."

Master draftsman Vern Clements displays his most recent plan, the Rearwin Cloudster. Vern has a catalog of his plans available; see text for address.

• Our lead-in lines this month, by Chris Bradford, are quoted from *Aeromodeller* magazine, and may be the best advice available to model builders..

SPEAKING OF *AEROMODELLER*

That fine English publication continues to maintain a remarkable level of excellence under the editorship of Geoff Clarke. The variety is outstanding, featuring a blend of free flight, control-line, and sport topics, as well as first-rate construction plans. The May issue presents a rubber-powered Found Centennial, originally inspired by a Walt Mooney Peanut, but tripled in size by Rob Presnell!

A fascinating article by Alex Imrie provides a comprehensive look at compressed-air engine models, balanced nicely by Chris Coote's coverage of simple electric power systems. Add to this international contest coverage, engine evaluations, and book reviews, plus an Al Backstrom rubber-powered butterfly, and you have something for almost any taste.

Aeromodeller subscription information for U.S. readers is available from Joe Daileda, Wise Owl Worldwide Publications, 4314 West 238th Street, Torrance, California 90505. Overseas readers may contact Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, England. Please tell 'em *Model Builder* sent you!

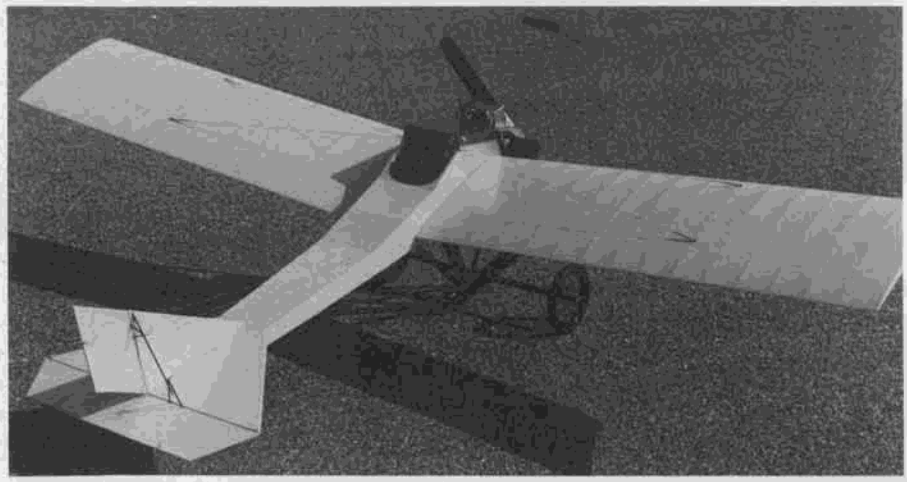
BEFORE LEAVING *AEROMODELLER*

The Argus staff hosted a retirement dinner for Ron Moulton, who was a guiding light of *Aeromodeller* for some 39 years. The banquet menu featured a simulated *Aeromodeller* cover with Ron Moulton holding a large, control-line stunt model, food items associated with model flying sites (Old Warden Bombe, Eaton Brey Brew, Cranfield Champagne Sorbet, etc.), and cartoons from one of Ron Moulton many books.

From Ron's own parting words we have extracted the following: ". . . after 39+ years the reminiscences are so numerous that complete severance is impossible"; "Retirement is all the more acceptable when spirits are high and the cogs grind smoothly." In spite of several location changes over the years, Ron remarked that ". . . the same original spirit still pervades with identical enthusiasm for aeromodelling."

And what does Ron expect to do now? Welcome a change in his lifestyle 'with the freedom to decline a request; freedom from the office desk'; and 'Retro.' (The French expression for returning again.) "It'll be great to get back to free flight scale, to toy with those designs which offer many fondly-remembered highlights. . . .

"So many readers have already discovered the delights of Retro. It refreshes parts



Large R/C scale 1911 Scottish Barnwell Monoplane, built by Carlo Mapelli of Italy, is intended for competition flying. Roll control is by wing warping, as per the original.

Bob Borman of Ecuador harvests his own balsa for his models! This highly detailed Fairchild 71 is a 1/32-scale static display model. Wings fold back as on the full-size aircraft.

Above: Nicely built indoor scale SE5a belongs to Ulises Alvarez, of Uruguay. In-flight photo was taken by Mario Garcia Onorio.

Right: Another SE5a, this one a Peanut version built by Alexander Nekvapil-Pardubice of Czechoslovakia. The realistic looking prop is longer than scale and we suspect it's the one used for flying. Photo by Pavel Jelinek.

that sophisticated latter-day creations simply cannot reach, and I look forward to the opportunity of my own relaxed, mid-week flights with anticipated pleasure. See you on the flying fields!" Happy landings Ron!

FRUGAL FLYERS

Our discourse about simple, low-cost models a few columns ago, brought several letters of agreement, for example: Bill Pinkston, of Mt. Vernon, Washington, expressed it this way: "I feel there must be a market for a small, lightweight motor to power rubber-style model airplanes . . . sort of an electric rubber-motor, I guess. I've played around with the idea a bit and find a 1/2AA battery and a 'toy' size Mabuchi motor weigh less than one ounce and should fly a 30-inch span model. I'd like to add my 'please do' to help persuade Pete Coleman, of Texas, to publish a detailed article on his system."

Bill refers to Pete's $7.30 electric power combination composed of easily available components. If other readers may be interested, drop Editor Bill Northrop a hint! *(I'm listening! wcn)*

HOW'S THAT AGAIN?

From a 1911 article "Why Flying-Machines Fly," recently reprinted in the book *Early Flight*, this observation: "The aeroplane must move fast enough to reach a new section of air before it falls."

HOW TRUE

From the pen of the late Dr. Alexander M. Lippisch, writing in *Air Trails Pictorial:* "You cannot build as many different models as is necessary to find out how to get best performance."

SQUARE TREES, ANYONE?

Herb Weiss favored us with an article from *The Economist* of April 15, 1989, dealing with an idea for increasing the usable lumber yield from trees. Presently, much of the wood in a tree trunk is unsuited for use because of its round shape.

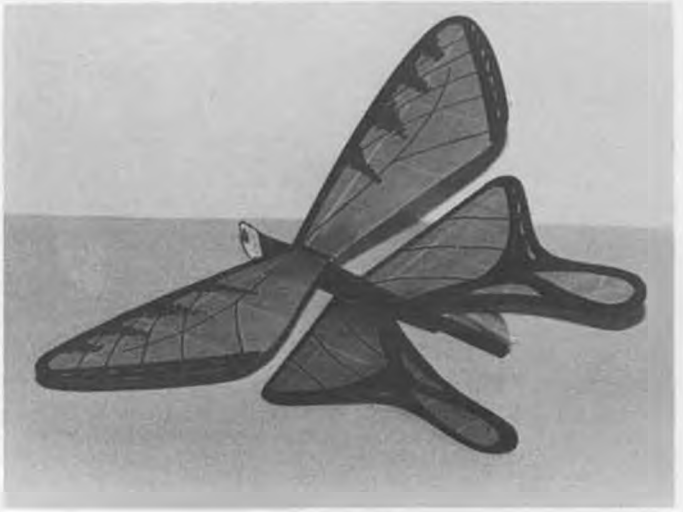
A potential solution would be to grow square-trunked trees, and Robert Falls, University of British Columbia, proposes to do exactly that. By applying some sort of growth stimulus to four 'corners' of a tree, it could be persuaded to grow nearly square in cross-section, yielding about 150% increase in usable wood. Since his patent is pending, Mr. Falls is keeping mum about the exact process. Evidently he has proven the concept workable on spruce, poplar and cedar trees; we wonder if the idea could be applied to our favorite balsa trees?

SPEAKING OF BALSA TREES

We received a letter from missionary Bub Borman, who lives in the home of balsa, Ecuador, South America. Being a

Continued on page 74

Perry Peterson's Massachusetts General Hospital Bostonian ambulance plane is designed to look somewhat like the General Aristocrat of 1929. Model will be featured soon as a construction article in *MB*.



Novel rubber powered butterfly by Al Backstrom was featured in the British magazine *Aeromodeller*. See text for subscription info.

Free Flight

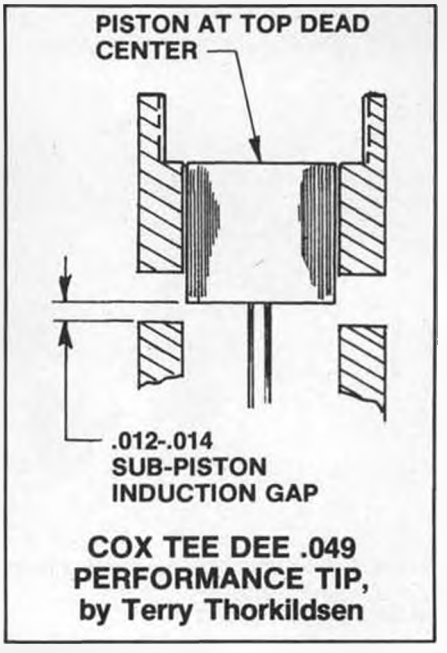
By BOB STALICK

• It's one thing to read about free flight in columns like this one, but it is truly a special experience to move your body to a real free flight contest to view the action in person. Additionally, most of the free flighters that I know are more than willing to show and tell you about the special features incorporated into their designs. As with many bits of general advice like this, however, I would suggest that a few rules of courtesy need to he observed. For your information, here are four "don'ts" that I would suggest:

1. Don't interrupt a free flighter who is just ready to prepare his model for flight.
2. Don't interrupt a free flighter who just appears to be standing there looking at the sky, watching a mylar streamer, soap bubbles or cattail fluffies.
3. Don't interrupt a fellow standing there, stop watch in hand, peering at the sky.
4. Don't interrupt a free flighter who is winding the rubber motor in his model, especially if he seems to be mumbling something that sounds like numbers as he winds.

But just like many other considerations, there are four "do's" that seem to work practically all of the time.

1. Do overhear and move closer to a conversation on the field when several free flighters seem to be bunched together admiring someone's model.

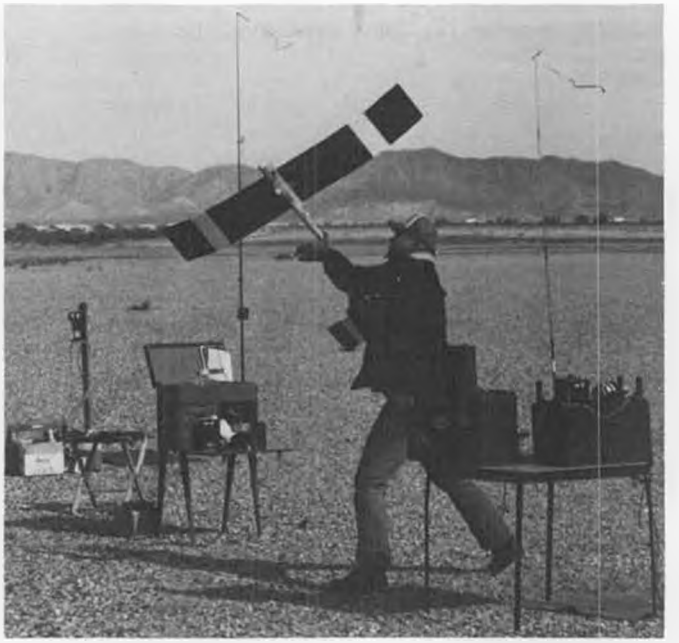


Terry Thorkildsen looks real pleased with his 1/4A Top Banana at the Second Annual San Valeers All Nostalgia contest at Taft.

2. Do move closer when other free flighters appear to be looking at a model or other related piece of free flight stuff while standing around near the parked car line.
3. Do ask to take a picture of a free flighter who is just standing there model in hand . . . most free flighters like to have their picture taken.
4. And, do ask the free flighter whose picture you have just taken to explain some pertinent feature of his ship.

Of the many letters that I receive each month, I would venture that nearly half of them ask questions that could be answered by observation at the local free flight field. Now, I know that in some parts of this country, the notion that free flight fields are "local" stretches the definition a bit. It's

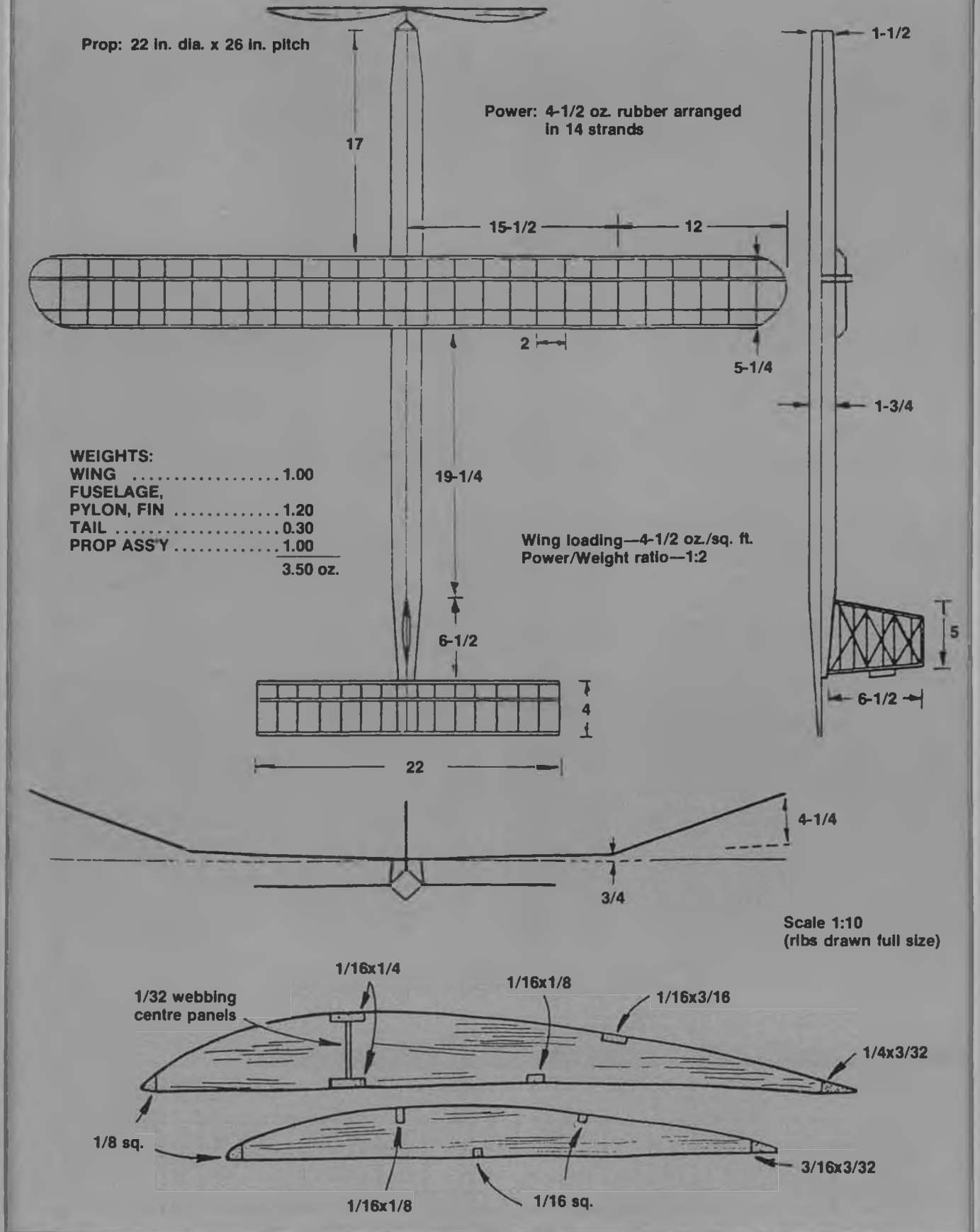
Proof positive that someone really has built a Gastove Nostalgia design. Jack Hamilton took 2nd with this one at the 39th Annual Tulsa Glue Dobbers meet. Diesel engine is standard equipment on this ship.

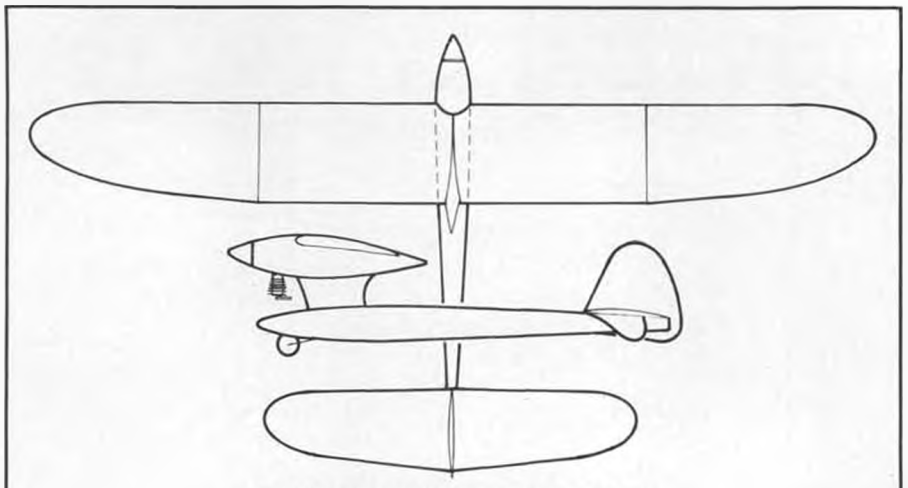


Jim Summersett, co-designer of the prototype Texan (see text), launches what appears to be a Starduster at a recent Southern California contest. Photo by Terry Thorkildsen.

ILLUSIVE BUTTERFLY Mk. 12

by Julian Hopper





OCTOBER MYSTERY MODEL

a good idea to locate the nearest free flight club and contact one of the officers for information as to the nearest activity . . . club meeting, contest, or fun fly. People who get elected to club officer status are most interested in getting new members, so you are a potential member to this guy. Usually, they are most interested in getting you involved.

To find out which club is nearest you and the name of the contact person, I would suggest an inquiry to AMA for a list of such clubs in your state or AMA district. This is how you can get yourself to the place where the contest is held so you can see for yourself the answers to those questions that columnists like me can only answer vicariously. Besides, you will have a great time and get to know some really fine people . . . free flighters.

Now, here are the regular features.

SEPTEMBER MYSTERY MODEL

Some of the best mystery models have been submitted by the regular readers of this column, so it's always nice to get these stumpers in front of the readers. This month, the design has been submitted (and drawn by) Nigel Tarvin of Vancouver, B.C. Nigel is an active free flighter who seems to lean toward model designs that are on the weird side. No different with this one. Nigel notes that this ship was produced as a British kit in 1949 and was noted to be suitable for the Frog 100, 160, and 180 engines. The model wingspan is 48 inches, the length is 25-3/4 inches, and the weight was listed at 13 oz. No doubt in my mind that this ship is both strange and wonderful. If you know the name of the design, drop a card or letter direct to Bill Northrop, % *Model Builder* magazine. First person with the correct answer wins a free subscription to, guess what? *Model Builder* magazine!

SEPTEMBER THREE VIEW—ILLUSIVE BUTTERFLY MK. 12

This three-view was carried recently in the Brainbuster's newsletter, and I believe it came from Free Flight News from England, although no source was provided. This design is what I consider to be a Mulvihill (or Unlimited Rubber, as I still like to call them) class model of classic proportions. This is the true large rubber model. The fuselage is 51+ inches long, the wing-

Continued on page 79

Nigel Tarvin, who supplied this month's Mystery Model, flies this .020 powered replica of Leon Shulman's famous Zomby. Site is Hart's Lake Prairie, in Washington.

Below left and right: Before and after covering shots of the neat Morane Saulnier A-1 now available in plans form from Ed Lidgard. More info in text.

DARNED GOOD AIRFOIL-GOTTINGEN 456

STATION	0	1.25	2.5	5.0	7.5	10	15	20	25	30	40	50	60	70	80	90	100
UPPER	0.85	2.10	2.90	4.25	5.30	6.15	7.30	8.05	—	9.00	9.25	8.75	7.75	6.40	4.60	2.50	0.10
LOWER	0.85	0.50	0.30	0.05	0.00	0.10	0.85	1.00	—	1.80	2.25	2.35	2.25	2.00	1.50	0.75	0.10

the INSIDERS

INDOOR FLYING REPORT

By DAVE "VTO" LINSTRUM

INSIDERS VISITS THE U.S. INDOOR CHAMPS

• In the Smokey Mountains of Eastern Tennessee, somewhere South of Troublesome Hollow and a bit East of Dollywood, the Parton Theme Park, you will find Insider Heaven. In the little college town of Johnson City, at the East Tennessee State campus, there is the heavenly Mini-Dome flying site that draws indoor fliers from all over the U.S.A. and Canada. This magnificent field house is big enough for a football field with track and bleachers . . . all under an arch vault roof over 114 feet above the floor. To put that in perspective, you could build an 11-story building inside.

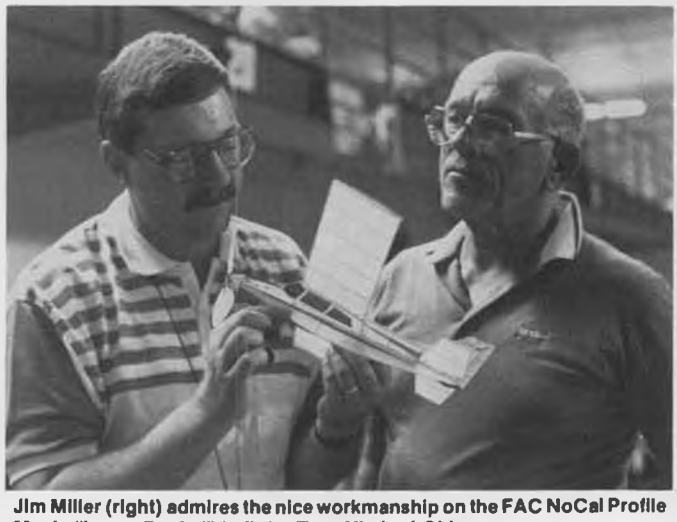
Millard Wells actually got his "flying silo" Gee Bee R-1 to fly quite well. Truly a miracle!

To those Insiders traveling to the U.S. Indoor Champs in early June, the car radio would echo their feelings, playing tunes like "You Left Heaven Down A Dixie Road," or "Ah Got A Love Burnin A Hole In Mah Heart." Insiders love to fly in the highest ceiling they can find . . . and over 100 entrants flying in 23 events found their Heaven in friendly Johnson City.

If you are not a regular indoor flier, your concept of an indoor model may be the stereotype F1D microfilm rubber model, weighing in at only 1 gram sans rubber, and flying at 2 mph, the prop ticking over at only 40 rpm. While many fliers had these, the majority did not . . . in fact, indoor scale models, with plastic or balsa props, were seen as often as microfilm ultralites. Evidence of this was the number of entries in events other than F1D. In unofficial Chicago Aeronuts Kit-Plan Scale (23 entries), Open Pennyplane (37), Novice Pennyplane (68), EZB (60), Bostonian (36), Manhattan Cabin (25), AMA ROG (13), Federation ROG (23) and FAC NoCal Scale (39), there is proof that insiders fly all kinds of models. Naturally they all try to build light and use lots of turns in the rubber, but the variety is almost endless. There was little evidence of CO_2 or electric power, but even that is a growing trend in indoor aeromodelling. So, don't think that Indoor is only microfilm models.

Miami's Walt Everson built his P-39 Airacobra from Clarence Mather's plans in the now out-of-print book, *Flying Scale Models of WWII*, published years ago by *MB*.

Well, who are the heroes in Indoor Heaven this year, and what did it take to get there? We don't have room here for full results (see NFFS Free Flight for that full-page listing) but we can recite the Top Guns of the USIC for you, with the score in minutes or points following the winners name: HLG Open/Bernie Boehm 2:14 (two flights); Catapult Glider Open/Chuck Markos 2:33; Ornithopter/Frank Keiser 11:12 (yes, 11 minutes of flaptime!); Helicopter/Peter Kearney 10:36 (yes, 10 minutes of rotortime); AMA Scale/John Blair



Jim Miller (right) admires the nice workmanship on the FAC NoCal Profile Maule "Lunar Rocket" built by Tom Nied, of Chicago.

Seattle modeler and Boeing engineer, Dave Aronstein, won Federation ROG with his "Sea Witch"—over seven minutes with a plastic prop model!

Ken Groves shows the state of the art in Expert Pennyplane: two wings and a prop that's darn near equal the wingspan.

Ft. Worth's Jesse Shepherd about to launch his EZB. Originally for beginners, it's now an expert-only event. Winning time was 22 minutes.

(Cessna AW) 100 Scale Pts, 190 total; Rubber Speed/Jim Thornbery (Guillow Jetstream RTF) 14 mph; Peanut Speed/Chuck Markos 11 mph; EZB Open/Chuck Markos 22:01; Intermediate Stick Open/Dan Belieff 26:30; FAC NoCal Scale/Chuck Slusarczyk 5:03; Federation ROG/Dave Aronstein 13:58 (best flight 7:01 with a plastic prop!)/New Jersey State Winner; 7 Gram Bostonian/Richard Miller 1:18 Charisma, 7:05 (2 flights) 501.5 Total; Manhattan Cabin/Joe Krush 11:16; ROG Stick/Dick Obarski 14:37 (with a tiny Atrium Insect); ROG Cabin/Ron Ganser 24:38 (with a big fat wide body); Pennyplane Open/Chuck Slusarczyk 15:05 (with a Biplane); Novice Pennyplane/Bob Champine 12:27; Peanut Scale/Doc Martin (Benno Sabel Astra from MB) 97.2 Scale, 1:37 plus 1:32 flights, 192.2 total (this win after 8 years of trying!). If World Champion Jim Richmond had been there, he probably would have won microfilm F1D as he usually does, but his absence allowed Dick Doig to put in flights of 35:10 and 35:32 to win. This was done during a rainstorm that left puddles on the floor!

The atmosphere on the floor of the Mini-Dome was relaxed, as you might expect, with the slow flying planes overhead . . . even when there was a Sunday morning snowstorm of Pennyplanes with 25 in the air at once! NFFS CD Tony Italiano, had plenty of volunteer help, with Dick and Melody Doig doing a fantastic job recording scores on a Sharp lap-top computer; then publishing results immediately after the meet. They made these available to anyone who needed a copy . . . a real luxury. The only real tension was in the rubber motors, wound to the max on torque meters and carefully attached to prop shafts and rear hooks. The "buzz word" for this meet was FAI TAN, the new beige rubber that Ed Dolby, of FAI Supply, has made in the U.S.A. This looks to be full of energy and not too brittle . . . perhaps it will become the Pirelli of the Nineties. With that Italian rubber virtually extinct (few Insiders have any stash left) the FAI rubber will be much in demand.

While all of the competitors were male, there was still representation from the distaff side. Most of the wives socialized, did needlepoint, etc. One very supportive wife, who helped in the pit crew, was Linda Nied of Roselle, Illinois, near Chicago. She married Tom Nied two years ago; he has been flying indoor for over a year. As a computer graphic artist, she appreciates the precision of indoor. She likes traveling to contests and learning about the wide variety of indoor models, including the stereotype F1D microfilm which reminds her of a "big bubble, floating in the air."

"FaMoth" Bostonian by Jim Miller, of Ohio, is a reduced size version of the Flying Aces "Moth."

Doc Martin judges one of the over 30 entries in the Pistachio Gran Prix.

Below: The top three of 23 in the Chicago Aeronuts Kit Plan Scale event were VTO (with IMS "Daphne"), Jim Miller, and Don Lindley. Don was also the CD for this unofficial event.

Bernie Boehm, of Indiana, easily won Indoor Hand Launch Glider with his long, lean models. His two-flight total was 2:14.

Tom Nied's Peanut Bucker Jungmann gets the once-over from Tony Italiano, NFFS CD for the USIC. Jungmann plans were in October '88 *MB*.

Her favorite model is Tom's "Rearwin Speedster" Bostonian. Tom does much of his building on the kitchen table . . . this proves how tolerant Linda is! He sometimes stays up until 2 a.m. building, and is slow to clean up, but she copes with this. Her only gripe is the balsa dust! She has built a Delta Dart, but is otherwise only interested in the social aspects of the sport. Tom is certainly a lucky fellow to have such a helpmate. Perhaps it is the fact that he builds many of his craft from *Model Builder* plans that makes her appreciate his Insider activity? Or, perhaps he takes her out to dinner when he goes to the Japanese Art Supply store in the Loop, for the "Gampi" tissue he uses?

Other than huge increases in event entries, there were no clear-cut trends observed. A new material was ultrathin sheet foam, used on several Pistachios by Doc Martin and Mike Arak. Model designs are either evolutionary or retrograde . . . there were plenty of old Comet kit scale models around. Two handy hints for you from our observation: Jim Grant colors his EZB structure with Merthiolate . . . even the prop! This makes it stand out in the air, very helpful for the timer. Bud Tenny uses a 1/4 inch square bit of cardstock above the rear hook on his Pennyplane to prevent bunching . . . often a problem with the huge motors used in this event.

Florida's Tony Becker passed away shortly before the USIC, but he will be remembered for all he did to encourage interest in the "FROG" event: Federation ROG. Had he been around it is certain that Florida would not have come in last in the state competition he organized. We are sure he would have applauded Dave Aronstein's seven-minute flight, made with a model pulled by a cut-down Peck 9-1/2 inch prop scraped to ultrathin section. Only last Christmas, Dave had set the World FROG Record of only five minutes.

Jim Miller (left) and Mike Arak with Jim's Santos-Dumont 14bis canard—a great flier.

A repeat win in Rubber Speed went to Jim Thornberry with Guillow "Jetstream."

To prove you don't have to be an expert builder to do well, Jim Thornbery assembled . . . right out of the bag . . . a Guillow all balsa RTF Jetstream, added "too much rubber" and won the Hardy Brodersen cash prize for his 14 mph speed around the rubber speed pylons . . . two strings held by helium balloons. The model had to complete two circuits of the pylons . . . not an easy task.

We would be remiss if we did not mention one last hero in this Indoor Heaven at the USIC. A certain indoor columnist built an IMS "Daphne" from the Lew Gitlow kit, covered it in red tissue, with a Garfield pilot, and the imaginary registration N-OSY, and entered Aeronuts Kit-Plan Scale. He got 94 points (of 100) for kit fidelity/craftsmanship and put in a pair of 94-second flights (max limit to points) with his boxy bird. To everyone's amazement, he won first place! We won't reveal his name, but his initials are VTO.

Oregon indoor supplier, Lew Gitlow, removes the Pirelli from his Ultra Film covered EZB.

If you are a dedicated Insider, we know you will want to go to Heaven next year when NIMAS and NFFS again sponsor the U.S. Indoor Champs at the ETSU Mini-Dome. Start building now for this fun filled, record setting event. We hope to see you there. •

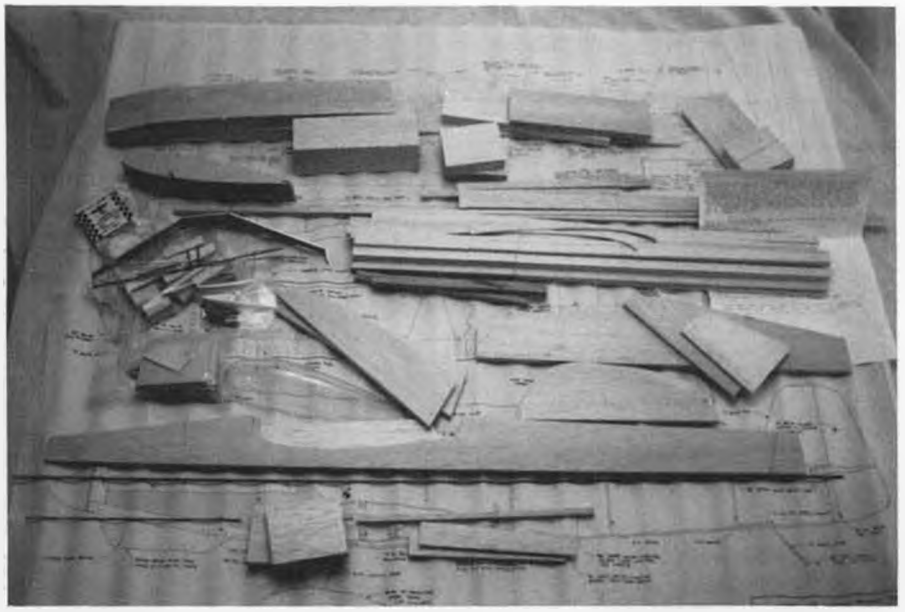
"Big Penny" by Toronto's John Marrett set a new Canadian record of 14:29 on 1/8-inch FAI tan.

Control Line

BY JOHN THOMPSON

MORE KIT NEWS

Last month we were discussing enthusiastically the flood of new and excellent kits coming available for control-line fliers. within days after that article had been mailed off to *Model Builder* headquarters, still another example arrived in the mail. It was a prize for the Northwest Regional Controline Championships over Memorial Day weekend, but it passed through my possession just long enough for me to snoop through the box.



The kit contents for the "Super Pow Wow," a 1953 stunt design being resurrected by Control Line Classics in Anaheim, California. All top quality stuff. More in text.

It was further confirmation that the modern-day control-line kit maker has quality and convenience to the modeler in mind. This one is the Super Pow Wow kit produced by Control Line Classics.

It's a 52-inch wingspan stunt plane, which can be built either as the original 1953 Pow Wow, or the updated version designed for 1990s precision aerobatics. It has 550 square inches of wing and a 32-1/2-inch fuselage.

The wood is carefully selected and precisely sawed (not die-cut), and the kit includes all the hardware needed to build the aircraft. Well-drawn plans fill out the package. This is a fine stunt plane kit designed for experienced builders.

If it's not at your local hobby shop, it's available for $79.95 plus $3 shipping and handling directly from Control Line Classics, 1788 Niobe Ave., Anaheim, California 92804.

CHAMPIONS, ALL

Speaking of the Northwest Regionals, they took place May 27-28 in Eugene, Oregon, with an excellent turnout of 81 fliers accounting for nearly 200 event entries.

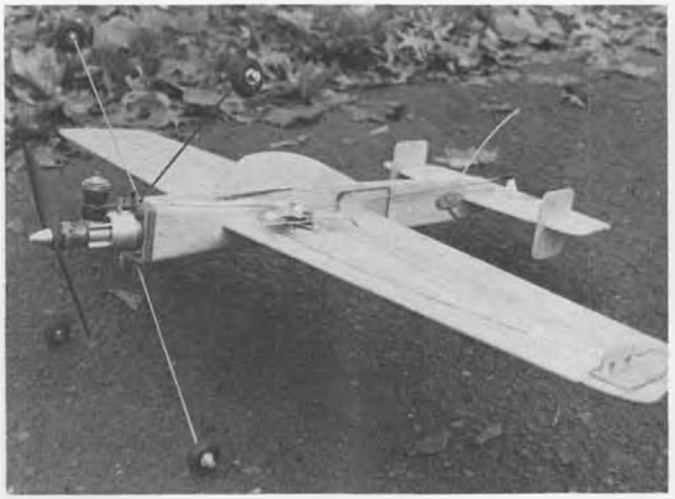
Weather was a mixture of rain showers and clearing on Saturday, and mostly sunshine on Sunday.

AMA fast combat was the biggest single-event draw with 19 fliers, but there were some 25 fliers in the four classes of precision aerobatics. Turnout was good as well for speed, racing, and the ever-popular balloon bust. The contest featured five new events: .15 carrier, Nostalgia stunt, FoxDoo combat, FAI team race, and sport scale.

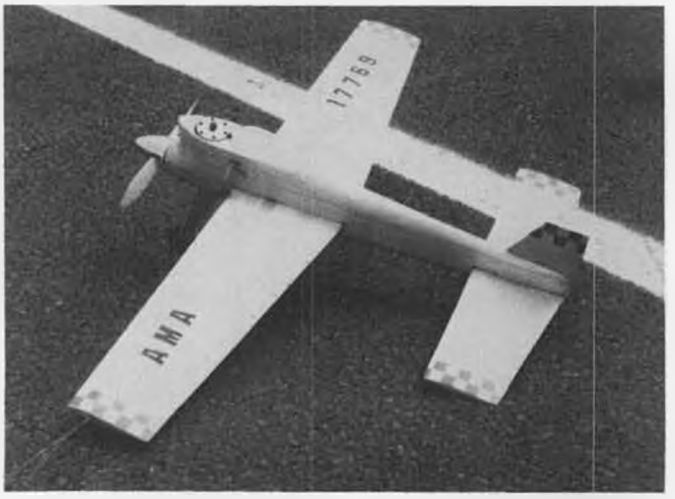
The traditional grand championship trophy, awarded to the flier placing the highest in the most events, went to racing/speed flier Paul Gibeault of Calgary, Alberta. Second place grand champion was racing/speed flier Joe Armstead of San Leandro, California, and third place went to John Hall of Sumner, Washington, who flew racing, sport scale, and carrier.

Here are the winners of the 18th annual Northwest Regionals competition events:

AMA combat, Jeff Rein, Bothell, Washington. Slow combat, Gary Byerley, Spanaway, Washington. Half-A combat, Larry Bell, Clayburn, B.C. FoxDoo combat, Randy Schultz, Seattle, Washington. Half-A speed, David Williams, Yorba Linda, California. A speed, Fred & Joyce Margarido, Fremont, California. B speed, Don Chandler, Redwood City, California. D speed, Loren Howard, Vancouver, Washington. FAI speed, Paul Gibeault, Calgary, Alberta. Jet speed, William Nusz, Carmichael, California. Formula 40 speed, Paul Gibeault. Class I Navy carrier, Terry Miller, Roseburg, Oregon. Class II carrier, Bob Parker, Renton, Washington. .15 carrier, John Hall, Sumner, Washington. Profile carrier, Bob Parker. Sport scale, Jim Fuller, Bremerton, Washington. Precision scale, Jim Fuller. Junior balloon bust, Joel Braby, Richland, Washington. Senior-open balloon bust, Dick Salter, Seattle. Rat race, Martin Higgs, Vancouver, B.C. Slow rat race, Joe Armstead, San Leandro, California. Junior Class I mouse race, Wesley Mullens, Seattle. Senior-open Class I mouse race, Paul Gibeault. Class II mouse race, Roy Andrassy, Calgary. Goodyear, Joe Armstead. FAI team race, John McCollum/Tom Knoppi, El Toro, California/Seattle. Junior Northwest Sport Race, Teresa Byerley, Spanaway, Washington. Senior-open Northwest Sport



Jim Cameron's wild air show model features a reed valve .049 with throttle and top and bottom landing gears!



Unusual Formula 40 speed plane by Ken Burdick and Ken Burgar is powered by a Fox .36 Combat Special.

"Wildfire" is the name given to this wicked looking asymmetric FAI Speed model designed and built by Chris Sackett. He's got everything pared down to the bare minimum; ship has only half a wing, half a stab and half a prop!

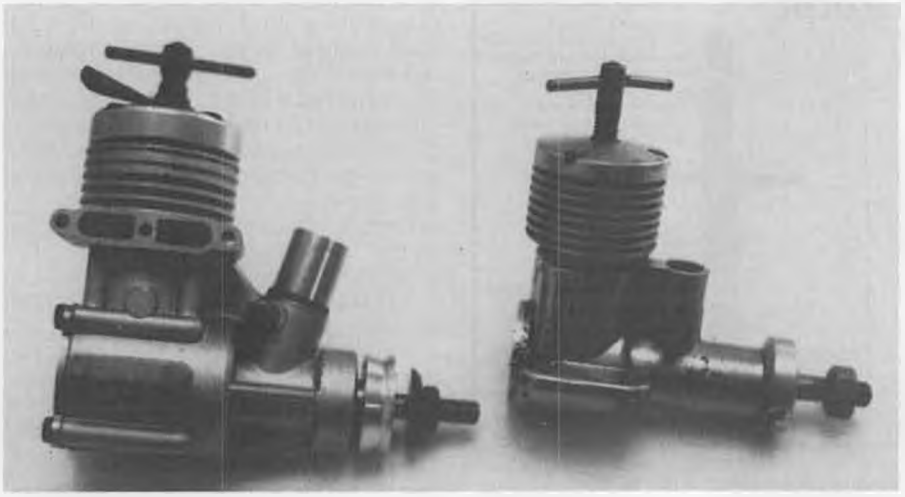
Race, Ron Salo, Burnaby, B.C. Northwest Super Sport Race, Joe Armstead. Old-Time Stunt, Don McClave, Portland, Oregon. Nostalgia Stunt, Bob Hazle, Loomis, California. Beginner precision aerobatics, Barrie Shandel, Surrey, B.C. Intermediate precision aerobatics, Darrell Harvin, Ridgecrest, California. Advanced precision aerobatics, Gerald Schamp, Albany, Oregon. Expert precision aerobatics, Paul Walker, Lakewood, California.

The Regionals is sponsored and hosted by the Eugene Prop Spinners, with assistance from other Northwest clubs and individuals and the hobby industry. No. 19 is scheduled for Memorial Day weekend, 1990.

BURP, BURP

To modelers who grew up with the glow engine, the model diesel is a peculiar beast in many regards.

"The model diesel can be fascinating to study and to domesticate. It can, in fact, be a spectacularly successful model airplane engine. It's a relative rarity in the United States, but a common sight in much of the rest of the modeling world."



It looks funny. Where's the glow plug?

It sounds funny. Burp, burp, burp.

It smells funny. A little like a hospital ward. And your car will smell funny on the drive home, too. And your workshop, your clothes, etc. . . .

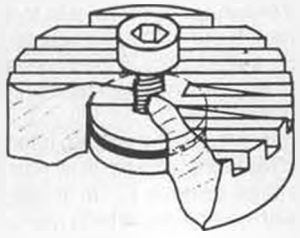
But, like many peculiar beasts, the model diesel can be fascinating to study and to domesticate. It can, in fact, be a spectacularly successful model airplane engine. It's a relative rarity in the United States, but a common sight in much of the rest of the modelling world.

The model diesel has several characteristics that are different from model glow engines. It requires no glowing element to ignite the fuel, which is ignited instead by the compression of fuel and gases as the engine is turned over. Therefore, the model diesel has two adjustments rather than the non-throttled glow engine's one: The needle valve and the compression screw. One adjusts the fuel-air mixture and the other adjusts the compression in the cylinder.

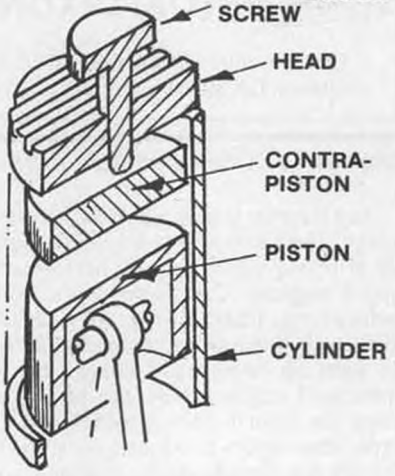
Diesel engine performance also is different from glow engines. The diesel tends to turn a much larger prop and operate at lower rpm than the glow engine. It is known for tremendous power at low rpm, enabling diesel engines to pull larger, heavier aircraft through vertical climbs than a glow engine of the same displacement. However, diesels also can be high-performance engines, as is witnessed in the FAI team race application. Finally, diesel engines operate on a relatively inexpensive fuel . . . and they use very little of it

Continued on page 99

Left: This month's C/L column contains an in-depth discussion on the care and feeding of those mysterious diesel engines. Two typical examples are the Supertigre .15 and P.A.W. .09. The P.A.W. engines are made in England but are available here in the U.S.; see the "P.A.W. Diesels" ad elsewhere in this issue.



CUTAWAY OF A TYPICAL DAVIS DIESEL CONVERSION HEAD



TYPICAL DIESEL CYLINDER DESIGN

Engines ....*Continued from page 34*

. . . but the rear was through a drum valve intake! The East Europeans favor the rotating drum valve inlet for high performance speed engines. Czechoslovakia's MVVS factory today makes racing .40s (6.5 GRRT ABC) with this more intricate intake and it's seen on homemade Russian control line speed engines. Now the Soviets are using the drum in 2.5cc MARS diesels that have been factory produced since '84-'85. The drum is complicated to machine, adds weight as well as rotating mass, but it has the advantage of a precisely timed huge intake window and a huge hollow channel for atmospheric combustion air to rush in to satisfy, or relieve, the negative pressure caused by the rising piston. If we tried to use the same size intake window and same inside diameter hollow channel in today's conventional front intake engines the crankshaft's would simply be too weak. The drum valve is an alternate to a too weak crankshaft.

We are indebted to the golden hands of Jiri Patrman for being able to show you two different intake systems . . . in jewel-like similar miniature engines which he makes at home.

Both engines score 10 points on manufacturing excellence, score 10 points for design excellence, but the engines have not been run for performance ratings as they are highly collectable rarities. Running would lessen their value. •

Piper .....*Continued from page 19*

some work, and have a better looking cowl to boot, for only $20.00 plus $3 shipping.

For the radio, my trusty Futaba was drafted into service with standard size servos on all four controls. Recommended power is .45 to .60 two stroke, and .60 to .90 four stroke. I found an O.S. FS .61 fit in the cowl quite nicely.

Generally I build for go, not show, so I chose to cover the model with MonoKote. After filling some pinholes, the cowl was painted with Formula-V. I was fortunate to have the opportunity to copy the simple paint scheme of a local, full-size Super Cruiser, which got me a little flight time in the real one. You reap what you sow!

When finished, with everything installed, I found the model to be very nose heavy and had to add several ounces of lead to the tail. This is due, no doubt, to the long nose and heavy engine. Installing the radio as far to the rear as possible will help. Total weight came to 9-1/2 pounds. The 85-inch wing has 1,040 sq. in. of area and this gave me a wing loading of 21 ounces per sq. foot.

After owning a full size J-3 back in the mid-fifties, and having built several model J-3s over the years, I thought I had a handle on the upcoming first flights. I was right . . . almost. The model did fly "right off the board" and I found it to be quite similar, though faster, than the other Cubs I had built. As long as both rudder and aileron are used in the turns, the model flies very well and will loop and spin easily on the power of the .61. However, on the third takeoff I got an unexpected opportunity to test the structural integrity of this model when I pulled it off the ground too fast in a crosswind. The ensuing cartwheel resulted in a broken elevator, crunched wingtip, and some popped MonoKote. She's a tough one!

Overall, I found the model challenging to build, nice to look at, and fun to fly. What more could I ask?

A special thank you to Chris Kidd for his help with this article.

Manufacturers supplying products for this article: Davey Systems, 675 Tower Lane, West Chester, Pennsylvania 19380; Fiberglass Master Inc., Rt. 1, Box 530, Goodview, Virginia 24095. •

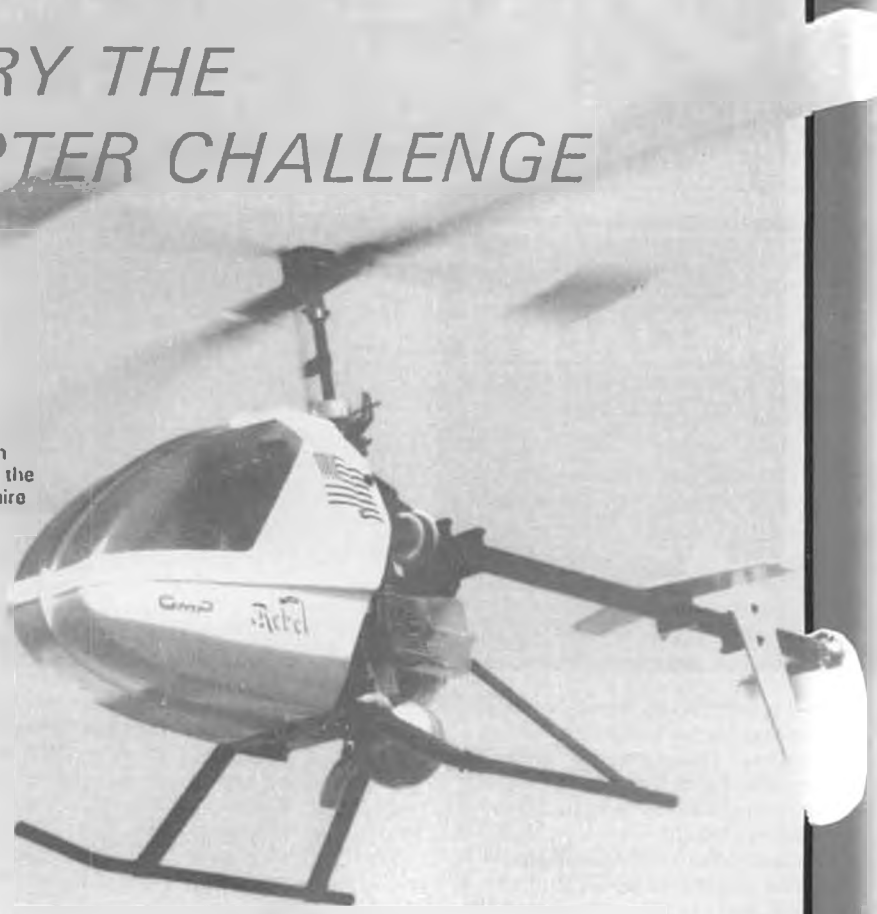
Old Timer ..*Continued from page 40*

know." Claude's article explained that balsa had "gone to war," and would pretty much be in short supply to those few modelers who, because of age, physical disabilities, military exempt jobs, etc., were still able to indulge in the hobby.

On the other half of that very same page (the magazine was 10-3/8 x 13-3/8 in those days) was the beginning of a construction article for a gas model, with the appropriate name of "Pinch Hitter" . . . appropriate in that there was not one snitch of balsa in the whole thing. The article suggested the use of spruce or pine, and the wood sizes were reduced from what would normally

Rebel

WANT TO TRY THE R/C HELICOPTER CHALLENGE FOR $250?



Today's R/C helicopters are technological wonders with features such as autorotation, collective pitch, bell-hiller mix and automatic tail compensation. They can easily loop, roll and fly inverted in the hands of the experienced flier. Most of these machines require special engines, radios designed for helicopter use and specialised accessories so the initial cost can run betwen $750 and $2,500. Well worth it, if you want the best and GMP offers a wide range of these machines.

But what about the entry level modeler who wants to try R/C helicopters before making such a large investment? To meet this need GMP introduces their new REBEL, a very low cost R/C helicopter specifically designed to help the entry level modeler test and develop his flying skills. REBEL can be flown with low cost airplane type 4 channel radios and a 40 - 50 airplane engines.

Initial cost of REBEL is about $250 - $325 if you add a gyro. Any entry level modeler will enjoy our new REBEL. It looks and flies great and is an excellent trainer and sports model. So don't let the R/C helicopter challenge pass you by, fly a REBEL.

For a complete line of GMP helicoptes call your local dealer today or send $2 to receive GMP's new illustrated catalogue describing our extensive range of R/C helicopters and accessories.

Simple, very rugged chassis.

New, high technology rotor head.

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be used if it were constructed of balsa. If you were familiar with the late Paul Plecan's "Simplex" design (see our August '89 issue), you could spot the origin of some of the basic, straight-lined construction and the essentially pleasing lines . . . really kind of a slimmed-down and leaner Simplex. Paul's byline was shared by Gil Shurman, a close friend and equally well-known designer of the prewar modeling era.

The construction is quite basic and should need no explanation for experienced builders. Here's a good chance to try the use of spruce. It's really nice to work with, and several suppliers, Sig for example, offer it in the sizes required. It should be a simple job to switch to balsa, if you prefer . . . just increase sizes in the appropriate locations.

There was one omission on the drawing, having to do with the cowl. It's easy enough to use chunks of balsa to duplicate the shape, but if you want to be authentic, you'll note that only the cowl outline is shown . . . no details. But also note those mysterious curved pieces located under the side view, just aft of the landing gear, and labeled C-1, C-2, C-3, etc. These were apparently cut from 1/8 sheet hardwood and assembled directly over the cowl frame, which is shown just under the aft end of the side view, forming an open structure which was then to be covered with "two-ply bristol board" and finished with silkspan and dope. Might be fun to try to put this jigsaw puzzle together!

The original model was designed around the Rogers 29. No information was given on flight characteristics, and the luxury of a specified balance point was also denied. The Sal Taibi Pacer-style inverted stab is in a difficult position for dethermalizing. It may call for splitting in two halves and pivoting at the spar location.

We'll be watching for your "Pinch Hitter" in John Pond's Plug Sparks column! •

Peanut . . . . . *Continued from page 53*

The spar carry-thru tubing goes across the center section near the top, just behind the main spar. Note the location of this and the holes for the drag pins in the 'R-1' ribs. Be sure to make one extra 'R-1' to be cut down for the centerline rib in the wing center section.

There is a tail notch at the aft end of the fuselage to accept the horizontal tail. It does not go all the way to the leading edge of the tail, but it accepts the notch in the leading edge of the tail.

The rudder sockets in the fuselage are just holes in the balsa to accept the short lengths of pin that extend down from the front and rear of the vertical tail. The aft pin sticks down through the horizontal tail and keeps it in place. Strut tubes are located at each lower longeron just forward of the landing gear. Notice the crosspiece that leans forward like the strut. Two crosspieces that lean aft accept the main landing gear. When installing them in the fuselage frame, put a piece of matchbook cover, or equivalent, between them to allow for the thickness of the gear wire.

The nose gear merely plugs into a balsa block built into the bottom center at the proper location. Where wires simply plug into holes in balsa, the holes can be hardened by the application of a little thin cyano adhesive. If done very carefully, the surrounding balsa is hardened without the holes being filled.

The wing panels have tubes to accept the carrythru, a bamboo drag pin and tubes to accept the upper end of the struts. Note that the tube hole in the 'R-2' rib is lower than in the 'R-1' to allow for the wing dihedral. The bamboo drag pin penetrates 'R-1' and extends to 'R-2' and is cemented to it at the 'X.' The drag pin should extend from the panel root about a quarter of an inch. Make a smooth point on the free end of the pin so it will penetrate the center section 'R-1' rib easily.

The struts are made with a round bamboo leading edge long enough to extend into the fuselage strut tube at the bottom, and the wing strut tube at the upper end. The balsa part completes the streamlined strut and is made to fit between the fuselage side and the wing panel bottom surface. The bamboo at the upper end of the strut may have to be bent to align with the wing tube. A little misalignment will not hurt because it tends to make friction between the bamboo and the tube and thus more secure struts.

The particular ITOH 62-160 modeled, JA3216, has a blue and white color scheme. The model was completely covered with white tissue which was water shrunk and given two coats of thin dope. The blue color was achieved by double covering with blue tissue, carefully cut to the pattern on the plan. Registration numbers are also blue tissue. Surface outlines were made with a fine, permanent felt pen. There is a black "N" in the circular blue sky surrounding the swan on each side of the vertical tail.

Thin, clear acetate sheet (.003) was used for the windshield. The pattern shown is a good starting place, but all models vary a little, so first cut one out of paper for a trial fit.

The side windows are simulated with black tissue. Pilot and passenger silhouettes are cut out of the black tissue, thus leaving white silhouettes when the tissue is doped over the white tissue. Pilot and passengers were then drawn in with colored felt pen, with just a touch of white correction fluid

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for the pilot's shirt collar.

Two nose block and propeller assemblies were made, one with a big propeller for flying and the other with a scale propeller for judging. This may not garner additional scale judging points, but the model looks better when it is sitting on the shelf.

The ITOH is a nice flying model. Ballast it as necessary, to get the balance point where shown on the plans. The tail notch can be widened at the aft end if up or down elevator is required. Both wings on the model pictured were warped to give about 3/32nd of trailing edge up (washout) at the tip and this appears to be about right.

The model in the photos weighs 8.5 grams without rubber. •

Choppers . . . *Continued from page 33*

tailboom. With only three servos, the all-up weight is only three pounds. The Japanese magazine photo shows the helicopter soaring on a mountain slope. Anyone care to try it?

Another interesting thing done by R/C helicopter enthusiasts in Japan is to dress their helis as medieval Samurai warriors (see photo). These are powered by 60 size engine and utilize Hirobo/GMP Stork mechanics. The tail boom comes out at the back of the warriors. The warrior models are each about six feet tall. How about someone in the U.S. building pro football Rams and Cowboy models? The other photo shows a helicat at a Japanese model air show. These would be great for AMA show teams.

Small R/C helicopters, such as the Kyosho Concept, and Hirobo/GMP Shuttle, seem to be very popular because they are inexpensive, drink less fuel, are quieter, fit in compact cars, and can be flown almost anywhere. For example, California may be the third largest state, but in Southern California, flying fields are scarce. I recently visited a small R/C helicopter flying field in Santa Monica, California. Boy, was it small! Big 60-size helicopters would have problems flying around there, but Shuttles and Concepts were buzzing all over. As the photo shows, you see nothing but small choppers in the pits. For directions on how to get to this field, call Andrew Sutton, of Copter Corner Hobby Shop, at (213) 828-2028. He operates a small R/C helicopter shop in Santa Monica and helps beginners on weekend mornings. If you visit his shop, you can fly his computer R/C helicopter simulator, free. After hours of simulator practice, Andrew's wife now gets to practice on his Shuttle and Concept.

We may have the Shuttle XX review for next month. By the way, Hirobo has just introduced a new rotor head for the Shuttle. It is an underslung, flybar design similar to GMP's Elite competition rotor head. The Shuttle kit, with the new underslung flybar head, will be called the Shuttle Z. The present Shuttle with the flybar above the rotor head, will continue to be available.

This month's mystery question: Do you know what those rakes on top and below the full-size Jet Ranger are for? They are for cutting wires. Low flying helicopters often accidentally fly into power lines, telephone wires, etc. Without these cutters, the wires can wind around the main rotor shaft, or catch on the landing skids, and cause the helicopter to crash. Last week I felt the need for these cutters on my R/C helicopters, too. There is a big flying field at the University of Maryland, where my friends and I fly. One day a friend was flying his R/C glider at the field. He has a hi-start (a 200 ft. bungee chord and woven nylon line) set up for launching the glider. As he stretched out his hi-start for launching his glider, with a million and one odds against it, I flew my helicopter right into his hi-start line. The line wrapped around my rotor shaft at least 50 times. My helicopter went from 50 mph to 0 mph, instantly. The helicopter plummeted to the ground. If I had a rake mounted on top of my canopy, there would have been no problem. Now, all army scout helicopters are also equipped with such cutters.

In a few months, winter will come. For the dedicated fliers who can't give up R/C flying in blistering north wind, the solution is to build a windproof box as shown in the photo. For those who would rather purchase one, a local flier is selling a ready built flight box for $95. Call (301)986-5827 for order information. *(What . . . no heater? wcn)*

Stay tuned for next month's rotor blade tip design column, and possible Hirobo

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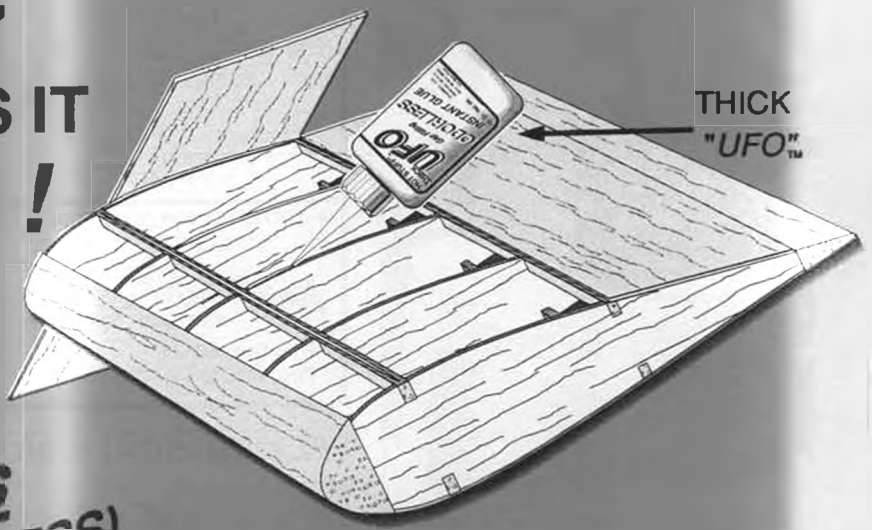

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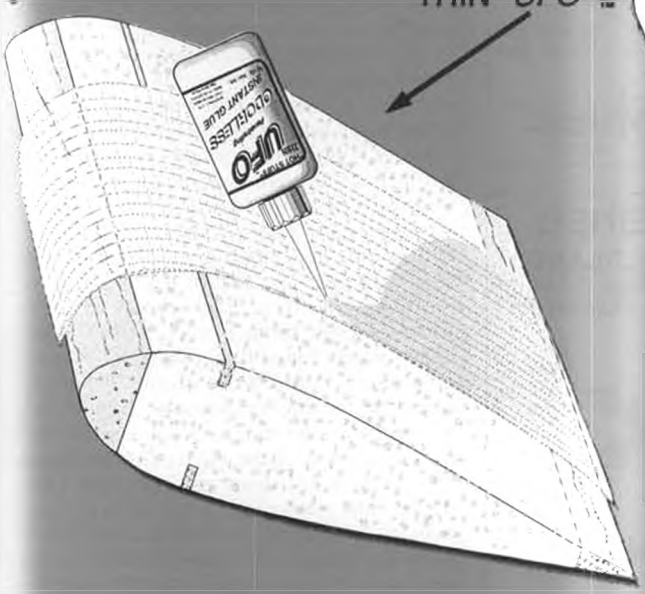

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Shuttle review. Then we will have a long review on the Schluter Magic, Enya 60, and Futaba 1024 PCM. I will tell you about an electric R/C helicopter that I am currently designing for a model shop. This involves using my helicopter analyzing computer program to calculate the optimal rotor size for given weight and performance requirement. I will wrap up this month's column by referring a picture of my special research rotor blade on a four-bladed Schluter Champion, built by Mike Johnson. For everyone who called or wrote, I am glad to answer your questions. You are welcome to continue to do so. Send a self-addressed, stamped envelope to: P.O. Box 699, College Park, Maryland 20740, or call (301)589-0855. •

Electric *.....Continued from page 45*

all the gear scavenged from the Korda. All-up weight was 8.75 ounces, wing loading 7.75 oz./sq. ft.

"The first flight was marginal, the plane was nose heavy. After the plane was balanced, the performance really showed. The flight duration was almost nine minutes with full throttle, double the air speed of the Korda, and excellent loops and barrel rolls. Climb performance was good (excellent climb-MP) and thermaling was very good. Some improvements to make are a folding rubber band propeller for power off thermaling (prop has to be idling while thermaling or the drag is too high), replace the Tamtech motor with the Kyosho DMC20BB ball bearing motor (weight 1.1 ounces), and a 600 mAH pack (4.3 ounces), would add 1.2 ounces.

"The basic specs of the plane are:

Cannon electronic elevon mixing, no room inside for mechanical mixing.

Tamtech motor, gearbox, propeller, and speed control with wires and connectors weighing just under two ounces.

Six-cell 270 mAH Sanypo pack, 3.1 ounces.

Static draw is 2.2 amps, static power 15.8 watts, 29 watts/lb.

Span 39 inches, area 162.5 sq. in.

"After the upgrade to the LeMans DMC20BB motor, the performance made a quantum leap. Static draw went to 3.0 amps, with a Peck-Polymers rubber power prop slightly smaller than the original. The motor shaft tube now has ball bearings. The rate of climb doubled, with 7-minute plus flights, and it can easily be flown in winds over 10 mph, remarkable for such a light model."

Thank you, Tom, for the report! As said, I saw Tom fly the wing many times at the fly-in, and everyone lined up at the fence to watch every flight. Tom has made me a believer in flying wings, and in high performance micro electrics! I would never have thought performance like that was possible on just 3 amps and a rubber band prop! How about an article on it, Tom?

Jeff Kelety sent info and photos on his electrics. Take a look at that float plane! Wow, that is good looking! It is Alan Clark's "Terrier," published in the March 1984 issue of *RCM* (coincidentally, my Aqua Sport is in the same issue-MP) The Terrier is designed for a hot .25 glow engine. That is how Jeff flew it until he flew his first electric a year ago, when it got put into mothballs. Then, a planned trip to Lake Tahoe inspired Jeff to bring out the Terrier again, as an electric float plane! Jeff is very impressed. Takeoffs are about 75 feet, it tracks better than on wheels. Flight characteristics are terrific; rock solid, scale like turns, power to spare. He is using an Astro cobalt 40 direct drive on eighteen 1200 mAH cells, 10x6 prop. It seems to fly forever on 2/3 throttle and climbs fast at full bore. The Jomar SM-4 speed control works very well. All-up weight was 115 ounces, summed up from: 42-ounce frame and radio, 54-ounce motor system, 13-ounce floats, and 6-ounce rigging. This is a 30 oz./sq. ft. loading, but in the air this is not noticeable. Landings are fast; you have to watch out for bounce/skip on landing. The floats are John Sullivan 32-inch foam core, sold by Hobby Lobby. Jeff used 1/64 ply on the bottom and 3/4 oz. fiberglass cloth. A 1/8-inch balsa crutch was used (slice the foam floats down the center), and 3M 77 spray adhesive. Jeff likes the foam floats, they are easy to repair. I like balsa floats, they are very light, but Jeff's experience shows there is more than one way to do it well. I wish I had a float plane that good looking, guess I'll have to get building!

Jeff's Volksplane is 1/6 scale, 54-inch span, with a geared Astro cobalt 05 turning an 11x7 prop, seven 1200 mAH cells, JoMar speed control. Weight is 51 ounces, 15 oz./

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sq. ft. loading. It flies like the real thing, slow and sure. It is a real crowd pleaser. It is built like a rubber model; 1/4 inch balsa stick, with ailerons, full flying stab and rudder, just like full scale. The dummy VW engine took a whole week's worth of vacations but it is so real folks think it is a four-stroke engine. Nice work, Jeff.

Well, some contest announcements: the KRC Electric Fly is September 16-17, in Quakertown, Pennsylvania. Contact Bob Kopski, 25 West End Drive, Lansdale, Pennsylvania 19446. Bob has the most complete guide sheet I have ever seen for a fly-in, with motels, campsite, map, and even the menu for the Saturday night buffet! This is the premier electric event in the U.S., don't miss the chance to see some super electric flying and planes, and bring your own!

The Tammany Aero Club in Goodbee, Louisiana, will have a fun fly, plus scale event, September 30th and October 1st. There will be workshops, swap shops, and a Cajun cookout Saturday night. Call Boyd O'Brien, 504-835-5212, or Ben Matthews, 833-5589, for more info. It sounds like fun! Till next time, celebrate with electrics! •

Hannan . . . . .*Continued from page 57*

longtime model builder, Bub finds his location most conducive to his hobby, and frequently begins new projects literally "with a log" removed from a nearby jungle.

Although he has constructed all types of models from free flight gas to Peanuts and hand-launched gliders, his present projects are static scale types, as illustrated in one of our photographs. Explaining that there are no hobby shops 'around the corner' in his location, Bub makes almost everything himself, and finds it fun to make models 'out of nothing.'

He prefers working in 1/32nd scale size, and employs a variety of jungle woods including mahogany, cedar, and a local wood called 'laurel.' Among his projects have been a Gee Bee Z, Grumman Duck, Noordwyn Norseman, Helio Courier, and a DeHavilland DH88. Judging from the Fairchild 71 shown in the photo he sent, they must be masterpieces!

SUSPICIONS CONFIRMED

In a letter to *Aeromodeller* magazine from model aerodynamicist Martin Simons, of Australia, we found this gem (pulled out of context like a plum!): ". . . mathematical models tend to break down severely as the wings get smaller and flight speeds get lower. (Richard) Eppler has been heard to say he would like to make the Reynolds numbers of model aircraft illegal, because as I think he admits, the theories still have not been developed to cope." Amen. . . .

BARNWELL MONOPLANE

The Scottish 1911 Barnwell shown in one of our photos is the magnificent work of Italy's Carlo Mapelli, and was based upon research material compiled by the late Doug Gillies, one of Scotland's leading aero historians.

Featuring a 4-stroke engine, the model incorporates functional wing-warping for lateral control, and according to Carlo, flies exceedingly well.

We find it particularly interesting that this design has flown successfully in forms as small as Hoby Clay's Peanut, slightly larger in Larry Kruse's CO_2 powered contest-winner, and now in large radio-controlled size.

DEDICATION IN DELINEATION

Another of our photos shows master draftsman Vern Clements examining his most recent production, plans for the Rearwin Cloudster. Truly a labor-of-love, the drawing required some 460 hours of Vern's drafting-board time. Incorporated are complete details including scale airfoils, rib-spacing, and structure, in addition to comprehensive suggestions for direct conversion to flying model form. Only those who have tried researching and documenting an aircraft can truly appreciate the tenacity and patience required for such an undertaking, but even a casual observer will be impressed by the sheer quantity of information presented.

We suggest that you send $3 for Vern's complete plans catalog and newsletter (refundable with first order): Vern E. Clements, 308 Palo Alto Dr., Caldwell, Idaho 83605.

PEPSI-COLA TURBINES?

Among the letters received in response to our coverage of rubber-powered ducted fan models was one from Frank Scott, of Dayton, Ohio, who recalled hearing of a Yak-17 with such a system. According to a description, the rubber-driven fan

had, "in a former life been an aluminum beverage can."

Frank is a staunch frugal flyer enthusiast, and says: "I haven't touched an engine in a couple of years! Rubber, however, is perfect for midnight flying in front of our house."

IS THAT ALL THERE IS?

Paraphrasing German philosopher Friedrich Wilhelm Nietzsche, Stuart Van Dorn opines: "Free flight forms the only law of the world . . . life has no other purpose, we all come into being only in order to find our share of thermals and then, like our planes . . . vanish."

PEANUTS MAY IMPROVE YOUR HEALTH!

We've long felt that the fun provided by building Peanut models could add zest to your life, however, it now appears that eating peanuts (the shelled variety) may add years to your life! According to an Associated Press release sent in to the hangar by Jim Alaback, Loma Linda University Research has suggested that eating a handful or so of nuts each day may significantly reduce chances of heart attacks.

According to Dr. Gary E. Fraser, peanuts were the most commonly consumed nut. Whole wheat bread and citrus fruits were also considered significant in reducing heart attacks, although it was cautioned that the study was still a "somewhat preliminary finding."

BROWN CONGRATULATES GASPARIN

Bill Brown, designer of the original Brown Junior ignition engine and longtime producer of CO_2 engines, has sent a message of congratulations to Stefan Gasparin, of Czechoslovakia. As readers of this column may recall, Stefan received recognition in the *Guinness Book of Records* for building the world's smallest engine, and has extended full credit to Bill Brown for having inspired his efforts. Brown, in return, assured Gasparin that he had no intention of trying to build any engines that small. Meanwhile, Stefan has made an even smaller example!

BOSTONIANS GALORE

Perry Peterson sent the photo of his "Massachusetts General" Bostonian model, based upon the 1929 General Aristocrat. Since the fuselage was rather short, Perry abbreviated the name of his ambulance plane to "Mass. General." As we understand it, the model will be published in a forthcoming issue of *MB*, and has proven to be a fine flyer.

The General is one in a series of ten different Bostonians Perry has created, and he explains his fascination as follows: "I have become hopelessly addicted (to Bostonians). They give back more fun for the time invested than any other type of model in which I am interested."

P-38 PUBLISHED IN ITALY

Dick Howard, of Arizona, prolific producer of Peanuts, Pistachios and plastic propellers, was a P-38 pilot during World War II. Dick and his aircraft, named "Green Eyes," were recently featured in the Italian plastic model magazine *NOTIZIARO DI PLASTIMODELLISMO.* In addition to an article with photographs and markings drawings, a picture of Dick himself appeared on the publication's front cover, looking youthful and serious in the cockpit of his Lockheed.

"Green Eyes," also lives on in flying model configuration, having successfully participated in Arizona and California contests.

SIGN-OFF TIME

David Backer, of England, compiled this trio of thoughts for *The Scale Buff:*

"Do and you shall be." John-Paul Sartre
"Be and you shall do." Albert Camus
"Do be do be do." Frank Sinatra •

Big Birds . . .*Continued from page 31*

Guys, this is the straight, unadulterated skinny, told for the first time as it really happened, by a modeler who is probably the foremost authority on Gee Bee's. The book contains over 150 pages and 200 photos from the collections of various Granville family members . . . and many of these pix have never appeared in print before.

You can order the book by sending $24.00 (postage paid) to: Henry Haffke, Magic View Motel, Route 11, Londonderry, Vermont 05140, (802)824-3793. He's not traveling; that's his new business location, as proprietor of the motel in scenic Vermont.

BUCKER JUNGMEISTER 133C

As most longtime "BIG Bird" readers know, I love bipes . . . especially those with round engines.

I guess it's because I learned to fly in an open cockpit sandwiched between two wings, feeling the full sensation of flight on my face, and being mesmerized by the Lorelei-like song of the flying wires.

I've flown lots of biplanes. Some endeared themselves to me and some didn't, and surely some memories of these aircraft have faded and some have become confused . . . but the one two-winger that still stands out as THE absolutely best flying machine was the Jungmeister.

This is a love affair that will never die, and I still mentally kick myself in the tush every now and then for not bringing back a pristine blue and white Jungmeister when I left Germany 35 years ago.

Anyhooo . . . this is leading up to telling you about Dry Ridge Models' latest offering. In addition to a 1/4-scale Spacewalker, a 1/3-scale J-3 Kitten, and a 1/3-scale J-4 Sportster, Emil Agosta has completed plans for his Bucker Jungmeister 133C.

This bird spans 86.5 inches with a wing area of 2249 squares, weighs in between 28-35 pounds (for a wing loading of 32-35 oz./sq. ft.), and flies best with a 3.7 to 4.2 cubic incher up front.

Construction is a conventional built-up framework, with spruce longerons, balsa uprights and diagonals on the main fuselage, and a laminated ply firewall. The wings contain hollow box spars with 1/16-inch ply shear webbing, and are fully cantilevered.

Emil sez that takeoffs are easy and the plane is rock steady throughout every maneuver. Knife-edge requires little or no correction, and inverted flight is equally stable. Sounds like the typical Bucker to

me.

Quarter and third sized models handle exactly like the full-scale machine, and that ain't a bad banana. When flying a Jungmeister there's no doubt that you're in charge, but this bird also seems to have the uncanny ability to read your mind and respond to your command even before you consciously move the stick. It's as if the pilot and plane become one. You have to fly this plane to find out what GOOD really is.

The plans, nine Yadven Jungmeister photos and a manual are 60 bucks, from Dry Ridge Models, 59 McCurry Road, Weaverville, North Carolina 28787, (704) 658-2663. And yes, a cowl and wheel spats are also available.

RYAN STA

It ain't a bipe but the Ryan STA is one helluva fine bird . . . on the ground and in the air. Fred Reese, now Golden Age Models, who's had many great looking and flying small models published, has an exact quarter-scale 90-inch Ryan STA kit ready for you. This classic weighs only 15 pounds and flies just right with a 120 up front. You've gotta see this airplane in person to fully appreciate it's lines and timeless beauty.

The kit has: complete deluxe hardware and flying wires, select wood, lightweight quality epoxyglass cowl and wheel pants, glass cloth, cockpit interior, decals (even for the prop), full size plans, instruction book, photos and 3-views. And a complete photopack, scale spinner and wheels will also be available.

This golden age classic should fill the bill for an easy flying bird that can be flown comfortably on weekends and yet still knock the socks off any competition at a scale meet.

Fred didn't have a firm price at this time, but you can find out by writing or calling Golden Age Models, 17750 Gray Oak Ct., P.O. Box 807, Penn Valley, California 95946, (916)432-2828.

SR TOOL KIT

Yup, this is the same SR Batteries, Inc., which has built such a solid reputation selling excellent battery packs . . . so it sure sounds kinda funny to hear their name mentioned in regard to anything so mundane as a "tool kit."

Well, this isn't any ordinary bunch of tools. Exercising the same care that goes into choosing his batteries, Larry Sribnik has made sure that this tool kit is also first rate.

I've had mine for almost two months now . . . and lemme tell you it's been USED a lot. As with many other good tools, once you get your hands on them you wonder how you ever got along without them.

Here's what's in the kit:

1) 12 Allen Hex heads, from .05" to 5/16"
2) 6 Metric Hex heads, from 1.5mm to 5.0mm
3) 3 slotted screwdriver heads
4) 2 Phillips screw heads
5) A socket drive
6) A screwdriver handle
7) A ratchet
8) An extension

This is top quality stuff . . . no cheapie pot metal here. You'd have to do something horrible to these heads to break them, but if a piece should become lost or broken, individual replacements are available.

Almost forgot . . . the case is a bright yellow, which makes it easy to spot, even on a cluttered workbench. And it's STURDY. I accidentally stepped on it (okay, so I'm a klutz), and my 200 pounds of rippling muscle and sinew had no effect; not even a scuff mark.

I know that sometimes we buy tools and hardly ever use them. But this SR Tool Kit is so handy that I can't imagine anyone not reaching for it many times a day.

How much is it? $26.95, plus three bucks for shipping, to SR Batteries, Inc., Box 287, Bellport, New York 11713.

CA GLUE

Back in the August issue I included Joe Utasi's comments on the best way to connect Jomar's Aramid Cable to Kwik-Links.

This rather simple but strong installation, potting the cable inside a DuBro Threaded Coupler, depends on CA glue for its integrity and allows the tension on bracing, rigging and control cables to be adjustable.

I'd also mentioned testing the potted end by literally hanging on it. Well, since then, this neat setup has also proven itself in the air; it works superbly.

However, due to yanking, pulling and hanging on lots of Aramid Cables glued into lots of couplers, I've changed my mind about the quality of CA glues. I used to think that they were all pretty much the same . . . but apparently that's not so.

The cables I initially tested were glued in with Hot Stuff's very thick Special "T" . . . and these remained intact. However, later on, because some of us local turkeys were curious, I tested a few more threaded coupler glue joints . . . only this time I used two "Brand X" CA's.

Guess what? Neither of them appeared to be as strong as the Hot Stuffed joints. Figuring that perhaps they hadn't been allowed to cure properly, I made up a second batch of couplers using the other brands . . . and this time waited almost two days before doing the dirty deed, but the outcome was the same.

As with most other products, quality in

CA glues does vary from brand to brand; some are not up to snuff, some are good . . . and then there's the better/stronger Hot Stuff from Satellite City.

GETTING OLD

First you forget names . . . then you forget faces . . . then you forget to pull your zipper up . . . and then you forget to pull your zipper down! •

Electronics . . *Continued from page 11*

Well, look at the illustrations for the proper orientation of these grommets. As seen, the wood or machine screw used to secure the servo in place will bear down on the small end of the bushing, which, having its enlarged end down can not be forced into the wooden support. Installed in this manner, the rubber grommet can be compressed only so much, since the travel of the screw is limited by the length of the bushing.

If the bushing is installed with the enlarged end on top, as is often done, the screw can then be tightened enough to drive its small end into the wood, without any limitations on travel. The grommet can then be squeezed enough so that much of its shock absorbing and vibration resisting qualities are lost which could lead to premature servo failure. And who needs that?

MORE ABOUT SERVOS! Now that you know how to mount them properly, how about what to do when you need one that travels more than its usual amount? Say, for example, once you retire that Ugly Stik and get into a more exotic airplane with flaps and retracts!

As there are dozens, and probably hundreds, of servos now available, I can't give you any exact information that will work in all cases, but I can pass along the general information and let you work out the details for your particular equipment and application. It isn't difficult, and rather fun to do.

First of all, you have to have an idea of how much you need to extend the servo travel, and to set up to drive the servo during the modification process. Obviously, the former is dictated by the task to which the servo will be put, and for the latter, you can use your R/C system. However, the chore is considerably simplified by the use of a servo driver, such as Ace R/C's "Datamaster," which not only operates your servo in exactly the same manner as is done by the R/C system, but also allows you to accurately read and duplicate the control pulse information so that once the modifications are made and the servo is installed, there are no surprises.

Whichever method you use to operate the servo, for any accuracy at all, you will need to be able to read the servo movement. That is easily done by attaching a dime store degree compass to a servo wheel with double sided tape, and setting up a pointer of some sort to read off the degrees for you. At this point, it is also necessary to assure yourself that the servo mechanism will allow rotation for as much as you plan to build in. Most servos have some sort of mechanical stop inside the top case that limits the movement. If this stop is such that it will prevent the desired movement, it will have to be removed, which generally requires only some surgery to the plastic case. Again, no guidance can be given to cover all of the possibilities, but if something is there to limit the rotation of the output wheel, it will be perfectly obvious upon examination.

This is also a good time to explain that the total servo rotation is always limited to that of the pot element, normally about 270 degrees, though in most servos, other circuit components limit reliable operation to slightly over 180 degrees. Since 180 is usually the maximum we need, we'll use that value as an example.

Assuming that you have now removed all physical obstructions to the servo traveling 180 degrees, let us go on to the electrical changes that will have to be made. The object is to add resistances in series with each outside leg of the feedback pot, the question being just how much to add to obtain the desired results. Piece of cake for some of you I know, but for the less experienced, refer to our pictorial diagram. With the power off, carefully disassemble the servo and locate the pot, which is located under the electronics on the side opposite the motor. Notice that it has three wires coming to it, soldered in a triangular pattern. The center wire is left as is, the other two are unsoldered, but first make a diagram to remind yourself which color wire goes where.

Now, temporarily solder a 5K (5000) ohm pot in series with each original wire lead, as shown. Turn the added pot shafts as shown, which is the position of minimum resistance; the servo will operate normally. Now, with everything arranged so no shorts will occur, power up the servo and run it through its paces. You will notice no change from the usual. Now, with the transmitter stick (or Datamaster knob) moved for maximum travel in either direction, slowly turn one of the added pot shafts off the stop in the direction of increased resistance. You may have to try them both; only one will increase the servo rotation in the same direction as did the stick (or knob). Remember that one; the other pot will obviously increase the servo rotation in the opposite direction.

Now, a little bit at a time in each direction, increase the resistance of the external pots until the servo travel has increased to the 180 degrees (90 each way) we started out to get . . . or whatever you actually need, if it is less. Without upsetting the pot shafts, and remembering which pot is which, unsolder the wires and measure the in-circuit resistance, from terminals A to B. Permanently installing a fixed resistor of that value in series with the original servo wires will result in increased servo throw exactly as you had with the pots installed.

The resistors can be 1/4-watt units, and you are on your own about exactly how and where to install them. Obviously, they can not get in the way of the other components, and most servos don't have a lot of spare room in them. Generally, one end of the resistor can be soldered directly to the pot terminal, with enough lead so that the body of the resistor can fit between the pot body and servo case. The original wire is soldered to the other end of the resistor and should be protected with a short length of shrink tubing. On some amplifiers, it will be possible to install the additional resistor right on the PC board, in the holes the wires are in, with the wire then running from the other end of the resistor directly to the pot. Don't be scared off, once you get set up, it is actually faster to do than it is to tell or read about.

TESTING TRANSMITTER BATTERIES, either with a battery discharger, or with an ESV, though one should not put all their faith in ESV testing, is popular with a certain group of fliers. More about that certain group later, but first let me explain why your favorite testing method might not be working on your latest pride and joy. Some transmitters, as for example the middle-of-the-line Futaba equipment, the Airtronics Module Series, and no doubt others that I don't know about, have a series diode installed in the charging circuit which allows charging current in, but closes the gate when any external device that draws current, such as the cycles and ESVs, is connected.

This is where that certain group I was talking about comes in. You only find this protection in a certain class of transmitters, those popular with the experienced, but not actually, world class modeler. I know, those are not sharp classifications, as a lot of excellent fliers use the less than top of the line equipment, but these decisions are based on numbers, and of course some assumptions. Anyway, a lot of transmitters of the middle class are received at service facilities daily, with the wiring between the charge connector and the battery burned out. Along with the transmitter usually comes a note saying "IT burned, please fix under warranty," when in reality, the only way such damage can occur is by an external short circuit. IT was done, while connecting some battery testing device.

Now, interestingly enough, this does not occur with the same regularity with the cheaper beginner's or with the top class expert transmitters. The theory then, is that the beginner does not know or care about battery testing, and at the other end of the spectrum, Joe Expert has learned how to do it correctly and without damaging things. So much for theory, now for what to do!

Most of these transmitters also have readily removable batteries. The very best thing to do is to learn how to take them out . . . if all else fails, refer to the instruction manual. Obtain a connector to match the one on the battery and make up whatever harness is necessary to mate the battery to your test instruments. This practice will not void any warranties, and unless you are careless enough to cross the polarity, is practically foolproof.

If you prefer the original method and are not concerned with warranties, there is another way. After removing only four or six screws, you will have exposed the charging jack and associated wiring. Tracing the input, usually on the positive side, you will very soon run into the diode mentioned. You can simply remove it and install a wire jumper, or simply solder the jumper across the diode, the results are the same. And you can now test your transmitter battery in the manner in which you have let yourself become accustomed. But please, if you "smoke" things, don't say that I told you it was OK to do this when you have to send it in for wire transplants!

But wait, I know that you remember from previous discussions here in EC that a silicon diode, such as the one that you just eliminated, causes a .7 volt drop in whatever circuit it is installed in. Taking it out means that a higher voltage will now be applied to the battery and, according to George Ohm, that means a higher current is going to flow. Right? Right!

In this case, the higher voltage/current can be disregarded, it is not really enough to be concerned about, what with all of the other conditions that change drastically from charging an almost dead Ni-Cd battery to its fully charged condition. If you are a nit-picker (you're allowed!), let me tell you that I cranked some average values into my calculator and came up with a possible increase of 3.5 milliamps . . . definitely not enough to create problems of any sort, and if that doesn't convince you

let me tell you that most manufacturers having transmitters with and without diodes use the same charger for both of them.

It's flying season all over the good old U.S. of A . . . isn't it just great? •

Free Flight . . *Continued from page 60*

span is 55 inches, and the total wing area is nearly 300 sq. inches. Additionally, the beast uses 1/4 pound+ of rubber per motor. This is one model that takes a "big Kahuna" just to wind up. I love it!

This information was provided in the copy of the three-view that I received: "The first of this month's plans is of Julian Hopper's very successful open rubber model. Among its 1975 performances were victories at the Devon, Southern, East Anglian Open and SMAE Galas, and second places at the Nationals and at Woodford. My thanks are due to Julian, who lives at Saffron Walden in Essex and flies with the Stanstead Club, for this additional information.

"The Illusive Butterfly series was started in 1963-64. The mark number has only changed when a radical alteration was made to the design . . . of total wing area, for example, or of area distribution between the wing and tail. Thus, as many as five models have been built of the same mark number and with perhaps just minor modifications . . . to structure, prop dimensions, wing section, etc. Most of the earlier numbers were much more rugged than the Mark 12 which I'm currently flying. They probably showed considerable 'northern' influence, but the change to a more modern and conventional appearance was for performance as the prime object, rather than durability in gales.

"So far, five of this Mark 12 series have been built and all have performed with a degree of success. Some changes have included wing tip shape, thicker airfoil section, use of an underfin, etc., but they have all flown much the same, with the thicker airfoil (as shown on the plan) probably having the edge on the glide.

"With a relatively large model such as this, weight seems less critical than with smaller models, and they can therefore tolerate more 'beefing up' where it counts . . . in the center wing panels and the fuselage for example. The diamond fuselage of this design has 1/8 inch square longerons and 1/8 inch by 1/16 inch warren girder spacers. I'm pretty sure that this model flies with a heavier wing loading than most current rubber ships."

So, there you have it. A Mulvihill ship that can be scaled up from this month's three-view. The scale is 1:10 and the full sized airfoils are there for your use. If you are up to it, this model should give your life a new thrill.

SEPTEMBER DARNED GOOD AIRFOIL—GOTTINGEN 456

This is one of an immensely long series of airfoils from the Gottingen Laboratories. The section has a number of qualities that make it worthy of consideration for free flight power applications. First off, the Lift/Drag curve shows itself to be most efficient when the wing is set at about one degree incidence, so it can be set up to be used on a streamlined model or a VIT equipped design. One shortcoming of this airfoil is the sharply pointed and upswept Phillips entry (leading edge). Although this characteristic is used frequently on F1C designs, it is not the most forgiving feature for non-VIT equipped ships.

The section has two other nice features for fast flying gas models: 1) the high point of the airfoil is at 40%, a desirable trait, and 2) the airfoil high point is "only" 9.25%. For old airfoils (this one was developed in 1926) this thin a section is unusual. For AMA gas use, this airfoil could be used "as is" or thinned by up to 10%, which would put the max thickness at about 8.35%. F1C types would probably thin it down by around 20%.

At any rate, this airfoil is not one that I have found in the usual free flight source books, so its use is relatively rare. Give it a try to find out how well it works.

BILL BAKER REALLY DOES HANG IT UP

A couple of months ago, I noted here that Bill Baker, editor of the Okie Free Flight Flier newsletter had promised one big, last issue before quitting the newsletter editor business. Although a number of folks who claim to know Bill said that he would never go through with it, the last issue of OFFF came just last week. Bill really did it. It's his last issue. Claims it was no longer any fun to do.

So, here's to Bill Baker, who put out a quality product for over 30 issues, and to all of the other newsletter editors who labor at their typewriters and word processors. Thanks to you and those like you. Without your efforts, the hobby would be poorer.

We'll miss you, Bill. And, whenever you are ready to give it another try, we'll be ready to appreciate your labor.

NEW NOSTALGIA DESIGN APPROVED

As you have been reading in this column for the past two months, I have teased you with the possibility of a new revelation. Here's the scoop: Ed Miller and Jim Summersett uncovered some of the original drawings to the prototype Texan design. The Texan has been one of those models that has been specifically excluded from Nostalgia competition because all of the provable verification show that it was not eligible. Now the new information comes out that the prototype Texan was begun in 1952, thus making it eligible for Nostalgia competition. However, before you go out and build one, please be aware that the Texan that was published in *American Modeler* in 1960 is NOT eligible. The prototype is noticeably different in such areas as stab location, wing tip shape, etc.

Ralph Prey and Bob Larsh have tentatively approved the "Prototype Texan 1952" as eligible. A three-view of this design will be featured in this column very soon. Look for it, I think you'll find it worth your consideration as a quality Nostalgia ship.

IDENTIFICATION TAGS

One of the frustrations with lost models is the practice of a number of free flighters to not place their AMA numbers, or an identification tag on their models. With

the nature of free flight as it is, these omissions are sometimes critical when attempting to locate a lost model. My suggestion is that you do both. On the fields where we fly, the local farmers are quite understanding and helpful, if they have some clue as to who should be called to retrieve the found model.

A critical service once provided by the AMA was the identification tags that were available to all members. Currently, these paper tags have been replaced by a mylar version that contains similar information, but in my estimation, are a poor second for the old paper tags. Some free flighters have duplicated the old forms on their local photocopy machine, but nitrate dope attacks the carbon deposits on these forms of copies. Recently, I took some of the old forms down to a local printer and had them duplicated onto lightweight paper. Elsewhere in this column, you will find a reproduction of each of the two styles of name tags. These can be ordered directly from me, if you long for the old style tags. The cost is $1.00 per three-page set . . . each page contains 12 tags . . . postpaid. If you are interested in obtaining some sets, drop me a line at my home address: 5066 N.W. Picadilly Circle, Albany, Oregon 97321.

By the way, I find that it helps to put the words, "Reward for Return" on the tags. I also place the month and year that the model was completed on each of the tags. This way, I can tell just how old each of the models I fly really is. You'd be surprised how long some of those old ships are active!

GALAXIES GALORE ONE MORE TIME

I just received a new Geodetic Galaxie 1/2A kit from John Anderson. It's a beauty. For those free flighters who fondly remember the old Galaxie kit, you won't be disappointed with the new release of this favorite. John has duplicated the original kit with its band sawn parts, neatly packaged, and its quality selection of wood. The Galaxie was designed by Vic Cunnyngham Jr., and is now available in two sizes: the 1/2A at 312 square inches, and the A-B at 585 square inches. You might be able to find either or both of them at your local hobby shop. The 1/2A retails at $24.95 and the A-B is $37.95. If you cannot locate one locally, you can order either, or both, from Galaxie Model Company, Box 4842, Covina, California 91723. Add $2.00 per kit for postage and handling.

John informs me that the Maxie 1/2A kit is in the works, and even though I am not currently familiar with this design, I will report on it in a future issue of *Model Builder* Free Flight after I have a chance to review it.

PHIL HAINER'S WASP NEEDLE VALVE PROJECT

Phil Hainer told me at a recent free flight meet that he is just now getting caught up with his Wasp, Hornet, and Wen Mac needle valve project. So all of you who have been waiting patiently, you should have your prizes in hand by now. Phil is, however, giving up the project immediately. He has tentatively located another modeler who is interested in continuing with the service, and if this source pans out, you will be able to read about this new source in a future issue of *Model Builder* Free Flight. For the meantime, don't send any more orders for needle valves to Phil.

TULSA GLUE DOBBERS CELEBRATE 40 YEARS

Got a note recently from Jack Hamilton, who is the contest director for the Tulsa Glue Dobbers 40th Annual F.F. Contest. Whew! That's a bunch. The contest will be held on August 12 and 13. The event is being co-sponsored this year with the Wichita Wichihawks. Jack also included a photo, found elsewhere in this column, of his Oliver .15 powered Gastove British Power model. Jack notes that he won second place in the Nostalgia event at last year's Glue Dobbers Annual. For more information about the 40th Annual, contact Jack Hamilton, 5425 So. Oxford Ave., Tulsa, Oklahoma, or call him at (918)665-8371.

MORE TIPS FROM TERRY T.

One of my regular and reliable sources for good free flight ideas is Terry Thorkildsen, who is a member of the San Valeers F.F. Club of Southern California. Recently, Terry forwarded this bit of performance information about the T.D. .049 and .051 engines.

"Have you ever wondered what a GloBee and higher nitro fuel will do for your engine? Keep in mind that every engine is different, but a typical set of results for a good stock T.D. .049 on a Cox grey 5x3 prop are as follows:

Percent Nitro	Plug Types	No. of Plug Gaskets	RPM
40	Cox Hi-Comp	1	20,100
65	Cox Hi-Comp	1	20,800
40	GloBee Sport	2	21,400
65	GloBee Sport	2	22,200

A couple of points that should be made are that the GloBee sport plug has more compression than the GloBee racing plug since it has less volume. It can also cause detonation easier and some engines will take more gaskets to avoid this problem. The GloBees require more current to fire the engine, which is no problem with a power panel, but you'd better have a real good 1.5-volt battery or you won't get it to fire. You should set up your engine so that

the piston top is even with the landing at the top of the cylinder at top dead center. You can buy shims from Kustom Kraftsmanship to accomplish this. If the piston sets higher than this, it will require more gaskets under the GloBee to avoid detonation. After you set the piston top at the correct height, make sure you have enough distance below the piston and the cylinder at top dead center (known as sub-piston induction gap). The best distance is .012 to .014, but don't go below .010 or your engine may run slower. Elsewhere in this column is a sketch showing the above information more clearly.

LIDGARD'S LATEST

Just got a nice package from Ed Lidgard containing his latest F.F. scale design; a Morane Saulnier A-1, a little known French fighter. The model design features are: 22 inch span, sliced ribs with scale spacing, moveable ailerons, rudder and elevators, formers and stringers half-shell construction, camouflage and markings detailed on the plan; rubber, CO_2 or electric power. In addition, the model can use ready-made balsa wheels and 8 inch plastic prop. The plans contain sticky back decals for tail markings and name, plus red MS emblem for the cowl. A black and white three-view is provided. The plan is 30 by 42 inches, beautifully detailed, and comes postpaid to your door for only $6.00. See a picture of the model elsewhere in this column. If it piques your curiosity, as it did mine, you can get a set of these plans from Ed Lidgard, 614 E. Fordham, Tempe, Arizona 85283.

THAT'S IT DEPT.

Gee whiz, gang, that's it for another month! Glad to have you with me again. I hope I got some pictures of you at the 1989 Nats. If so, you can look forward to seeing yourself in *Model Builder* Free Flight in a couple of months. In the meantime, catch a thermal for me. •

Soaring . . . . . *Continued from page 49*

elimination of a spar system and its attendant weight. Two dry wall screws hold the wing to the fuselage. The finished wing weighs 8.5 ounces.

Everything in the fuselage and stabs is tapered. The fuselage sides and tops start out as 3/16 balsa sheet. These are tapered from 3/16 at the nose to 1/16 thickness at the tail ("hand sanded outside so as not to breathe the dust!"). There are spruce longerons in all four corners of the fuse for added strength. The sheet balsa stabs are sanded to a tapering airfoil shape and finished in dope.

Well Jim, we know who we have to look out for next year! Thanks for sharing your successful model design with us.

There's only one more 7-cell design I'd like to mention . . . that's my own, if you will permit me! It's a Goldberg Gentle Lady, and before you say that's beginner's stuff, let me agree with you. The Gentle Lady is one of the best and most popular first time sailplane kits you can buy. It is easy to build, stable, good handling, and most of all, LIGHT! It has all the makings for an excellent electric conversion, and a competitive Astro Champs model.

For those interested in all the details of the conversion, I would suggest they call up *Model Builder* and order a back issue, July 1985. In this issue Frank Heacox modified a Gentle Lady into what he called the Electric Lady, then I wrote it up as a type of construction article.

The Electric Lady that I flew at the Astro Champs has a one-inch longer nose than the one in the article. This helps solve a space problem and achieve balance easier. The all up weight comes out to 39 ounces, which is about the lightest you can get with a 78-inch span model. This compares favorably with Carl Goldberg Models specs for the Electra at 48 ounces with six 1200 cells and a lighter, direct drive, ferrite can

motor. I use a seven-cell, 900 mAH pack and an Astro 6-turn FAI gear motor for power, swinging a Bob-Sliff-modified Yoshioka 11.5x10.2 glass nylon prop with an aluminum folding hub. The hub pumps the prop diameter up to 12.8 inches. Motor control is provided by a Novak T-4 MOSFET car speed controller. It can handle the current of the Astro FAI wind gear or direct drive 05 motor, and the brake will not fail (provided it's not repeatedly used at full throttle).

The Electric Lady climbs competitively for the Astro Champs, and its thin, flat bottom airfoil seems to work very well. Carl Goldberg selected this airfoil section based on his many, many years of F/F and soaring experience going back to the thirties. I've never lacked for performance with the Electric Lady in spite of its simple wing. Care must be taken with this wing, however, because in its stock form, it will not take too much steep diving and hard pullouts with all the heavy electric gear aboard. It just wasn't designed for that kind of abuse! If that thought scares you, however, I will say this in defense of the Gentle Lady wing: I have successfully WINCH TOWED the Electric Lady aloft with electric gear aboard, and the wing did not fail!

7-CELL OLD TIMERS

This next-most-popular class attracted 12 entries. Like the 7-cell glider group, the most popular motor used was the Astro FAI 6-turn 05 cobalt. The three most popular choices for Old Timer designs are Leisure's (Lanzo) Bomber and (Cleveland) Playboy, and Astro's (Cleveland) Viking. It remains a mystery to me why there isn't more experimentation going on in this class with designs that are equal to or possibly better than these three. Perhaps the performance is high enough and the building easy enough from these readily available kits that there just hasn't been the need.

The winners were (1st) Gary Westland with a Leisure Bomber, (2nd) Ross Thomas with a Midway Model Co. Playboy, and Lowell Norenberg with an Astro Viking in 3rd. All used Astro FAI 6-turn 05 cobalt gear motors.

This year there was one new 7-cell OT design which looked promising: Randy Wrisley's 1936 Flying Aces Stick Model built from John Pond Plans. This design is so old (pre-1938), that it qualifies as a SAM Antique!

The FA Stick, according to Randy, is a 66-inch span model with 573 square inches of wing area. It uses a Clark-Y type, "sorta-flat-bottom" airfoil that is about 15% thick. All up, the FA Stick weighs just 35 ounces, the lightest model at the Champs with the lightest wing loading at 8.57 oz/sq.ft. What was even more unique about Randy's model is that it was the only model at the Champs with a ferrite magnet motor.

Randy contacted Peak Performance Motors (an R/C car motor specialist), and told them what he was looking for in the way of power output. They supplied him with a wet magnet motor of (to Randy) an unknown wind. To this motor, Randy bolted a Leisure 3.8:1 gear box and a Tom Dixon, $12.00-per-blade, 13x7 Bolly glass-nylon prop with a Bob Sliff aluminum folding hub. Randy also used an experimental KO Propo PX-II FET speed control with BEC circuitry (to eliminate the receiver battery), Cannon micro servos, and an old Aero Sport (Cirrus) 6-channel receiver with case removed.

The Flying Aces Stick, as the name implies, has sticks for a fuselage. This was one of the design's main attractions for Randy, who was looking for the ultimate in lightweight airframes. This Stick also has flat plate horizontal and vertical stabs that promised to deliver better handling and a more forward (stable) balance point location. The Stick's parasol style, cabane wing struts placed the model's wing high above the turbulent flow of air around the fuselage with its many exposed components. Finally, Randy gave the Stick wheels made out of laminated balsa. This technique is legal, and because the model only needs them for landing, not taking off, they are perfectly adequate.

For all this extra work, Randy was rewarded with a model that climbed almost as well as the hotter FAI cobalt gear motor Playboys, Bombers, and Vikings. We guesstimated that after a 55-second motor run, Randy was only 50 feet or so below the

main pack in a mass launch. He was certainly high enough to find lift and max out with relative ease. Randy claims that in the still early morning air and on a 30-second motor run, his model averages 3:17 on glide.

If Randy had any problems with this model it was mostly visual. The sticks were impossible to see at a distance, which made disorientation a real problem. Randy tried to compensate by flying with the transmitter's trim tabs, but it was still a problem. Randy admitted that he needed more practice.

Just imagine what a 35-ounce Flying Aces Stick would do with an FAI cobalt gear motor!

UNLIMITED CLASS OLD TIMERS

Moving right along with the OT's, we come to the Unlimited Class. Unlimited Class OT's can be very big and impressive. However, not all were big, as there was a mix of aircraft designs and sizes competing together from 05 to 40 size. There were eight entries in this event.

The winners were (1st) Bob Sliff with a full-size Cabin Playboy and Astro cobalt 40 gear motor on 24 cells; (2nd) Gary Westland with his Carl Schmaedig Flying Stick model using Astro cobalt 15 gear motor on 14, 450 mAH cells; and (3rd) Ross Thomas with his 80-inch (83% reduction) Lanzo Bomber using a gear driven Astro cobalt 40 on 26, 800 mAH cells.

The most unusual model was Gary Westland's 1937 Schmaedig Flying Stick model. Here Gary took an 84-inch span design and reduced it to a 66-inch span model with 630 square inches of area. He also used a loophole in the SAM rules to Monokote the area between the two stick sides of the fuselage, thus improving torsional strength, improving visibility, and lowering drag. The model uses a flat bottom airfoil and constant chord wing and stab which make scratch building this OT very easy!

Gary used the new 450 mAH size cells (which are half the size of the 900 MAH cells) to save weight and space. The all-up weight of this Flying Stick was 46 ounces. Fourteen 450's were used to power his Astro cobalt 15 gear motor which ran about 22 amps on a K&W 13x7 folding prop (Compare this to an FAI 05 at up to 45 amps and the wattage is about equal). For motor control, Gary used the lightweight High Sky motor on-off relay with no problems.

Gary says he gets a very good climb and that the flat bottom airfoil "moves right along" with "a very good glide," but that the Stick is slow in handling as an R/C model.

Having built a Frank Engling Stick model (Pond plans) and crashed it shortly before the Astro Champs, Randy Wrisley said he was looking forward to building a Schmaedig Flying Stick next year as a 7-cell with an FAI 05. This is the hot ticket Astro Champers!

Gary Westland's dad, Ray Westland, is also a modeler. His entry into the Unlimited OTs was an unusual 68-inch span (90% reduction) Turner Special scaled from John Pond plans. This is a cabin model from 1936. With its 804 square inches of area and

only 52 ounces of flying weight, the Turner is a real floater.

Ray powered the Turner with an Astro geared 15 on 14, 450 mAH cells. He uses either a 13x7 or 13x6 K&W folding prop. His preference is the 13x6 which he says flies better, except on rough fields, then he goes with the 13x7.

UNLIMITED SAILPLANES

Eight competitors flew this event. Half of these eight were FAI-F3E type fliers with their F3E ships! Three of these four were the 1988 US FAI-F3E Team: Jerry Bridgeman, Felix Vivas, and Steve Neu.

The winners were: (1st) Bob Sliff and his Astro 60 powered Gnome 3M; (2nd) Felix Vivas and his F3E ship; and (3rd) Lowell Norenberg with his original design 7-cell model with which he was making his fourth Astro Champs appearance!

In case you are wondering why the F3E types weren't more dominant in the final standings, two of them did not return for the second day of competition, thus receiving zero scores for their final rounds. Jerry Bridgeman had technical difficulties which he couldn't overcome in time for the start of his final round, so he also received a zero. Jerry had his ATRACS equipped Airtronics radio on mode #1 instead of mode #4, so the receiver refused to switch anything on!

Jerry had by far the best climb of the bunch, and after the contest gave the best demonstration of aerobatic soaring flight I've seen to date, so I'll spend some space on his model. It has no name, so I'll call it the JB.

The JB is powered by an Astro 60 cobalt direct drive motor housed in a carbon fiber reinforced, molded fiberglass fuselage of Jerry's own design. The motor is mounted to a tightly fitting, removable nose cone. This way, when Jerry flies the JB as a slope racer, he just adds a motor-less, ballasted nose cone and away he flies. The nose cone is merely taped in place. Access to motor, receiver, receiver battery, speed controller, and motor battery is as easy as peeling tape! All of these components appear to be simply stuffed into place!

Components include: Twenty-seven 900 mAH cells, a $250 custom made Hans Sumeraur (Swiss) speed control which Jerry purchased at the F3E World Champs last year (rated a true, constant 60-amp current draw and/or 30 cells); JR Propo micro servos (with metal gears); a Tru-turn two-inch aluminum spinner; and a K&W 13x7 folding prop carved down to 12x7.

The wing is a 94-inch span, 590 square inch, blue foam core which has a tapered chord and Girsberger RG-12A section. It is covered in composite materials and vacuum bagged. Those layers of composites are (top to bottom): 4 oz S-glass cloth full span, 1.8 oz Kevlar cloth full span, a second 1.8 oz Kevlar layer out 40% from the root, and 6 oz. unidirectional carbon 6 in. wide at the root tapering to a point at the tip, all in an epoxy resin.

The JB model is lighter than other F3E types. Compared to the Drone design flown by Steve Neu and Keith Finkenbiner at this contest, it weighs about a pound less. This translates to a significant 100 to 200 foot altitude advantage at the end of a ten-second motor run.

THE A-WARDS AND RE-WARDS

Following the contest, trophy plaques were awarded to the top three fliers in each class. Then came the rewards for being Astro Champs competitors! Prizes galore! There were so many prizes from the sponsors (mentioned at the beginning of this report) that everyone got at least two. Motors, chargers, kits with motors, battery packs, battery cells, wire, wheels, it all came to probably a couple of G's total retail value! Thanks sponsors! With wonderful rewards like these, you gotta be nuts not to get ready for next year's Astro Champs! Look for announcements in the magazines. See ya there! •

ARFs . . . . . *Continued from page 43*

red and black trim, and in a plane of this large size I expected it to be highly visible at any distance, but more about this later. A word of caution though, don't try to tighten up the covering with any kind of heat application, as it is not the heat shrink type. Either leave it alone or use the method I described in a previous column (lift up the edges, hand stretch the covering, then stick back in place).

For a power plant, Chuck chose an O.S. 40 four-stroke engine and fitted it with a 10/6 prop. The C.G. recommended was supposed to be 3 to 3-1/4 inches behind the wing leading edge, and it was right on without and adding any nose or tail weight. When all was done and I got my first look at the completed plane, I could hardly believe the excellent fit and the quality of the prefabrication. I absolutely defy anyone to recognize the Avistar as an ARF and not a conventional model! The only giveaway was the printed-on color scheme, but you would have to get your nose right up to the model to detect that it was not a top rate hand-covered framework.

Chuck and I set out one June morning

to put the Avistar through its flying evaluation, and instead of a balmy, sunny California day, we encountered an overcast sky with a direct crosswind gusting up to twenty knots. Well, at least we would find out how well she handled in the wind! The O.S. fired up easily and as the little four-stroke warmed up, we did our range testing and checked the flight control surfaces for movement in the proper directions. As the otherwise excellent instructions omitted the recommended control surface throws, we set the ailerons for 1/4 inch up and down, the elevator for 3/8 inch up and down, and the rudder for 3/4 inch right and left. These are rather average settings and we expected the Avistar to be on the docile side with such moderate throws.

I took the controls, and in view of the unfavorable wind conditions I thought it best to give her full throttle immediately. As she rolled along the rough dirt strip, speed continued to build up rather slowly, and I suddenly remembered why I was so partial to two-stroke engines. As the gusts of crosswind kept pushing directly on the left side of the bird, I prepared to feed in compensating left rudder, but it never was required. The Avistar left the ground like a real lady, well under control, and seemingly immune to the punishing wind. At about ten feet of altitude I thought it prudent to come left so as to climb into the wind, and in this manner I got her up to about two hundred feet, at which point I usually apply whatever trims are necessary. Strangely, no trim changes appeared to be needed, so I proceeded to perform the usual flight maneuvers.

I found it difficult to believe that the Avistar did not have a flat bottom airfoil, except for the fact that throttle changes did not seem to have a significant effect on the elevator trim. This is one advantage of the symmetrical and the semi-symmetrical airfoil. The plane went where it was pointed with a high degree of inherent stability, and I felt it could easily serve as a trainer for the average beginner, provided he had the services of a competent instructor. The Avistar was difficult to stall, and when low throttle and full-up elevator was applied, it finally did perform a gentle mushy stall with no tendency to fall off to either side. Loops and rolls were a breeze, and flying inverted was accomplished with ease. With our limited control surface throws and mild power plant I couldn't elicit any kind of spin or snap roll.

Without a doubt the Avistar is an extremely solid and stable flyer, one that can be set up to perform in a very gentle manner, or if snappy maneuvers are desired, all you need is high throws and a more rearward C.G.

After ten minutes or so of poking around the sky, I brought her in for a rock steady landing, and this also was done in the unyielding crosswind. At this point I must point out one minor shortcoming of this dandy ARF. All the color trim is on the top side, and the entire bottom of the airplane is dead white. Against the white clouds or an overcast sky I had trouble seeing the model in spite of its large size. Before our next flying session Chuck is going to put some stripes or other trim on the bottom of the wing, and that should easily cure the problem. We haven't had an opportunity to try the model with a more powerful two stroke, nor with increased control surface throws, but I have no doubt that this tame pussycat can easily be transformed into a high performance tiger. My conclusion is that the Avistar .40 is indeed what the manufacturer calls it, "a trainer that you can truly grow with!" This excellent ARF can take the novice right up to the advanced trainer stage. The Avistar is an excellent product, an outstanding value, and rates my full approval and highest recommendation.

RYAN O.S. MAX SPECIAL

The second jewel in Great Planes' crown is represented by one of the downright prettiest ARFs to come down the pike in a long time, the Ryan O.S. Max Special. As you may have guessed, this is the first offering of an ARF by the world famous engine people, O.S. Engines. The model is a standoff scale interpretation of the Ryan STA, with a wingspan of 58 inches, a length of 41-1/2 inches, and a wing area of 551 square inches. In a similar manner to other lines of ARFs, the construction is of wood covered with a foam material and a top layer of plastic with the color scheme built in. This type of ARF has proven itself over and over again to be light and strong, though somewhat more difficult to repair than a conventionally built model.

O.S. makes the Ryan available either

without an engine, or with a Max .40FP already installed. Taking the deluxe route, I opted for the kit with engine, and was pleased to find that the engine came already mounted with the cowl cut out and fixed in place. I noticed that the kit even included a scale-like prop nut, but a few items had to be supplied by the builder. A pair of two-inch main wheels and a 3/4-inch tail wheel were lacking, and the instructions suggested using EZ Connectors to install the throttle control rod. Otherwise, all other hardware was included in the kit. As I am presently involved in evaluating four or five models, I turned to another talented member of my assembly team, Jim Shaver, and asked him to put the Ryan together exactly stock, with absolutely no modifications. At this point let's let Jim give us his impressions of the kit:

"I thought it important to use 45-minute epoxy for most of the main assembly points of the airplane, and I strongly recommend it for joining the center of the wing. Follow the directions very closely, paying particular attention to the pictures. Be careful when installing the tongue of the wing center joiner. This can easily be put in upside down if care is not taken, as the wing is semi-symmetrical and it can be put in either way. Most of the directions are pictures and very short on words, but the pictures are quite clear and informative. Some ten-minute epoxy was used on parts that were not quite so critical, and which could be fitted quickly without concern about the epoxy hardening before the part could be placed. The plastic parts were glued on with Poly Zap because it is specially formulated for EZ type models. While this is not one of the easiest ARFs I have put together, I feel it is one of the prettiest and most appealing.

"I didn't like the nylon control rods because I prefer to use cable wire or arrow shafts, but this is largely a matter of personal choice. I also didn't care for the adhesive trim supplied to finish off the wing tips, as the curves are compound in nature, and impossible to cover without wrinkles in the material. I would prefer to use an iron-on material or paint the trim areas. I especially liked the ABS cowl. It feels really strong and can take some of those nose-over landings we can all expect from time to time. I also liked the widely spaced landing gear which projects forward of the leading edge of the wing. This will hopefully prevent some of the nosing over. I felt that the decal set was skimpy, and I wondered where were the Mobil Oil and Pennzoil decals? The bare-looking open cockpit really needs a pilot to finish off the appearance. I also thought the model cries out for an O.S. .48 Surpass four-stroke engine to make it the nostalgic airplane that it is.

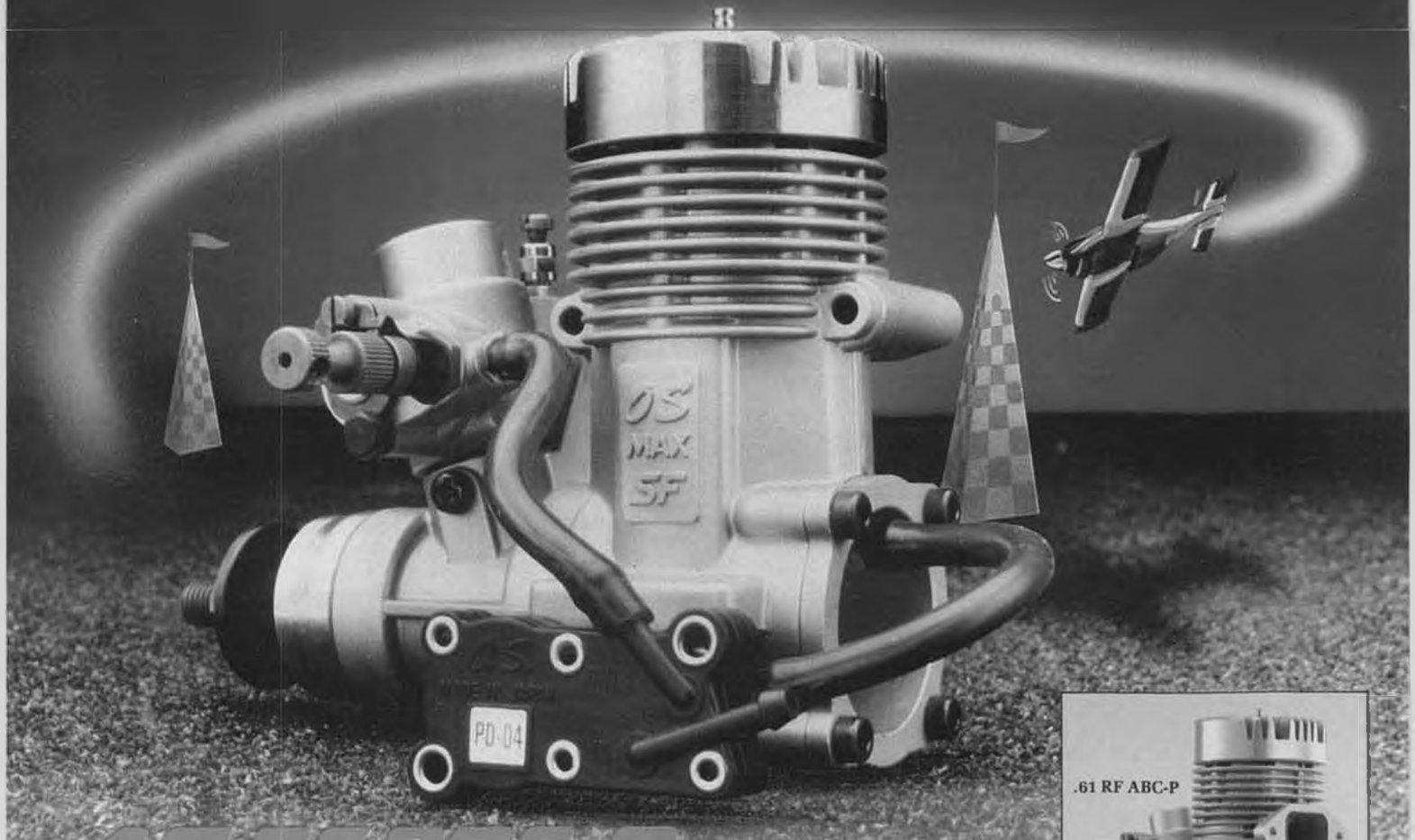
"My total building time, working quite leisurely, was about eighteen hours. Not fast, but it did go pretty well for me. On a scale of one to ten I give it a seven for building and a nine for strength and appearance. All in all, it is a very nice kit and I think it is well worth the money."

When Jim turned the model over to me for flight evaluation, it was complete and ready to go. I thought it was a particularly beautiful model with its tasteful white, red, and black color scheme, but the real kicker is the under surface of the wing and stabilizer. These are done in a large black and white checkerboard pattern, a real help in determining attitude while flying. I couldn't help but agree with Jim that a pilot figure was really a necessity, and I decided that I would install one after the initial flight testing. I felt that since the model was only a kind of stand-way-off scale type, there was sufficient scale detail. There are plenty of panel lines and rivets, but you can dress up the airplane as much as you like.

The manufacturer has made it easy to locate the C.G., as it is marked by a prominent black dot on the fuselage side. I determined that the C.G. was correct, and didn't have to shift any radio equipment or add any weights. As an afterthought, I did weigh the Ryan, and found it to be one ounce over the specified flying weight of four pounds, thirteen ounces.

In a way, I wished that the engine had not been factory mounted. Even though this was neatly done, it was placed in a leaning to the right position, and the spacious cowling appeared to allow enough

Power Play!



.46 SF ABC-P

If you fly a .40 or .46-sized plane, you can enjoy the classic features of O.S. SF engines with the bonus of a factory pre-set pump system. With Schnuerle porting, a double ball-bearing supported crankshaft, single-piece crankcase, and expansion muffler, the new **.46 SF ABC-P** is as forceful as you'd expect any O.S. engine to be. Outfitted with the newly-designed **46 Pump System**, it's the power you've asked for, and more.

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The .46 SF ABC-P's new pump and carburetor maximize fuel efficiency.

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room to mount the engine inverted and completely enclosed. However, in the semi-upright position, engine accessibility and ease of starting were excellent.

The next step was to set up the engine, adjust the throttle servo for correct throws, and check all flying controls. Then came the first fun part, taxi testing around my driveway. The ease of maneuvering the Ryan on the ground bore out Jim's conclusion that the landing gear spacing was optimal, and shortly I felt all was ready for the first flight. In order to allow me to handle the photography, I had arranged to have a test pilot in the person of my good friend Rich Anderson, meet me at the club field of the Palomar Flyers. The day of testing was once again quite windy, but right down the runway. The time was three in the afternoon, and the sky was blue and clear, with the sun at our backs. The O.S. .40 FP started up easily, and seemed to be putting out more than enough power for the airplane. Rich taxied onto the runway into the stiff wind, and ground handling remained solid. On full throttle, the Ryan leaped forward, quickly lifted its tail, and was airborne and climbing in seconds. Performance? Wow! Rich loves to really wring out an airplane, and this one was right up his alley! I know of no other model that will snap more quickly, or spin better than this one. Fast? Yes! Maneuverable? You bet! I can't remember seeing an airplane so stressed on its first flight. Rich showed absolutely no mercy, subjecting the snappy little model to every high-G stunt in the book. He especially liked the inverted flight with practically no elevator compensation needed. After I finished shooting off a roll of film, Rich gave me the transmitter. My first maneuver was a gentle right turn, but just slight pressure on the stick produced two quick rolls before I could recover! That was enough for me, so I gave it back to Rich and he brought her in for a landing. He misjudged and came in too high and too slow, but the landing was uneventful, pointing out the fact that the Ryan did not tend to stall easily or drop a wingtip during a stall.

I had assumed that Jim set the aileron throws to conform with the specifications in the instruction book, but the very quick responses of the model made me question if they were correct. I measured the aileron movement and found it to be a full half-inch up and the same amount down. That certainly seemed to be too much for my style of flying, even though Rich protested that it was just right for him.

Back in my workshop I got out the instructions (we experts are just like the rest of you, we fly first, then read the directions) and looked up the specifications for control surface movement. After reading the twenty-four pages of the instruction book for the fourth time, I realized that the specs were not given anywhere, so I reset the aileron throws to 1/4 inch up and down. I returned to the field a few days later, and this time the Ryan behaved just the way I like, still fast, but very docile, still able to do every trick in the book, but at a much slower rate. It was very comfortable to fly, and the slower responses made it even more scale-like in the air. I loved the checkerboard patten on the bottom, as visibility was outstanding. The wing has enough dihedral to give the Ryan a rock steady feeling, and this was especially evident when using back stick during landings. Speaking of landings, the model hasn't yet nosed over once, even after a couple of dozen touch downs. This certainly speaks out for properly placing the landing gear on a tail dragger. The O.S. designers have certainly done an outstanding job, especially in that respect.

The Ryan is a different kettle of fish from the Avistar .40, but once having mastered the Avistar, the Ryan would be an excellent choice. I am pleased to have the Ryan in my stable, and I know that later on I will probably readjust the ailerons to restore the lightning quick performance. But for the time being, I am having a great time putting in one relaxing flight after another. I really love this Ryan, and if you are ready for a high performance semi-scale model, you will too. Both the Avistar .40 and the Ryan O.S. Max Special are distributed by Great Planes Model Distributors Company, P.O. Box 4021, Champaign, Illinois 61820, telephone (217)398-6300.

Well ARF lovers, it's time for me to slip back to the workbench to put the finishing touches on some more fascinating projects

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The complete Professor kit comes out of the box ready to assemble.

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PROFESSOR SPECIFICATIONS	
Length	35.04" (890mm)
Wingspan	48.82" (1240mm)
Area	446.5 sq in
Weight (w/rec system)	39 oz.
Motor	RS540SH w/3:1 reduction gearbox
Recommended system	Futaba 4NBL/MCR
REQUIRES: 7.2v/1200mAH NiCd battery pack and charger, 2-4 Channel radio control system (electronic speed control optional).	

Futaba MCR-4A Integrated MOSFET speed control/receiver (Not included) required for optimum performance. Specifications: 4 Channel; 1.5 oz. (excluding switch and connectors); 1.24" x 2.92" x 0.63" BEC Voltage regulator.

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just for you. Look in on us again next month and you'll be glad you did. Meantime, keep those questions and comments coming to me at 2267 Alta Vista Drive, Vista, California 92084, telephone (619) 726-6636. •

Plug Sparks . *Continued from page 40*

In 1980, Gus Munich ran unto these castings being sold by Brebeck's grandson at a New York Collectogether. The magnesium castings, although somewhat corroded, were still in serviceable shape. The castings offered were a partially cored magnesium crankcase, and back plate.

What apparently happened is, when the Herkimer firm bought up the Bantam 19, this is all they really wanted, as the OK line of 29 size engines were selling very successfully. Any ideas of producing an additional 29 engine were shelved. Interestingly enough, Art DeKalb, in his report of the Bantam 29 in the March-June 1974 issue of the Model Engine Collectors Journal, mentioned that the performance of the Bantam 29 was comparable to all contemporary 29 size engines.

This month's engine, the Bantam Diesel, was another offshoot of the ignition version. No question about it, the success of Leon Shulman's Drone 29 spurred the idea of a diesel of the same size. This diesel is the only one this writer has come onto.

The plastic tank used on the ignition version was replaced by a metal tank after noting distortions from fuel used in the ignition Bantam engine.

However, production of either style engine was late with the market fully glutted with Torpedo, McCoy, O.K. and Delong engines. The old saying, "It takes money to make money," was never truer in the frantic 1946-50 era of new engines.

According to Gus Munich (an educated guess), the bore of .750 inch and stroke of .625 inch would give the required .29 cu. in. displacement at a bore to stroke ratio of 0.9. As mentioned before, the castings were magnesium with a machined aluminum cylinder and head, as was the bronze bushed connecting rod. The metal tank appears to have been taken from an O.K. 29 engine, while the needle valve is a standard Bantam 19.

Unfortunately, the engine from which the drawing has been produced was not available for measurements, as Carlson had sold the engine. However, Gus Munich gives an excellent writeup on how to make a creditable looking Bantam 29 engine. Information can be obtained by writing Gus at 24 Skipper Drive, West Islip, New York 11795.

50 YEARS AGO, I WAS. . .

Received a most interesting letter from Leon Shulman, 173 Essex Avenue, Metuchen, New Jersey 08840, regarding the name "Tambe" applied to his "Skyscraper" design, published in the November 1938 issue of *Model Airplane News*. Here's what Leon has to say:

"Through the years, I have seen pictures, read articles, and had numerous conversations with many people about the name 'Tambe' being tagged to one of my early designs of the mid to late '30s. The plane, dubbed the 'Tambe,' is actually the 'Skyscraper!'

"The sequence goes this way: I designed this airplane back in 1937 after reading Charles Hampson Grant's articles expounding the concept of having a model design with a low center of gravity and center of lateral area resulting in a deep-bellied fuselage model with a long tail moment, etc. Theoretically, this caused the model to have extremely good spiral stability, albeit looking slightly 'pregnant.'

"The original version of this model featured an elliptical wing with a modified McBride B-7 airfoil and was made of sheet balsa with no spars, and used a double-ellipse outline. The wing was silked with a minimum of dihedral, and then, upon being shrunk with water and dope, was suspended by the wing tips with weight on the center section. When dried it formed the elliptical dihedral that made this plane unique for its time.

"The original version was flown with a Trojan, later versions used a Husky, Baby-Cyclone, Gwinn-Aero, and finally a Brown Jr. 'B,' 'C,' and 'D' model.

"In addition to the deep fuselage and elliptical wing concept, this model used only one wheel. My reasoning was . . . one wheel is *half the weight* of two; *half the wind resistance* of two; and *half the price* of two! This single feature created a big stir at that time. Many other modelers fol-

lowed that lead, since I was winning many contests . . . and that is 'where it was at' . . . then.

"Frank Zaic contacted me in 1937 to include the plans for this model in his Annual Yearbook. I had named this airplane 'THE SKYSCRAPER,' since it really got up high with the limited engine run allowed. When I gave the pictures and sketches to Zaic, I asked him to publicize the club I belonged to. The club's name was "The Airplane Model Builders Exchange," in short: T.A.M.B.E. Upon publication by Zaic, the model's real name, 'Skyscraper,' was deleted and 'Tambe' was inserted alongside the title-block of the model design's identification, as a favor to me.

"Evidently the 'Single-Wheel' design configuration was the main feature of this model, especially since M.A.N. featured the 'single-wheel,' in their title also, when they published this model. As the contest rules changed, I used larger, more powerful engines to get the model as high as possible. During these years, rules were frequently changed to cut down on the allowed motor-run, so we used more power to climb faster in the allotted 'motor run time' portion of the flight.

"I went from a (sick) 19 to a Brown Jr. 60 in this quest for altitude. With the larger engines and props, the model picked up weight and although the one wheel design saved many broken props (we used to carve our own), I developed the 'break-away' mounts which pivoted by shearing a match-stick and saved the prop in most cases.

"Along the way, I made design changes to harness the increased power. The culmination of this design, Skyscraper (not T.A.M.B.E.) was the article that appeared in *Model Airplane News* in Nov. 1938. Frank Zaic's yearbooks stood the test of time as many 'old-timers' saw these ZAIC plans and the name TAMBE stuck with the design.

"Shortly thereafter, the T.A.M.B.E. Club 'fell apart' because of personality clashes with the 'Senior Advisor.' We were all teenagers and at that period we had a Senior Advisor who helped the club in its organization and function. Also, he allowed us the use of his basement to hold club meetings.

"When the club 'fell apart,' the real active members got together and formed a new club. We had a contest among the members to come up with a club name. Obviously, with such a 'maverick' group, many names were tossed about. The winning name, which earned me the grand prize: a spark plug, was 'Skyscrapers.' My reasoning for using *this* name was because our club was very active, and from the New York City area, known for its skyscrapers. I believed the name to be symbolic . . . and the club adopted it unanimously! To this day, the 'Skyscraper' club logo is in use, and although the membership has turned over dozens of times, the club is still active in free-flight, and remains one of the pioneer Free-Flight Clubs in the country. I am proud to have been part of its foundation and development.

"I hope this information sets the record straight on the model erroneously called 'Tambe!' "

Columnist note: To show the name sticks, I just received Photo No. 7 showing a model called the "Tambe," O&R powered, built by Al Richardson. This model was flown at the SCAMPS Annual O/T F/F meet at Taft.

We were fortunate to have kept a photo of Leon Shulman receiving his Hall of Fame award. Photo No. 8 shows Leon with his most successful design, the Zomby, made in all sizes, with good results.

LANZO R/C STICK REVISION

While at the NFFS/SAM Champs at Lawrenceville, I ran unto Bucky Walters of SAM 41, who was flying an enclosed radio version of Lanzo's old radio control stick model.

As can be seen in Photo No. 9, Bucky is holding the Lanzo Stick with all the plywood covering over the old wire cage cabane struts. Bucky decorated the front, which has been neatly rounded, with windows. The plywood wing support is so unlovely that this reporter and several other onlookers suggested that halfmoons be painted in place of the windows. Haw!

SAM 100

Paul Vignone, Jr., R.D. #4, Box 86A, Spook Lane, Mt. Penn, Reading, Pennsylvania 19606, sends in Photo No. 10 showing his Spook 48 with the signpost "Spook Lane" in the background. As Paul says, "What else would an old time modeler build who lives on Spook Lane, other than

a Spook 48?"

Paul says the last SAM 100 contest was a real doozy for competition. He placed fifth in 1/2A Texaco and felt he earned it!

READERS WRITE

This is probably the most popular portion of this column as numerous modelers send in their handiwork. In many cases, it is a picture of a fairly rare model, as most sport modelers do not build competition types.

Such is the case of Photo No. 11, showing a Paul Plecan design, called the Falcon, as built by Gerald Martin. The model is powered by an Atwood 49 on ignition and flies great. As usual, with one wheel landing gears, Gerald finds it hard to keep the model from cartwheeling on landing or takeoff.

The model will please a lot of old timer "purists" as it is completely silked, with red dope finish. Nice to see something different!

THE DISTAFF SIDE

While yakking on the field recently at an NCFFC meet, Jerry Rocha of Napa, California, approached this writer with quite some enthusiasm and displayed numerous photos.

This columnist selected Photo No. 12, showing Mrs. Jerry Rocha with a 1/2A F/F Texaco Powerhouse that won in the SCAMP Annual O/T Contest at Taft. What better photo could we ask for than to have the designer, Sal Taibi, appear with the winner!

AUSTRALIA ECHO

Albert Fisher, P.O. Box 316, Guilford, N.S.W. 2161, Australia, is responsible for Photo No. 13, showing a Wigdor "Wasp," as published in the British Aeromodeller magazine. The model is powered by one of the many Burford diesel designs.

C.E. Bowden, the British gas engine model pioneer, was responsible for many of the British designs which were copied extensively. This "Wasp" shows the Bowden influence.

LOUISIANA

Bob Gourdon, 1625 Alexander St., Arabi, Louisiana 70032, sends in Photo No. 14, showing a gorgeous color photo of his Megow Super Quaker, a successful gas design by Matt Kania.

Bob sent in two photos, one of the "bare bones" construction that we did not use, in favor of the completed model photo. Special notice should be taken of the extra wing and tail ribs. Makes for beautiful construction!

SAM 41

It is always a pleasure to receive mail from Jim Alaback, newsletter editor of the SAM 41 "Aero News," because of the excellent photos he takes.

Photo No. 15 is no exception, showing Bob Jones' vintage rubber model "Fairy Facula," a 54-inch wingspan design by S.R. Crown in 1938 Aeromodeller magazine.

The model is flawless, being covered with silk on the fuselage, while the flying surfaces are Japanese tissue paper covering. According to Jim, the model flies quite well.

THE WRAP-UP

In a SAM 7 "Yankee Flyer" newsletter, Nick Notte expressed a "Viewpoint" which this writer regards very highly as it is happening to all of the old timers. Here is what Nick had to say:

"Approaching my 60th birthday, this marks my 50th year of building and flying model airplanes. This reminds me of how it all started.

"At 9-1/2 years old, my parents bought me an accordion and started me on music lessons at the same time my interest in model building began. I remember how many times I was pulled by the ear from my building board to practice my music. I spent 42 years as a weekend musician, retiring from it five years ago, after many years of night clubs, bars, private parties, etc.

"I remember seeing the first biplane fly over our house. This was followed by WWII with autogiros, and P-47s practicing over our area in western Connecticut. I'm still overwhelmed at being able to fly from Hartford to Florida in 2-1/2 hours. Our age group has seen it all.

"My dad bought me my first 10 cent Megow model. I remember laying out the plans and building the top and bottom from the top view of the plans. It took some time at 10 years old to figure out that it wasn't the way a fuselage was built.

"We went from rubber powered models to gas engine powered Playboys and Super Quakers to Victor Stanzel's monoline control that whirled us around until we were dizzy. Next came Jim Walker's "U" Control. I believe "U" Control brought modeling to every corner of the globe with its ability to allow you to fly models in the empty lot across the street.

"We experienced the marvel of radio control as it became available to everyone. The ability to control the model through its entire flight is what we all wished for. However, radio took modeling out of the hands of the young people. The cost, in early years, put it in the hands of doctors, lawyers, and businessmen. Today, most young people can afford radio, even if it is just a starter model.

"All this leads me to my pet peeve. I still curse the day plastic 'Snap Together' models came on the market. This great segment of modeling took youth by storm

with its excellent scale detail and up-to-date technology. The 'hurry and complete it,' the 'no thinking, just follow the numbers' syndrome of the times, put many real hobby shops out of business. More important than shops going under was the effect it had on the young kid who didn't get exposed to the real building of a model. In our day, we got many benefits from stick and paper building that were lost by the plastic era. We learned blueprint reading, design, aerodynamics, manual skills, methods of construction, electricity and electronics, and many more. The most important benefit was the development of patience. The model airplane hobby has directly influenced the greatest economic industry in this country.

"I believe that 1/16 inch balsa, Japanese tissue, and a tube of Testors glue, should have a special monument for their role in aviation history. That's my viewpoint. Nick Notte."

What better way to close out a column? This writer sez "Amen" to the above. •

Tech. Stuff . . *Continued from page 35*

seat of my pants, but when I have questions, Denny's program is going to answer many of them and give me a second opinion on many more. This R/C computer-aided-design program is the toy I've received this year. The latest revision even includes the use of Wing Cube Loading and RPF, so it must be good!

A.C.E.

For those of you who have computers, I also recommend a subscription to A.C.E. News, for "Aviation and Computer Enthusiasts." It was from the pages of A.C.E. that I first learned of Denis Mrozinski R/C Model Design Program. A.C.E. News covers computer programs of all kinds, for both full/scale and model airplanes, and is published by pilot and modeler computer buffs. It has both news and ads for other neat aero computer programs, from airfoil plotting to R/C flight simulation. A.C.E. also publishes info on do-it-yourself programming and offers low-cost disks. They just celebrated their fourth anniversary. Dues are $10.00 per year. Write to: Aviation and Computer Enthusiasts, 2009 Camelot Drive, Las Cruces, New Mexico 88005.

USE LONG SERVO ARMS

This bit of good advice is well known and appreciated by most experienced modelers, but it seldom gets into print. Both the molded plastic horns we attach to our control surfaces, and the plastic arms, or disks, we put on our servos, have rows of holes in them. We adjust the amount of travel we want on each control surface by moving one push rod end attachment to a different hole on either the horn or the servo arm.

To get more elevator throw, for instance, we can move the servo end of the rod to a hole farther out (at a greater radius from the servo shaft), or move the elevator end of the rod to a hole on the elevator horn which is closer to the elevator hinge (see Figure 1). Either way, we gained more elevator throw, but the result is *not* the same! The difference is the effect of the backlash in the system and the amount of deflection we get in the rod, the servo mount, and the structure.

Remember what you learned about levers in high school physics? The short end of a lever will exert a greater force, but move a shorter distance than the long end. If we attach our push rods to the inner holes of the servo arms, the movement of the push rods will be small, and the forces on them will be great.

So what? So this: Let's assume the backlash of the pin in the hole of the servo arm and the backlash of the clevis pin in the control horn are each .01 inches, or .02 total backlash for the pair. If the total travel of the push rod is 3/4 inch, the loss due to backlash is 1.3%. If we move in on the servo arm so the travel is only 3/8 inch, however, the same backlash now causes 2.7% loss, twice as much.

And so this: Under flight loads the rod bends slightly, the control surface hinges deflect slightly, and the servo shifts position slightly in its rubber mounting grommets. If the total rod travel is reduced fifty percent by using an inner servo arm hole, the forces will double and all of these "slight" deflections will double and start to become significant losses. These, combined with the losses due to backlash, and due to friction in the system, can seriously degrade the quality of our control. The control surface will then have a larger dead band, and the aerodynamic forces will

cause the surface to assume a different angle at high speeds than it does at low speed.

And so this: There is usually some difference in expansion between the airplane structure and the push rods due to temperature changes and to humidity changes. This differential expansion may be minor or serious, depending on the materials used, but it always causes some shift in the trim settings of the aircraft. If we double the amount of push rod travel we halve the negative effects of the differential expansion.

Therefore, to maximize the accuracy of our radio control and stabilize the trim settings, we should use the longest servo arms we have room for, and use control surface horns that are long enough to limit the throws as desired. Sure, you can buy small horns and may get small arms with your servos, but these are for small planes or tight places; don't unnecessarily degrade a model's flight with them. I'm most used to Futaba servos. They come with servo arms of three different lengths. Use the outer hole in the largest one when you can. R/C manufacturers could protect us from our poor judgment by providing *only* the outer hole in servo arms.

I recently had an elevator control that was too flexible to suit me. I couldn't beef it up without major surgery on the model, so I put an extension on the elevator servo arm. The push rod travel is now twice as much as normal. It did the job. The stiffness of the control is now quite adequate.

In connection with deflection of a servo in its mounting grommets, always mount a servo so it is aligned with the push rod it is to drive. If the servo is at right angles to the push rod, it will rock on its grommets much worse, due to the close lateral spacing of the grommets, introducing more error in the control (see Figure 2).

CORRESPONDENCE

One of the pleasures of writing this column is the mail I get from it, and one of the burdens is finding the time to answer that mail. Most of you have been getting reasonably prompt replies, especially when you included a SASE. I am also using some of your contributions in the column, but the many month's flow time before publication makes it an exercise in patience for the contributors.

Due to the nature of the column, I can't print descriptions and photos of your models, unless they are special models with unusual aerodynamic or structural design, or they use unique materials. Your commentary on what I have been writing is always welcome, and especially your corrections. As you have seen, I screw up sometimes. That is tolerable only if it is later corrected. I do not want to leave you with misinformation.

Several readers have suggested research for me to do and report on, such as, "Build a wind tunnel and get some data for us." Those correspondents have it backward. I already have a list of projects I want to do that will take more than my lifetime, and it isn't likely that their suggestions will change my list much. The better approach is for some of you to let me report on your technical work. That way we get more than one person's efforts into the column.

MD&TS has been largely textbook in nature to this point, but I'm beginning to run low on basics to cover. Therefore, I welcome your suggestions of topics, either in areas where you need some semi-technical information, or where you can supply some that you think would be of interest and value to other modelers.

Naturally, most of you live in the U.S. or Canada, but I once received a phone call from a reader in Brazil. That distance record stood until a letter came from Bangkok, Thailand. This modeler, who declined to be identified in print, bought the February issue of *MB* in Hong Kong, and paid over eight dollars for it.

TAPERED FOAM-CUTTING WIRE

Mr. Thailand's purpose in writing was to further convince me that there is nothing new under the sun. He made a tapered wire for cutting tapered foam cores in the 1960s, so I didn't invent that either. Sob!

He tapered the cutting wire by chemically etching it. Chem etching is extensively used in the aerospace industry for tapering wing skins, spars, etc. In Bangkok's setup, a clock mechanism withdraws the wire slowly from the etching tank, so the lower end of the wire is in the etchant longer than the top, and is therefore etched smaller. A weight on the wire keeps it straight. He doesn't remember what etchant was used, so that would take some experimenting.

Chem etching is an excellent method for making a lot of tapered wires for sale, or for turning out a great many foam core models. However, setting up the equipment and developing the process would take time. For a few wires it would be faster to taper them manually with abrasive paper, as I described in the February issue.

OUR NOISE PROBLEM

Yesterday I flew in the Annual Evergreen Radio Modelers' Float Plane Fun Fly at Lake Goodwin, near Seattle. It is not a function of this column to report on contests and other events, *but;* it was fun, about 35 seaplanes were there, the weather was good, and neither I, nor your Electric Power columnist, Mitch Poling, did well.

I took my thirty dollar Radio Shack sound meter to the Fun Fly and recorded a little noise data. Several observations: Most .40-and-up engines with stock mufflers are exceeding the frequently-published AMA goal of 90 dBA or less at nine feet. I measured three planes with over 100 dBA at nine feet. That is well into horrible when one considers that a hundred dB is *ten times* as much sound as ninety dB! The decibel scale is a log scale (non linear), and we are not talking about a log on the beach at Lake Goodwin.

The loudest plane I measured (105 dBA at 9 ft.) was a pusher flying boat with a standard-muffled two-stroke .90 in it. The ninety was noisy alone, but, in this case, the largest part of the total sound was the prop, *because* it was a pusher. Almost all pusher airplanes generate a lot more prop noise than do tractors with the same power and propeller. (Tractor propellers *pull* airplanes, not plows.) The propeller blades interrupt the air flow coming off the airframe ahead of the prop, much as a siren rotor interrupts the air flow through the slots of the stator of the siren.

To compound the problem, the prop has two blades, so we get a sound pulse twice per revolution, while we hear an exhaust bark only once per revolution. This doubles the frequency of the sound we would hear from the engine alone. Unfortunately, human ears are more sensitive to the higher frequencies (within reason), and people who complain about noise, complain most about noise in the higher frequencies.

It is sometimes recommended that we use three-bladed props to reduce prop noise, since the three-blader will have less diameter and therefore a lower tip Mach No. at the same rpm. That helps *if* we are talking about a tractor airplane. In the case of a pusher, a three-blade is worse than a two-blade prop. Because of the siren effect with pushers, a three-bladed prop will put out *triple* the frequency of the engine sound.

A pusher with a pronounced siren effect sounds nice . . . to airplane lovers, but not to little old ladies. If you build pushers, you should minimize the prop siren effect by putting the face of the prop more than an inch behind the fuselage end or well behind the wing or stab trailing edge. Also; if

a fuselage end is the problem, round it well; don't build it with a sharp trailing edge. OK, you've been warned. Think of me when the contest director, or the field manager, says you can't fly your pusher.

Pusher prop noise isn't idle theory; here is some data. I chucked an 11-6 prop in my drill press and spun it at 3620 rpm, which is as high as the drill press will go. At nine feet, the prop noise (subtracting the drill press noise) was 70 dBA. When I clamped a sharp, "trailing edge" one quarter inch ahead of the prop leading edge, the sound level was 84 dBA, or about twelve and a half times as much noise! With the sharp edge moved forward to a half inch from the prop, the sound dropped to 78 dBA, at one inch it was 74, and at two inches it was 73 dBA. Increasing the distance between prop and surface helped tremendously, but note that at two inches the sound level was still twice what it would have been for a tractor.

When I tested rounded edges next to the prop in the drill press, the *measured* sound levels were about the same as for sharp edges, but the apparent sound to my ear was very much greater with the sharp edges. I'm sure this is due to the fact that a sharp edge produces a sharp sound, one rich in higher-frequency harmonics. Remember, the ear is more sensitive to these higher frequencies.

One of the reasons many modelers prefer 4-stroke engines is that they seem quieter. I say *seem* quieter, because, on the average, the four strokers register as high on a dB meter as two-stroke engines of equal displacement. The reason the four-stroke engines seem quieter is again the difference in sensitivity of our ears to different frequencies. Since a single-cylinder four-stroke barks once only every other revolution, the frequency of its exhaust sound is only half that of a two-stroke at the same rpm, and our ears don't object nearly as much.

Also, most of the four-stroke engines are flying with little or no muffler. If we would muffle them as well as we do the two-stroke engines, we would have less real sound as well as less apparent sound.

The "Snuffler Muffler," which compounds with stock mufflers of various sizes, does reduce the sound very well. I am using one. It is recommended that you read and study the very good article, "Sound Advice," by David Abbe, in the June RCM. I checked out the rumor that one can buy a muffler identical to the Snuffler under the name "Arnold Small Engine Muffler," and also buy a clone from Taiwan, in "Coast To Coast" hardware stores for about two dollars. It is true, but you would have to do a little rework on it and add a few minor parts to complete the adapter kit that J'Tec sells as the *Snuffler* for model use.

Most original-equipment model mufflers have a single chamber; and their sound suppression leaves much to be desired. In addition to the Snuffler, at least two other model mufflers have multiple chambers, the Soundmaster, distributed by Davis Diesel Development, and the PST-PC from Hobby Lobby. I haven't tried these two yet, but they are both reported to be very effective. So is the simple and cheap expedient of hanging on an after muffler (made of a model plastic fuel tank, for instance). You can direct-couple the after muffler or connect it with a piece of hose.

SEATRACT

Fourteen years ago, I designed and built "Seatract," a floatplane with retracting twin floats. A photo of it was shown in this column in May, since we were talking about seaplane configurations. Reader Bud Overn wrote to point out that the famous, but imaginary, Bill Barnes had both retracting twin-float and retracting single-float seaplanes in his fabulous stable of unique airplanes. *(And how about that dashing, debonair Kerry Keen from Flying Aces! wcn)* The Blackburn B.20 flying boat had a retracting hull, as did one or two other full-scale flying boats. I am not aware of any for-real floatplanes with retracting *twin* floats, other than Seatract.

I have never published plans for Seatract, since I don't consider it to be a practical model, but Bud, and I think one or two others asked for info on it, so here is a summary. It is sixty powered, has a six-foot span, and weighs eleven pounds dry. It's wing cube loading (WCL) figures out to be 12.0, a bit high for a sport airplane. The retracting mechanism for those big floats is big and heavy. Also, the floats fit halfway up into the wing, which meant that the very-thin wing spar at the root had to be extra heavy as well. Its displacement loading is 22.5 (with it's old non-Schnuerle engine), so it is underpowered. It needed a Schnuerle .90, but they weren't available when Seatract was built.

Big servos also weren't available in those days. I made two jackscrew type actuators for the job, which fit in the wing roots. No, they didn't fit in the fuselage. *Nothing* fits in the fuselage, since it consists of little more than a web when the floats are down. When the floats are retracted, their round tops form the sides of a slightly wide fuselage. I had to make a special triangular-shape fuel tank that would tuck into the space between the bows of the floats. There was also no fuselage room for radio gear. That all went into a full-length dorsal fin on top of the fuselage.

The configuration doesn't have any future for full scale floatplanes. It would be heavy, very expensive, hard to maintain, and quite shy of passenger and cargo space. Also, when stowed, the float bows must be behind the prop. To get the bows far enough ahead of the CG I had to use an unusually long nose moment arm. All those negatives can't be balanced out by a few more MPH top speed, but it was an interesting and challenging model development. Seatract won first in Seaplanes at the 1975 RAMS N/W R/C Model Show. Now it hangs from my shop ceiling with some other hangar queens.

"A *mistake* proves that someone stopped talking long enough to do something." Francis Reynolds, 3060 W. Lake Sammamish Pkw'y N., Redmond, Washington 98052. SASE please. (206) 885-2647.

IN MEMORIAL

Lifelong modeler, Ralph Brooke, died in

June at age 59 of complications from diabetes. Ralph and I were in the University Gas Model Club/Seattle Guideliners in the 1940s. Ralph was generous, innovative and competitive in everything he did. Dr. Brooke was a leader and a winner in dentistry, in antique car restoring and showing, and in aircraft modeling. Among his many wins were two world championships in R/C Pattern in the early 1960s. So long, friend. •

Porterfield . . *Continued from page 51*

than the prototype, and the fuselage structure has been simplified in several places. None of these changes detract from the appearance of what is a tremendously appealing model. In fact, the Porterfield is what you might call a "sleeper"; the kit was introduced ten years ago and has somehow become one of those good deals that a lot of us managed to overlook.

In fairness to those of you who may build the Astro Porterfield, I will mention several aspects of the design that I chose to modify. Adding individual refinements to a scale kit is practically obligatory and I'll offer my thoughts on those changes in that light. In discussing these points with Astro Flight, I found them to be receptive to my suggestions and discovered that they had indeed already been considering some revisions to the kit. I'll elaborate as we discuss construction and flight performance.

Construction of the Porterfield is traditional "stick and stringer." Aside from being the best way to replicate the tube and fabric structure of the full scale aircraft, this approach is also a good way to keep airframe weight, always a concern in electric flight, under control. For this reason, the Porterfield is not a project that I could honestly recommend for the first-time builder. For the modeler with some familiarity with built up structures, the kit will pose no problems. In flight, while the Porterfield is undemanding and indeed rather docile, the complexity inherent in its being a scale airplane and the consequent "emotional loading" make it a better choice for an accomplished flyer than for a beginner. With this said, I'll add enthusiastically that I see it as an ideal first scale project. This kit has another big "plus" to offer. Earlier I mentioned the distinction between small and "big" motor systems. I am aware of very few kits on the market for "big" electric; although there are a number of "gas" kits around that accept modification for electric quite well, the Astro Porterfield is the only one I can immediately bring to mind that is designed expressly for large electric systems.

Actual construction is neither difficult nor complicated, although it will be necessary to devote some time to study of the plans to be certain you understand the sequence in which things go together before beginning work. The instructions consist of a photo sequence with captions and a narrative sufficient for an experienced builder to follow. A more detailed set of instructions would be helpful for low time builders. It happens that this is one of the concerns I discussed with Astro Flight; they have informed me that new, more detailed instructions are now going into several of their other kits and that revisions are being considered for the Porterfield.

Material selection and quality control of the wood put into the kit you get is excellent, as has been the case with every other Astro Flight kit I have seen. I began actual construction with the tail surfaces, using my old standby, Hot Stuff Super-T and Special-T adhesives and Kick-It accelerator throughout.

The tail surfaces are flat, built up of 1/4-inch square and 1/4 x 1/2 inch balsa. The curved portions of the surface outlines are trimmed to correct outline inside and out. This takes a little extra effort, but is well worth it. Laminated outlines for the tail are an alternative that experienced builders might want to consider. I will suggest that you consider widening the 1/4 thick filler at the horizontal stab center to provide a positive anchor for the covering, unless you plan to use plastic film and cover the tail surfaces before assembly. As I am not comfortable with this approach, I added an extra 1/4 inch square member on either side of the center section.

The wing construction is begun by laying down the lower leading edge sheet, the center section and trailing edge sheet, and the lower cap-strips in place, adding the lower spar and then the ribs and building the wing in place over that portion of the structure. With the exception of the wing strut fittings, on which I will elaborate later, I built the wing exactly per the plan. As mentioned earlier, the airfoil chosen for this design is somewhat thinner than scale, and there is no provision for ailerons. To save you the suspense of waiting, I'll say right now that it flies fine this way. I did depart from the notes presented on the plans by substituting a covering of 3/4 ounce fiberglass cloth over the entire center section for the fiberglass tape shown. Applied properly with polyester, Hot Stuff or an appropriate epoxy resin, this results in a negligible weight gain with a significant increase in strength.

The fuselage is built in what I still like to call the traditional manner of laying down two identical side frames of 1/4-inch square balsa and then joining them with cross pieces and formers. In the case of the Porterfield, there are no formers other than the firewall and instrument panel. In the interest of weight saving, all the remaining basic structure is 1/4-inch square balsa. Before you begin to worry that the airplane might lack structural strength, remember: this is an electric. There is NO engine vibration. It works just fine as designed; don't change it.

There are a couple of minor problems inherent in the fuselage structure as it is presented. Starting at the tail, where I indicated already that a little material might be added to the center section of the stab, you might choose to close up the structure at the base of the vertical fin, as there isn't a lot of detail on the plan, or a lot of material on the airplane to which to attach covering.

It seems to me that this area has been left to the discretion of the builder. I added a small dorsal fairing, indicated on the plan as an option, and made a modified faired fabric fillet with the covering, replicating full scale practice. You can see this in the photos of the completed model. No side window frames are provided in the kit; it appears that the builder is expected to install the clear plastic window material provided over the entire window area and then relieve the covering to effect window outlines. While this would result in an airworthy model, I wasn't comfortable with it and added window frames cut from 1/32 ply and recessed into the 1/4 square uprights and stringers. For a small amount of extra work I feel that I added significantly to the appearance of the model. The "instrument panel" former may get you into trouble if you aren't forewarned. The former in my kit should have been relieved by 1/16 inch on the lower edges to allow the 1/16 inch top cowl sheet to fair properly into the surrounding structure. Check the part in your kit; if it's oversize you can correct it readily. No provision for cowl attachment is mentioned on the plan; again, I feel that this option has been left to the discretion of the builder. Check the photos for a look at the 1/32 ply flange I devised to provide a very scale-like hold-down on my airplane.

I did depart from the plans in three other areas. For very little added work I have increased the appeal of my airplane markedly, and I'll outline what I did for your consideration. You can see by checking the drawings provided with the kit that there is a triangular area just behind the firewall of the full scale airplane that is recessed to provide a cooling air exit. This is so noticeable, especially on the scale documentation photos I have, that I felt it needed to be represented, so I made simple cutouts in the edges of the firewall and added curved insets to the side sheet on the nose. It looks great! The landing gear as shown on the plan is attached to the outside of the belly on the 1/16 ply fuselage/cabin area floor. This works quite well (I have seen it used on other Astro Porterfields built exactly per the kit) but I wanted a little more scale fidelity so I moved the brass tubes into which the landing gear struts fit inside the fuselage. I split the tubes at the center to allow the use of ordinary wheel collars to hold the struts in place, but found in practice that incorporating a slight convergence between the main and rear strut provides enough tension to hold the gear assemblies in place. The third departure concerns the wing struts. The plans show them attached using soft steel plates on the strut ends and wood screws that thread into ply plates in the wing and into the ply cabin floor. This looked to me like the source of a lot of trouble if the struts were to be put on for flying, as it would be necessary to remove them, along with many screws, to take off the wing. I made small strut brackets from thin fiberglass sheet recovered from discarded circuit board material (light aluminum, brass or nylon, would work as well) and inset them into the ply mounting plates already in the wing, and into suitable points above the bottom longeron; then added 2-56 clevises on the strut ends. I now have quick-detach struts that are fully functional.

Covering and finish on my Porterfield were in keeping with my well established practices. As with the wing center section, I added very light fiberglass cloth to the entire nose with polyester resin. My covering is Sig Koverall (dacron polyester cloth) attached with Sig Stix-It iron-on adhesive. This provides a covering far tougher than any film available and one which adds tremendously to the strength of the airframe when properly shrunk. I sealed and surfaced the Koverall with several coats of nitrate clear dope and finished with a lightly sprayed color coat of K&B Superpoxy. This gave me a convincing scale finish and super durability within acceptable weight limits.

A word about scale documentation is in order. As you may know, AMA rules for the various classes of R/C scale competition require photos of the full scale aircraft represented by the model to prove accuracy of outline and finish. One of the best sources of photos for this purpose is Scale Model Research of Costa Mesa, CA. I used their Foto Paak No. 178/40 to complete my Astro Porterfield as a sport scale version of Porterfield Collegiate NC2729l. While not intended to produce a Masters-Class scale model, the Astro Flight kit supplemented and documented in this

way can serve as the basis of a very rewarding sport scale project.

THE POWER SYSTEM

The heart of this project is the Astro Cobalt 25 geared electric motor system. Based on what I have experienced personally in the time that I have been involved in electric flight, I feel confident in saying that the Astro Cobalt motors are in a class by themselves. The "big" motors (they make a 15, 25, 40, and 60) open up a whole new range of possibilities for exciting projects compared to the smaller motors most of us started with. I won't repeat all the technical details; you can read them in Astro Flight's well written ad elsewhere in this magazine. What I will do is tell you what the "25" system consists of and what it can do. The motor is furnished with the Astro Flight gearbox in place, eliminating the need for assembly and adjustment. The gearbox is the most rugged I have seen in an electric flight system; there is no plastic at all in it. The main housing is attractively anodized machined aluminum alloy. The output shaft is hardened 1/4 inch steel; looking at one sticking out the front of a closed cowl, you wouldn't know it wasn't attached to the business end of a glow engine. The motor is matched to a 14-cell pack made up of the Sanyo "red" 5CR 1200 mAh cells, which are noteworthy in that they accept fast charging very well and have a remarkably flat discharge curve. All necessary connectors and an on-off toggle switch are included in the wiring harness provided with the system. I opted to add the Astro Model 200 speed control. This unit plugs into the receiver in place of a throttle servo and provides fully proportional speed control. The Model 200 is rated for loads of up to 120 amps and is intended for use with motors as large as the Astro Cobalt 40. The unit is remarkably linear in response and in bench testing with several different props, using an analog tachometer (my reliable Ace Tachmaster) produced no significant drop in RPM compared to the levels achieved running with the motor connected directly to the battery. There may well have been a performance drop on the order of a few percent, but my tach didn't show it. The Model 200 speed control is intended to be mounted flat (I used Velcro to attach mine) and with a moderate supply of cooling air coming directly through inlet holes in the firewall, mine has showed no tendency to overheat.

The Cobalt 25 with the Astro Flight gearbox is rated at 5800 RPM on a 13-7 prop; I tached exactly that on a carefully reworked (thinned and undercambered) Zinger 13-6/10. To those of you unfamiliar with electric, this may seem like a low figure. Believe me, on an airplane of the size the 25 is intended to fly, a big 13 inch prop turning at that speed moves a whole lot of air. I strongly suspect that such a combination is actually more efficient than a 25-size glow engine turning a small prop at over twice the speed.

This whole assemblage is kept ready to go by the new Astro Model 112 DC/DC Super Charger. I've promised Astro Flight to provide a separate short article on the new charger, so I'll mention here only that it is just the ticket for those larger systems such as the 25 that use more than seven cells. The Model 112 has a constant current feature that eliminates the need to monitor and adjust for optimum current flow as the charge cycle progresses.

THE AIRTRONICS VANGUARD PM

This radio just plain makes me feel good. The FM Vanguard is the first system I have seen that I can unreservedly recommend to the newcomer to R/C flying. There is no shortage of inexpensive radios on the market, most all of which work quite well. There are some expensive radios around which are described as "state of the art" and which offer a real margin of safety from the many forms of interference with which we are plagued. The new Vanguard FM appears to combine the desirable features of low cost and excellent immunity to interference in one package! Specifically, the system I have, the Vanguard FM 4-channel, offers exactly what the beginning flyer, or for that matter, the accomplished modeler who wants an "extra" radio, needs. The transmitter exceeds the AMA's 1991 guidelines. The 92765 FM receiver is one of the very few now actually on the market acknowledged to exceed those same standards. This Super Narrow Band dual conversion FM receiver, which just happens to be compatible with my earlier model Airtronics FM transmitters, makes up a system that Airtronics describes as "the first complete R/C system at a 'down-to-earth' price that meets or exceeds all the AMA specifications and guidelines for operation in 1991 and beyond." The very competitive pricing makes this degree of selectivity, and the obvious confidence that it inspires, available to the newcomer or established modeler building and flying on a limited budget. I can personally attest to the feeling of quality and safety that comes with the system; though perhaps somewhat qualitative, one of my flying experiences makes the point. While the Porterfield was being built, I was test flying the FM Vanguard in my Astro Viking. One of the local flying areas was being plagued with a "mystery glitch" which was shooting down airplanes regularly. On the particular afternoon in question, two models had already gone down for what gave all indications of being interference-caused reasons. Wishing to make a point, I flew the FM Vanguard-equipped Viking back and forth through the area known to be "glitch alley" with no evidence whatever of any trouble. Though this hardly constituted a conclusive test, I mention it because it illustrates the degree of confidence I have in this radio.

My particular transmitter doesn't show the red FM logo on the case, as it is a pre-production factory prototype built into an earlier AM case (I couldn't wait to get my hands on one!) I requested my system equipped with the very small 94401 micro servos you see in the photos; these are appropriate for all but the very tiniest of models, but with 33 ounce-inches of output torque, are more than capable of handling a mid-size airplane like the Porterfield. The FM Vanguard is normally supplied with 50 ounce-inch output 94102 servos, which are suitable for "40" to "60" size and larger models. The battery pack supplied is of the usual 500 mAh size which is what I have installed in the Porterfield; I also have several of Airtronics' 250 mAH packs for use in smaller models.

The FM Vanguard transmitter is equipped with a "buddy box" (dual control) connection and switch and with servo reversing switches on all channels. No dual rate or other options are included. I agree with the philosophy Airtronics appears to be following here. The extras aren't necessary in most cases for simple sport flying and may actually contribute to confusion

for a beginner by providing him with unnecessary extra variables to worry about. The 6-channel model does include dual rate functions on elevator and aileron. The point I want to emphasize is that the FM Vanguard (and the companion model PCM Vanguard) is an outstanding value that meets a real need. No longer need the beginner or sport flyer on a limited budget feel that he must settle for second best in terms of safety from interference. The FM Vanguard does it all.

FLIGHT REPORT

As you may have guessed by now, the Astro Porterfield flies very nicely! I feel that it has great potential as a sport scale model, and intend entering mine in local competition. Here are some specifics. My airplane came out of the shop weighing about 5-3/4 lbs. Although the plans list a finished weight of from 4 to 5 lbs., I think the lower figure is somewhat optimistic; you might meet it by using a light film covering and opting for the Astro 15 with its attendant smaller flight battery, rather than the 25. The greater weight, however, is just not a problem. The wing loading on my airplane worked out to a little under 20 ounces per square foot, which is just fine for a sport scale model in this size range. In terms of scale performance, the model as I have finished it is in fact a little overpowered. My Porterfield will maintain level cruising flight at less than half throttle, takes off from grass in under fifty feet, and loops cleanly from level flight. This far exceeds scale performance. When full scale airplanes in this class are flown aerobatically, they must be dived gently from level flight to build up extra speed in order to be able to complete a loop. The extra power is nice to have, though, since we can't always fly off scale grass into scale wind!

I have had the best performance so far using a reworked (thinned and undercambered) Zinger 13/6-10. I don't recommend using these props as they come off the shelf. I'd start with a 13-7 or 12-8 wide blade prop such as a Rev-UP or Super M and experiment from there. Using the 1200 mAh 5CR battery pack supplied with the Astro Cobalt 25 motor system, I am getting six to seven minute flights which include some aerobatics and a touch-and-go or two interspersed with level cruising flight at under half throttle. As I fine-tune the airplane and get more comfortable with it, I suspect that these times will increase somewhat.

By the time you read this, my Porterfield will be flying as the "test bed" for another custom modification. Full scale Porterfield Collegiates were flown on floats, and I see no reason why this one shouldn't as well. I added float strut mounting points when building the airplane, and put the switches and charging connections inside the cabin (now you know why I did that) in hopes that a float conversion would work out. The Astro Cobalt 25 geared system provides more than enough power to do the job. As soon as I get the secret project in my "skunk works" off the building board, I'll get the floats finished and if they work as well as I expect, I'll see that you get a flight report! •

Control ... *Continued from page 65*

. . . and they are relatively quiet, even unmuffled.

The subject of diesel engines came up in this column some months ago, and the author revealed to the world then that his experience with diesels was limited and not entirely successful. The appeal went out to fliers with better knowledge to contribute to the edification of the rest of us.

Quick to respond was one Ian L. McQueen of Tokyo, Japan, who offered to translate an article he had previously written in Japanese. It's a happy thing for those of us curious about diesel engines that Ian undertook that arduous task, because what follows should answer just about every question about the care and feeding of this peculiar beast that could be imagined.

Ian's commentary needs little embellishment; therefore, without further ado, we turn the narrative over to Ian L. McQueen:

MASTERING THE DIESEL MYSTERY

When I saw John Thompson's plaintive words about his problems in starting and adjusting a PAW diesel engine that he had been given, I wrote and asked if he would like an article on starting and adjusting diesels. He wrote back "yes," requesting a concise article. Maybe he is regretting his acceptance, for this has turned out anything but short, but it is very complete and, I hope, interesting. How many words have been expended over the years on running glow engines? Diesels deserve at least one full article.

I have been running diesels for several years, and import PAW engines and Davis Diesel conversion heads into Japan. I don't claim to know everything about diesels, but I have probably had most of the problems (i.e., made most of the mistakes!) that any user might experience, so I can pass on much useful advice.

By now John may have passed on Nathan Sturman's information on his experience with diesels on stunt models, so you have some idea about how great they are. He found that they give substantially more usable power than a glow engine of the same size, they run three to five times as long as a glow engine on the same amount of fuel (giving LOTS of practice in one flight!), and they are very quiet. (With a PAW 149, the wind in the wires was louder than the engine!) They are much more flexible in operation.

What do I mean by "flexible?" I mean that you can hang the optimum size of propeller on your engine without worrying about overheating or lugging it. "Optimum" on typical stunt models usually means a larger, more efficient propeller than is usually used on glow engines, a prop that gives higher thrust at moderate rpm. "Larger" is a prop one to two inches longer and coarser in pitch than what is normally used on a glow engine (The optimum prop for any model must, of course, be found by actual testing). As examples, Nathan has been getting the best results for CL stunt with an 8x5 on a PAW 149 (.09); an 8.5x6 on a PAW 249 (.15); a 9x6 on a PAW 19; a 10x6 on an O.S. 25FP with a Davis head; and an 11x7.5 on a PAW 35. One experienced glow flier was astounded at the power of the 25! Except for racing, a small prop turning at high speed is just not the way to go. However, if you put a big prop on a glow engine, there is every chance that you will overheat and even damage it. With a diesel, there is no such danger.

There are several reasons that diesels can turn larger props. One is that the higher compression ratio and better combustion properties of the fuel give diesels higher torque. Another is that the ignition

timing can be advanced or retarded to suit the speed and load just by turning the compression screw in the head. Inside the top of the cylinder is a contra-piston that seals the cylinder. Turning the compression screw in pushes this contra-piston down, increasing the CR; turning the screw out lowers it. (Gas pressure when the piston rises pushes the contra-piston back up.) As explained below, changing the CR varies the point of ignition on the piston upstroke.

Want an example of flexibility? When PAW was developing their 29 engine, they ran it for four hours with a 17x6 (!) prop in it. The maximum speed at low, of course, (3500 rpm), but the engine ran at normal temperature without a trace of damage. Try that with your glow engine! Of course, such a large prop is useless for flying, but it indicates that you can run the prop that gives the best results without any risk of damage.

After using a diesel for a while, you will probably become convinced that the props used on glow engines are too small!

Another advantage of using a diesel is noise. Any engine turning a larger prop at lower speed generates less noise, and diesels are inherently much quieter than glow engines anyway, with a more "masculine," lower-pitched sound. You quickly learn the diesel flier's motto, "It isn't rpm and noise that flies your plane!"

Any disadvantages? Well, the fuel doesn't have the perfumey aroma of glow brew, and you may be cleaning brownish oil off the model after flights. Other than that, all they offer is pluses!

Diesels are great in R/C models as well, and the following information is equally valid for starting and adjusting diesels with carbs for R/C models. There are many stories circulating about how diesels will not throttle. No matter how many times this notion gets knocked on the head, it never seems to die. To repeat: Diesels throttle just fine, and idle very well.

HOW DO DIESELS OPERATE?

All diesels operate on the principle of using a high compression ratio to raise the temperature of the air-fuel mixture in the cylinder high enough to ignite the fuel when the piston rises. In a car diesel, the CR is about 19:1, and the fuel oil is injected into the hot air. An injection pump isn't capable of being drawn into a two-stroke engine in vapor form. Model diesel fuel contains ether (roughly one-third), a material that will ignite at the temperature generated by a CR in the range 16:1 to 18:1. (It also helps atomize the fuel into tiny droplets when it vaporizes in the engine, so the fuel can burn more quickly.)

Ether doesn't give much energy per gram when burned, so kerosene (over 40% of the mix) is used to provide most of the power. The rest of the fuel is mostly lubricating oil (typically 20-25%), together with a small amount of a chemical like amyl nitrate that makes the fuel ignite with a lower compression ratio and burn more smoothly.

STARTING AND ADJUSTING

A diesel may seem more difficult to start and adjust because it has two adjustments, the compression screw (lever) in the head, and the needle valve. However, when you understand the function of each, you can quickly figure out how each affects running. As for the NV, a diesel will run with a wide range of settings, so it will not be a critical problem. The following will explain the mystery of the compression screw. With an engine that has good compression, starting should be a one- or two-flip operation, every time.

Diesels can be designed from the ground up as diesels, or we can convert any of a large number of glow engines to diesel operation with a Davis Diesel conversion head. If your engine began life as a diesel, you can expect it to have been designed for a good piston-cylinder seal for good compression. If converting a glow engine, you want to start with an engine that has good compression. Some manufacturers seem to be setting their engines up loose at the factory, presumably so that the user will not be able to burn them out by running them too fast, too soon. These may be more difficult to start by hand, although they should respond instantly to a starter. I have found that several O.S. 10FSRs that I have used had quite poor compression and that they required a special technique (described below) to get them started, although once running they were very powerful. I was worried about the compression of ringed-piston engines, but I converted an O.S. 45FSR ringed engine to diesel and had no trouble starting it by hand, even at temperatures just above freezing.

THE NITTY-GRITTY

The following instructions are based on experience. They are different in some significant details from any others that I have seen and are (I believe) better than those supplied by any manufacturer, for they supply information that makes starting easy.

For the beginner, I would recommend committing the following Golden Rules to heart:

- Never flood a diesel.
- Don't prime into the cylinder.
- Learn how to start it with an empty fuel tank.

Follow these rules, along with the instructions below, and you should be able to avoid 99%+ of the problems that modelers seem to have with diesels. (The first and last rules are probably equally valid for most glow engines.)

Always keep in mind that a flooded diesel engine just will not start. When I say "flooded," I don't necessarily mean an intake full of fuel. The correct prime is counted in drops. That's right. Drops! The count 'em type. For an engine of .049 size, this would be about two drops, while engines in the .09 to .19 range might take three to five, and larger engines proportionally more.

I can't stress correct priming highly enough, and it can be difficult to get the message through. I have shown experienced modelers here the correct starting

routine, stressed very clearly that they had to count the number of drops, and watched while they picked up the priming bottle and squirted the intake full of fuel.

To repeat: Count the drops exactly when priming. If you put in more, it will be difficult or impossible to hand-start the engine without a lot of bother.

The next tip is to prime only into the intake. The reason for this is as follows. The volume of the combustion chamber with the piston at top dead center is very small, and the CR for starting must be very close to correct, not too high and not too low (As I mentioned before, the volume of this space is adjusted by the compression screw moving a contra-piston). If you put liquid fuel into the cylinder as a prime, the volume will be reduced appreciably when the piston is at TDC. To maintain the correct CR, you will then have to raise the contra-piston to restore the correct volume. When the engine fires, the liquid burns off, the CR drops markedly, and the engine will run very poorly at low CR, or will stop completely. To keep it running, you would have to grab the compression screw as soon as the engine fired and turn it in quickly if you were to keep the engine running. You may not be able to do this quickly enough, could put your hand in the prop, etc.

If you prime into the venturi, on the other hand, only an air-fuel mixture (compressible) is drawn into the cylinder, so it can fire properly, and the rest of the prime keeps the engine going until fuel can be drawn through the spraybar.

Jumping ahead, the reason for clamping the fuel line, etc., in the instructions that follow, is to keep fuel from running into the engine by gravity. You want to keep all fuel out of the engine other than the prime that you put into it until you want it there. In that way you have perfect control over the starting conditions and will have no unwanted surprises. To this end, I would suggest making an inclined stand for the model that lets you support it with the nose high enough that the spraybar is above the level of the top of the tank while you are flipping the prop. When the engine starts, raise the tail to make the model level or nose-down.

As for the mysterious compression screw in the head, the simplest way to steer you through its use is by a computer-type flowchart. Just go step by step, and you should have no trouble.

A word on the initial setting of the screw would be useful. It seems to be an invariable aspect of human nature that any modeler handed a diesel engine will immediately turn the compression screw. You won't learn a thing by doing this, so don't waste your time! With luck, the screw may come from the factory at the running setting; if you fiddle with it, you will have lost the initial reference point.

PAW says in its literature that the screw is at the running position, although I have found that I usually ended up turning it in one or more turns before I got my engines to fire the first time. The same is true of Davis heads. A further note about Davis heads is that Bob Davis has been too optimistic about his ability to predict the correct position of the contra-piston in his heads, and the screw supplied with several heads that I have tried has been too short to push the contra-piston down far enough. I can understand his philosophy of not wanting users to push the contra-piston completely out of the head by mistake, but he has erred too much on the side of caution on several occasions. The only cure for this problem is to substitute a longer screw for the one supplied, but be very careful not to turn it more than about one turn maximum beyond what the original screw would turn. *(Down, Bob! We'll print your comments on this subject! wcn)*

INSTRUCTIONS

(Here, Ian uses a flowchart that would be a little difficult to reproduce typographically . . . therefore I'll attempt to edit it into the form of text.—jt)

Mount the engine in a model or proper test stand.

Do not fill the tank.

If it's an R/C engine, open the carb about half way.

Put 1-4 drops of fuel into the venturi.

Flip the prop quickly. If the prop is difficult to turn past TDC, CR is too high, or there is excess liquid in the cylinder. Turn the screw out one-half to one turn, or drain out fuel.

If the engine fired and ran for a second with a good, smooth burst of power, skip the following troubleshooting section.

If the engine didn't fire:

If the compression ratio screw has not been turned in more than 1 to 1-1/2 turns, the CR probably is too low. Turn it in 1/8 to 1/4 turn. If the screw had been turned in more than 1 to 1-1/2 turns, the CR may be too high. Turn it out 1/2 turn past the initial setting.

If the engine fired but didn't run for a second with a good, smooth burst of power:

If it had a "soft" sound, it may be undercompressed. Turn the screw in 1/8 to 1/4 turn. If it had a harsh, clattery, growly, or metallic sound, it may be overcompressed. Turn the screw out 1/8 to 1/4 turn.

If the engine did start and run for a second with a good, smooth burst of power:

Starting position seems correct. Repeat two or three times to be sure that setting is correct. Clamp off fuel line to engine.

Fill the tank. Open needle valve for rich setting (see manufacturer's instructions. For a converted glow engine, use the glow starting setting.)

Tilt the nose up so the spraybar is above the top of the tank. Keep the clamp in place. (If using a test bench, position the top of the tank below spraybar level.)

Repeat priming and flipping as before to confirm that the engine is set correctly and ready to run.

Remove clamp (Do not choke the inlet

and draw fuel to spraybar). Running the engine will do this. (You can use this method when you have developed a feel for the engine and do not draw so much you flood the engine.) Prime and flip as before. When the engine starts, quickly tilt the nose level or slightly down to aid fuel draw.

If the engine continued running smoothly skip the next troubleshooting section.

If the engine stops: Fuel probably was not drawn along the full length of the supply tube. Repeat priming and flipping two or three times. If it keeps stopping but runs a little longer than on prime alone, open the needle valve 1/2-1 turn. If it refuses to fire even just on prime, it's probably flooded. Clamp the fuel line, close the needle valve one or two turns and flip the engine repeatedly to clear out the fuel.

If the engine is misfiring and galloping: It's slightly undercompressed. Slowly turn screw in until it runs smoothly.

If it sounds harsh, clattery, growly, or metallic: It's overcompressed. Turn the screw out 1/4 turn, more if it continues to sound harsh. Note that, especially with a new engine, the contra-piston may not move up when the screw is turned out. In such a case, try quickly turning the screw in 1/4-1/2 turn and immediately turning it out again to the desired position. The contra-piston usually will "jump" out due to the higher pressure. Do this quickly! Continuation of the harsh sound indicates a potentially damaging setting, because it overheats the engine and puts high mechanical stress on the moving parts. The engine is pre-igniting. A diesel should never run extremely hot, and you should be able to touch the cylinder briefly while the engine is running without burning your finger. If it is very hot, the compression is too high.

If the engine is running smoothly: It is probably running rich at this point. If it is not broken in, follow "break-in" instructions below. If the engine already has been broken in, continue with this procedure to peak out engine speed.

With an R/C engine, open the carb fully.

Slowly turn the needle valve in 1/8 to 1/4 turn at a time, then wait for several seconds for speed to stabilize. If speed increases, it probably is still rich. If it starts to misfire, it has gone too lean; quickly turn the needle valve out 1/8 to 1/4 turn.

Let the engine run for a minute to warm up fully. Turn the compression screw out 1/8 to 1/4 turn. If the engine doesn't start to misfire, the compression still may be higher than optimum. If it does, compression is too low; turn the screw back in and continue to observe engine sound. Further adjustment may be needed when needle valve is adjusted.

Test the effect of turning the needle valve in or out a small amount to find the position of maximum rpm (Wait several seconds for the setting to stabilize.) The engine is now close to the correct adjustment.

As the engine heats up, the mixture fires earlier on the upstroke, and the CR should be lowered in small steps by turning the screw out to retard the timing.

The fuel mixture and CR interact, so adjusting one will have some effect on the other. Fine-tuning a diesel is a process of adjusting each a little at a time to maximize power. Thus, if the engine is leaned out, the temperature in the cylinder increases, and it probably will be necessary to turn the screw out a small amount. (Remember how to loosen a stuck contra-piston!)

MISCELLANEOUS NOTES

• Because the prop is loaded more heavily when the plane is on the ground (static), prolonged running may make the engine hotter than it would be in the air and the CR setting on the ground may be too low for normal speed in the air. When preparing to fly, try to make the final adjustment within a minute of starting. If the setting is not perfect, improve it on the next flight.

• The correct settings for flying compared with those for maximum static rpm (after prolonged running) will generally be:

—Needle valve slightly richer (1/8-1/4 turn). This allows for higher engine speed and fuel requirement in the air.

—CR very slightly higher (1/16-1/8 turn). This gives the advance in timing necessary for higher engine speed in the air, and also compensates for extra cooling in flight which retards the timing.

• You can determine the correct flying settings only by flying and making fine adjustments. Remember, it is better to start out a little undercompressed and increase the CR on the next flight, than to set the CR too high and risk overheating the engine.

• Don't fill the tank completely while making initial test flights. Otherwise, if you have a bad setting, you will be circling for a very looooonnnnng time, waiting for the fuel to run out. Diesels fly much longer than glow engines on the same amount of fuel.

• The prop size affects the required CR setting. A smaller prop (diameter/pitch) and high rpm require a higher CR to advance the timing; a larger prop requires a lower CR.

• When the engine is running well, try turning the screw in to overcompress the engine intentionally. Listen to the harsh sound so you can avoid it in the future.

• Hand-starting engines with poor compression:

Diesels, or even dieselized glow engines, usually will run well even if the compression is poor enough to make them difficult to hand-start, such as the O.S. 10FSRs mentioned above. One trick (applicable for glow operation as well), is to prime with an excess of fuel, turn the prop a few times to draw it into the crankcase, and then invert the engine. The fuel will run down and make a better seal between the piston and cylinder. Note: Flip carefully, for excess liquid in the combustion chamber will cause hydraulic lock, preventing the piston from passing TDC. Never force the engine! (If this happens, turn it back upright and flip again.) With a bit of practice, this often will get the engine going.

• Break-in:

Engines with iron piston/hardened steel sleeve, like PAWs, should have a classic slow break-in. Initially, run the engine with a rich, slobbery needle valve setting, and run it for only two or three minutes at a time. Let it cool to near ambient temperature between runs so that parts can expand and contract to their normal fits. Lean it a little on each successive run, but accumulate an hour before trying for maximum speed. Let the surfaces polish themselves slowly. You can't damage it by breaking it in slowly, but too fast, too soon means worn out too soon, too. Set the compression ratio high enough that the engine

runs smoothly but do not overcompress it. A little patience at the beginning yields an engine that runs better longer.

If you have converted an ABC engine to diesel operation, follow the manufacturer's advice. Usually this means fast running with a rich setting at high rpm. K&B recommends 20,000 rpm rich for its racing ABC engines!

If this has left any of your questions unanswered, you may want to write: Ian L. McQueen, 2-18-7 Kami-Meguro, Meguro-ku, Tokyo 153, Japan.

Questions, comments, photos, club news, etc., are always welcome: Write John Thompson, 1520 Anthony Ave., Cottage Grove, Oregon 97424. •

Paris .....*Continued from page 21*

crashes in the past 40 years at the Paris Air Show. On no occasion did any crew try to escape, and only on one occasion did someone try, but died. This may be because the crew always tries to steer the doomed machine away from the spectators. Amazingly, Anatoly only suffered some internal injury and was released after two days in the hospital. No one on the ground was injured.

Anatoly later said, "All my efforts to control the aircraft were no good, and the left engine was in full afterburner, the asymmetric thrust caused the aircraft to turn and bank to the right. I realized that it was not going toward the crowd, and the engine was not recovering. The aircraft began to turn toward the ground and a crash was inevitable. I had very little time to assess the situation, but when I saw that the aircraft was going to clear the people, I ejected. It is a hard decision, as all pilots must feel."

Guess who Anatoly thanked after the incidence? He thanked the K-36 ejection seat designer. A true test of the modern fighter pilot seat, especially as the ejection was made slightly outside the design envelope. Later investigation discovered that the flameout of the right engine was due to bird ingestion.

In John Farley's view, this accident was different because of good planning, good execution of the plan, good equipment and good training. The Paris Air Show board insisted that a high-alpha pass is not just a straight fly-by to be done at 200 ft., but must be treated as an aerobatic maneuver, with a safety margin of 500 ft. altitude. (High-alpha fly-by means a low speed, nose high fly-by. The nose must be raised high at very low speed to increase the angle-of-attack of the wing to generate sufficient lift to support the aircraft. This maneuver illustrates that a well-designed fighter can fly slowly without stalling the wing.) Farley says Anatoly's equipment was good, and his training was good. So, even though he was not expecting his engine to fail, he was able to react quickly and initiate his escape. Finally, no one was hurt on the ground because he was flying well away from the crowd and not right up to the display line. A professional job by all concerned.

Throughout the 10 days, over 70 types of aircraft were flight displayed. French Aerospatiale's Panther troop carrying helicopter performed loops and rolls every day. The majority of helicopters in the world do not have sufficient control response to loop or roll. Somehow, looping and rolling of full-size helicopters, like the Panther, do not seem to be as awesome a sight as when done by model helicopters. The Panther does them so effortlessly. There was no blade slap noise, and the loop was perfectly round and ten seconds long. The roll was more of a barrel roll, and had a duration of four seconds. Stall turns were also performed. Full-size helicopter aerobatics are not as wild as done on models because each maneuver has been thoroughly planned out, then executed. R/C modelers, on the other hand, usually just yank the right stick back when suddenly feeling the urge for a loop, or push the stick to the right when in the mood for a roll.

The Su-25 Frogfoot and Su-27 Flanker made their first Western air show appearances at the Paris Air Show. The Su-25 is a subsonic ground attack aircraft with capability similar to the American A-10 Thunderbolt. Su-27 is a Mach 2+ fighter. Following the Mig crash on the first day, another Mig-29 was called into service. The most impressive maneuver by the Mig-29 and Su-27, is the low altitude, vertical tail slide. The two fighters' performances left Western air-superiority aircraft designers with a heavy burden when they returned home from the show.

The only American military aircraft flight displays were th F-16 Falcon, and the F/A-1 Hornet. The F-16 was flown by General Dynamic's test pilot, Bland Smith. His F-16C has a new F110 engine and a slightly larger air intake. After a standard high-alpha pass, it would simply accelerate into a climb without dropping the nose. This is remarkable when compared to standard jet fighters and older F-16s, which require the nose to be lowered first to unload the drag, then accelerate up to speed before a pull up. I think ducted fan models exhibit similar problems, but more due to intake air starvation. Though the F-16 is more than a decade old, it is still very impressive. The American F-16 is also being manufactured under license in Belgium and Holland. Turkey recently began constructing the F-16 under license from General Dynamics.

The British Aerospace/McDonnell Douglas Harrier GR.5 is a longtime veteran at Western air shows. It gained fame during the 1983 Falkland Island War. The Harrier is a subsonic jet fighter/attacker that can fly forward at 600 mph like conventional aircraft, and can redirect its exhaust nozzles downward to hover like a helicopter. This type of VTOL (vertical takeoff and landing) aircraft will become even more popular as we move into the 21st century.

A decade ago, American F-16s started the trend of low cost, single seat, high performance fighters. Since then, Britain, Germany, Italy, Spain, France, Sweden, and Israel all started programs to design and

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build a small, agile fighter for the '90s and beyond. The first four countries aligned together and designed the EFA (European Fighter Aircraft). The prototype EFA did superb flight demos at the 1987 Paris Air Show. This year, due to busy flight test schedules, the EFA could not be spared for demos. Sweden's new agile, fighter prototype, the JAS 39 Grippen, was damaged in a test flight this spring, so it did not appear. Israel's Lavi fighter program was cancelled due to budget problems. France's Rafale was the only super-modern, European fighter flown at the Show. Rafale means a pulse of machine gun fire, like 12 to 15 shots in sequence. Rafale is an all-French venture designed by the Dassault Company, the same group that designed the famous delta wing Mirage. Naturally, Rafale has a delta wing, but also sports a canard for outstanding controllability. It is not yet in full production. The demonstrator aircraft has digital flight controls, voice control in the cockpit, extensive composite structure, and advanced aerodynamic design.

Besides military jets, commercial aircraft, like the European conglomerates' Airbus passenger plane, and Fokker 100, routinely perform steep 40 degree takeoff, and 70 degree banking turns. Single and tandem seat, propeller planes like the Brazilian Embraer's Tucano, Promavia's Squalus, Chile Enaer's Pillan, Swiss Pilatus' PC-9, Russian Sukhoi's Su-26, and American Pitts Special, were putting on anti-gravity displays.

The biggest aircraft in the world, the Russian An-225, was also at the show with the Russian space shuttle, Buran, piggybacked. Doesn't the whole package resemble the American space shuttle sitting on a 747? Till the air show, the An-225 had made only 35 flights. It is driven by six Lotarev D-18T, 51,000 lb. turbofan jet engines, and has 28 wheels. The interior cargo room is 130 ft. long! You can fit 80 Russian Ladas (equivalent of a Honda Civic), or 16 ISO-type containers. The maximum payload is 250 tons, and it requires only 3500 meters of runway for takeoff. The Russian Buran space shuttle, seated on top, is scheduled for launching in the '90s.

At the show, Germany and France each

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displayed a large scale model of their own future space shuttle vehicle. Another interesting hi-tech display was the French AGV (Avion a Grand Vitesse) hypersonic plane which is the equivalent to America's NASP (National Aerospace Plane). These are designed for the year 2015 to 2020. They call for an aircraft with extremely swept wing, combined with turbo-ramjet engines. They can takeoff and land like conventional transport planes, but can also cruise into the stratosphere of earth's atmosphere. A trip on the AGV or NASP from New York to Hong Kong would take only two hours.

What's new in missile technology? Conventional missiles are controlled by aerodynamic fins similar to the elevator and ailerons on R/C aircraft. New missiles are controlled by direct thrust jets located at the center-of-gravity of the missiles. The control jet is from gas bleed off from the main engine. The advantage of such a control system is shorter response time, and effective control even when the missile is flying at low speed.

R/C drone aircraft were very popular at the show. At least ten companies from Switzerland, Israel, U.S., France, Canada, etc., all exhibited drones for military surveillance, or target practice. Their relatively low cost, low noise, and low observability, make them ideal for military reconnaissance.

Start planning for the 1991 Paris Air Show. Don't forget your American Express card, and leave your cash at home. Gypsy kids in Paris love tourists. If two kids start asking you questions, for directions or change, or selling you something, beware, a third one might be behind reaching into your pocket. Watch out for motorcycle snatchers, too. Americans often complain that the French do not like American tourists. If you keep an open mind, try a few words of broken French, together with a smile, you will get very far. Imagine a French couple visiting Disneyland, they would feel out of touch, too. Besides hundreds of museums, austere cathedrals, fancy shopping streets, romantic bridges, 15,000 outdoor cafes, gourmet patisseries selling delicious pastries, what I like most about Paris is the convenient subway system. Parisians boast that no matter where you stand in Paris you are never more than a half kilometer away from a metro station. See you there in 1991. •

Float Fly . . . .*Continued from page 17*

A pilot's meeting was held at 8:30 a.m., and the rules were laid down by the event director: "Anyone acting in an unsafe manner will be asked not to fly the rest of the event. There are several flight line marshals wearing orange vests and you must obey what these people tell you. If you have a problem with what they tell you to do or not to do, take it up with the event director whose word is final. There is a line of buoys in the water approximately twenty feet from shore which must be taxied beyond before commencing the takeoff run. There will be no flying between these buoys and the spectators. All flights are to be kept beyond the buoys and down lake. If a man-carrying retrieval boat is out getting a downed airplane, you are not to land, but keep circling at a high altitude until the all clear is given by the announcer." All in all, the pilots meeting lasted about five minutes, with minimal dumbassed questions.

It was obvious that everyone came to fly and have a good time. Every aircraft was subject to random safety inspections, and I don't know of any that did not pass these inspections. ACE had a repair station set up to repair anything from radios to broken airplanes. I saw one person rebuild his wing after a particularly hard landing and he was able to fly again. The repair station is a nice touch and one which I would like to see at all of these types of get-togethers. I broke a tail brace joint Sunday morning while unpacking the van and I was able to repair the break right there at the field and consequently did not lose any flying time.

The announcing and M.C. duties were ably carried out by Jim Van Loo owner of R/C EXTRA, Sargents Bluff, Iowa, and also president of the IMAA. There is never a dull moment with Jim around. This year he had a wireless mike and you never knew where he was going to turn up. He sure nailed me good a couple of times. Just remember, Jim: "Vengeance is mine saith Uncle Al, the kiddies' pal."

All transmitters were impounded in a deluxe impound area that was in the shade and completely out of the weather. The flight line list was controlled via computer and they did have some problems with it on Saturday. For instance: There was only one person on 53.5 Mhz and he only flew once and that was in the late afternoon. I only flew once (other than the show) and that was also in the late afternoon. A few did not get to fly at all, whereas other people got to fly several times. This was the only glitch that I saw the whole weekend and that was straightened out Saturday evening. In spite of this problem, 227 flights were logged Saturday.

A special flying session was held between 1:00 and 1:30 p.m. both days whereby most of the ACE R/C line of kits were demonstrated. The planes were flown by the ACE people: Tom Runge, Paul Holsten, Steve Kaluf, and "Goose" Guzman. Several well known modellers had been invited to participate in the show, as well as other factory teams. These included Ken Willard, designer of the Seamaster; D.B. Mathews, designer of the 4-40, 4-60, 4-120 series of airplanes; Bud Atkinson, a designer of many planes, one of which is the ACE Sport T-34; and John Britt, well known pattern flier and winner of the Best Finish aircraft at the 1988 TOC in Las Vegas. John also placed eighth in the flight standings. As I had the only other Seamaster 120, I was invited to participate. "Goose" Guzman flew a Super Tigre 3000 powered 4-120 monoplane with an R/C skydiver attached underneath each wing. This was real exciting, particularly on

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Unusual tandem-wheel canard, .45 power. Has flaps on wing and canard. A.G. Lennon.

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An interesting fuselage pod-model from '42 with 50" span. By Cohen & Worth.

No. 12881 R/C GUFF **$25.00**
Pioneer R/C aircraft, won '38, '39, '40, '47 Nats, now in Smithsonian. Walt Good.

No. 11881 THE WHISP **$10.00**
Simple R/C hand launch glider for slope or park flying. 49-inch span. By J. Tank.

No. 11881-O.T. CLASS C GLIDER **$7.50**
A Joe Weathers classic-glider design from Flying Aces, 1939. Wingspan is 30 inches.

Saturday as only one of the skydivers was released. No matter what "Goose" did, that other skydiver would not release. "Goose" was able to effect a near perfect landing even though the drag from the skydiver caused the airplane to fly at a 40° crab with full opposite rudder applied. Sunday, both skydivers released as planned. Paul Holsten managed to maneuver the retrieval boat under the first one and just missed catching the second one. The SIG team was represented by Dave Falkenhagen and Bruce Tharpe. Bruce flew the new SIG FOUR STAR 40, which will be available by the time you read this. Dave Falkenhagen had radio problems and did not get to fly his SIG HOG. In a brief moment of compassion I allowed Dave to fly my Seamaster 120 and needless to say, he didn't hesitate one bit in taking me up on my offer.

A slight mishap occurred when Tom Runge, flying a Seamaster 120, and John Britt, flying a Seamaster 40, collided while flying formation. Both airplanes were brought to a successful landing, even though the Seamaster 120 top right hand wing at the leading edge was minus most of its covering and one prop blade tip was gone. The Seamaster 40's left side of hull had been sliced in two just aft of the left wing. A superb show of piloting skills by Tom and John. Both airplanes were repaired and were flown the next day. Repair work was performed by the Ackerman twins, Richard and Kenny. Richard is an ACE employee and Kenny came from Springfield, Missouri, for the weekend. These two guys are exact look alikes and we had a terrible time telling them apart. John Britt noticed that each twin wore different style eye glass frames. This was OK, but I never could remember who wore what frames. Both are modellers and are real nice people to be around. Richard and Kenny told us there are thirteen sets of twins in their family! *(We assume all their models are powered by two engines! wcn)*

There were some neat airplanes, some conventional and others not so conventional. Dennis Brooks, of Kansas City, Kansas, was there again with his super-flying Nobler. Dennis has lengthened the fuse two inches, it features plug-in wings, and with a Rossi 40 and GB floats, it weighs in at six lbs. Dennis knife edges on climb out and stays in knife edge through 720° turns and loops. Very impressive. Unfortunately, the photo I took of Dennis and his plane was at the end of the roll. Although the negative looked good, the processing outfit did not print it. Sorry, Dennis!

I think the most unusual flying machine was built and flown by Ed Morrow, from Kansas City, Missouri, and this was a Round Tuit on floats. It is kitted by an outfit in Texas called Bonded Models, is of foam and plywood, uses an OS FP-40 for power, the floats are home brew, and the whole thing weighs four pounds. It looks real weird, especially during takeoff and landing. It doesn't get airborne in the usual manner; it hops off the water. On landing, it sorta squats onto the water and comes to an abrupt halt. Another airplane that intrigued me was an electric powered Seamaster 40. I saw it fly twice on Saturday and it was very impressive indeed. It got off the water and flew as well as the glo powered Seamasters. I was unable to interview the owner or even find his plane for a close up photo. I had him paged over the P.A. Just bashful, I guess. I don't know his name, but I did find out that he had lengthened the wings and that it carried eighteen batteries!

Bill Dickey, from Topeka, Kansas, had a cute little original open frame model covered with opaque yellow mylar covering which he named the "Higginsville Hornet." It had a K&B 20 Sportster, JR radio, and weighed 3 lbs. Bill said he built it especially for this get-together. It appeared to fly very well.

Paul and Deb Grubich, from Cedar Rapids, Iowa, were there with their magnificent scratch-built clipped-wing Monocoupe. Paul didn't really know how much it weighed on floats, but thought it weighed somewhere between 12 and 16 lbs. w/out floats. It is powered by an OS Max 91 and uses a Futaba for guidance. Paul does an excellent job flying this beauty and he put on a real show each time he flew.

Flying for the day ended at 6:30 p.m. The Flight Line and Frequency Control were closed down and we headed for the clubhouse at the Higginsville Country Club, which was located a quarter of a mile up the road from the flying site. A no-host bar was available for those who wished to partake, and a magnificent buffet was served starting at 7:30 p.m. If you went away hungry it was your own fault. Cost of this excellent meal was a nominal ten bucks.

After dinner, we all adjourned to an area overlooking one of the golf greens where a stage had been set up to one side of the green. Tom Runge introduced the ACE R/C staff, then a touching tribute to Ken Willard was made by D.B. "Doc" Mathews. Ken responded to this tribute in his own inimitable way. Even though Ken was quite tired due to his recent illness, he managed to get off a couple of his famous corny jokes which indicated to all of us that his sense of humor had not diminished one bit. The entertainment for the evening was

by a male quartet called the "Friendship Group." They were accompanied by one of the member's wives who is a superb pianist. This group specializes in gospel music and they were good!! A lot of fun was had by all when the group called on various persons in the audience to participate in some of their numbers. Tom Runge really took it when they called him up and dedicated a song to him called "It's Hard to be Humble." All too soon the entertainment ended and a tired but happy crowd of modellers retired for the evening.

Sunday dawned with a high overcast and low scattered clouds. Temps were in the low to mid-seventies with a gentle breeze to keep it comfortable. Flying commenced at 8:00 a.m., and it was evident that the computer controlled flight line problems had been corrected, as everyone was able to fly several times. The noontime show was held with no mishaps and, much to my delight, Ken Willard flew my Seamaster 120 a couple of passes around the lake.

Although flying was scheduled to cease at 5:00 p.m., activity started slowing down around 2:00 p.m. and this year's great splash-in was over til 1990. A nice touch were the prizes handed out at various intervals throughout both days. Prizes were donated by ACE R/C, SIG, R/C REPORT, to name a few. I even won a year's subscription to R/C REPORT! Next year's dates for the Float Fly are June 2nd and 3rd. This years landing, or splash-down fee, was $3.00. Where else can you have so much fun for three bucks? For those of you who missed this year's bash, start making plans for 1990, as it is well worth the effort. Once again, Tom and Donna, thanks for one heckuva fun weekend!!!

P.S.: It started raining about 6:00 p.m.! •

Workbench . . *Continued from page 7*

you are first learning how to use diesels; they have two adjustments for starting and running, the compression screw and the needle valve. The needle, as on any engine, controls the fuel/air mixture. The compression screw, as it implies, provides a means of adjusting the compression ratio of the engine by raising or lowering the head. Actually, the head is bolted to the top of the cylinder in normal fashion, but the inside of the head, that fits down into the cylinder, can be raised and lowered from the outside by turning the screw in or out. At this point, in order to avoid getting in trouble with our simplified explanations, we refer you to Ian's words as quoted in John's article!

We're not sure if the low use of diesel model engines in the USA is because of a lack of interest on the part of the modelers, or because very few hobby shops carry the engines and/or the fuel, or because they are misunderstood, or a combination of all three. Whatever the reason, we intend to go further with our investigation of the model airplane diesel engine in future issues.

THE LUCKY LINDY SAGA

In the August "Workbench" column, we described Sal Taibi's field repair for torn tissue, in which the victim was Ralph Prey's "Lucky Lindy" Nostalgia model. Before giving you some answers to my question about removing tissue from real old airframes, we offer this testimonial for one of the products advertised in *Model Builder*. Again, Ralph Prey tells the story.

I launched my Lucky Lindy into this air, and the last I saw it, it was about 1500 feet and still going up. The DT string had hung up and the model partially stalled, never fully to DT, so it kept on going up. I stopped at the city limits of Maricopa . . . about eight miles from the flying field (Taft), *and returned to get my handy dandy Jim Walston Retrieval Receiver and directional antenna. I went back to the spot where I last saw the model, fired up the receiver, and aimed the antenna at the area of sky where I last saw it, and what do I hear . . .? "Beep . . . Beep . . . I'm here . . . Come get me . . .!" After getting a line on it, I then followed the beeps and within 20 to 30 minutes I had the model in my hands. WOW! What a relief. As far as I'm concerned, that one instance PAID for the system. Norm Peterson also has the same Jim Walston system and he would have lost his models five times, but recovered them with no problem. IT WORKS. It's high buck, but then, so is my model and my time.*

And now, here are three methods suggested for removing real old, hardened tissue from airframes. The first is a confirmation of the method I mentioned in the August column. Seal the model parts and an open can of thinner (maybe acetone would work better as it is more volatile) in a polyethylene bag and leave it for 24 hours. There are no details on this method, but it would seem you should work fast and with lots of fresh air around you when you open the bag. I wonder how long you have to work before the tissue hardens up again? The confirmation came from Harry Hutchings (if I read his signature correctly) of England, who dropped a note while on the east coast on business.

Next, in a conversation with Gene Wallock, I was given this method: Obtain a can of thick, almost pasty paint remover, such

as "Strip Ease" or something similar. Apply this goop to the framework and allow it to remain until the tissue and dope softens . . . maybe 15 to 20 minutes. Use a course rag, such as old terrycloth towel material, to rub the mess off the wood. The stuff leaves a waxy residue which must be cleaned off with thinner or acetone, after which the framework is ready for its next suit of tissue.

The third method comes from Nat Comfort, of Chester, Virginia. Cover your work area with a large piece of cardboard, and make sure you have plenty of ventilation. Use a wide dope brush and "paint" one panel with acetone. Cut the bristles of a throwaway acid brush to half the length, and using it like a spatula, alternately dip it in acetone and push it along the framework, getting under the tissue and lifting it from the wood. Keep working ahead with the acetone, wetting the framework thoroughly as you go along. It's a messy job, but a lot less trouble than building new structure.

Anybody have a better way?

VINTAGE R/C SOCIETY

Headed up by John Worth (President), Joe Beshar (Sec'y/Treas) and Art Schroeder (Newsletter Editor), the Vintage R/C Society has been founded, is firmly into its growth curve, and the first newsletter has been published. To quote John Worth:

"Looking at where the RC industry and activity is today, it is hard to believe that only thirty years ago it was a relatively new and tiny part of the modeling scene. Before 1958 there were only two Citizen Band frequencies, one at 465 MHz and the other at 27.255 MHz. Now as we near 1991 when a total of 80 frequencies (50 aircraft and 30 ground, plus several in 27 MHz) will be available, the RC activity dominates the aeromodeling world.

"Most people involved with RC are new to the genre, within the past ten years. Most are unaware of the roots from which all this activity came. Those of us in the Vintage R/C Society think that the newcomers are missing the heritage of RC and we hope to change that situation by telling how it all began and how everyone can share in the history and folklore about RC."

We have just joined the VR/CS, and strongly urge all old-time R/Cers to jump in. Just what will develop in the future is hard to tell, but certainly swapping favorite war stories will be a prime activity. There is also the likelihood of some fun contests with qualified vintage aircraft, flying the old Class I and Class II maneuvers. If nothing else, it would be very satisfying to show today's ten-year "veterans" how to fly a model with nothing more than rudder control and *maybe* throttle!

To join the VR/CS, send your name, address, and $15.00 to Joe Beshar, 198 Merritt Drive, Oradell, New Jersey 07649.

This writer started in R/C in the winter of 1954/55. Our first model was the Royal Rudder Bug, a somewhat modified version of Walt Good's original design, which was kitted by Berkeley. Power, if you could call it that, was a K & B .15 Greenhead (There were no R/C engines then, and throttle control was practically unknown . . . the amount of fuel in the tank determined how long the engine would run, at whatever rpm you set it for just before launching). The control was rudder-only, by a Babcock compound escapement, operated . . . at times . . . by a three-tube BCR-3 Babcock receiver and hand-held BCT-2 transmitter. The first "flights" were actually long, hand-launched glides down the sloping fairway of a golf course, which gave us plenty of time to experience the first-ever thrill of actually changing the direction of a model's otherwise free flying path!

S.A.S.E., PLEASE!

Over half of the daily correspondence we receive which includes requests for information do not include an S.A.S.E. (Self Addressed Stamped Envelope). Some of these can be answered in a moment, but require the services of one of our hard working staff to type out the answer we have scribbled, then bring it to us for signature, and then pass it on to the mailing department for processing. Other answers may require time-consuming investigation or possible searching through over 200 issues of the magazine for the correct information. Without an S.A.S.E., we simply cannot take the time to prepare and send back an answer. Please keep this in mind when asking for a response . . . you'll stand a much better chance of receiving an answer to your question if you'll offer us the courtesy of an S.A.S.E. . . . Thanks. •

FOUR BY FOUR.

THE ATTACK 4NBL

Our newest 4 channel system has something for everyone. In fact, the Attack 4NBL is such a versatile performer we've customized it for all kinds of radio control fun.

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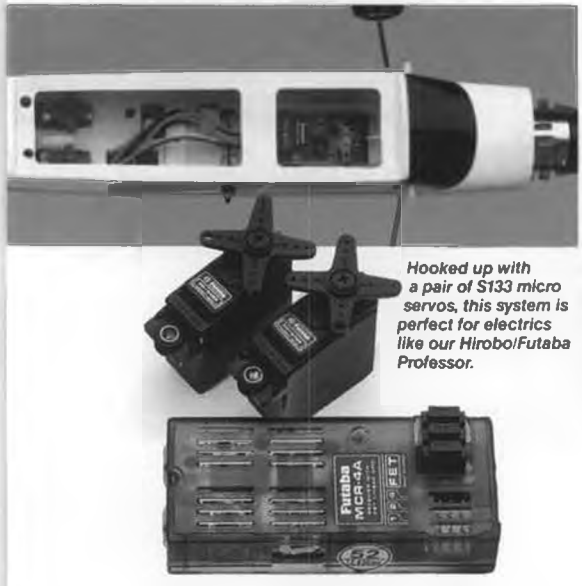

Hooked up with a pair of S133 micro servos, this system is perfect for electrics like our Hirobo/Futaba Professor.

The MCR-4A four channel receiver/MOSFET speed control weighs just 1.5 oz. and can easily handle 280 to 540 size electric motors. 1.24" x 2.92" x 0.63".

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R114H	S148(3)	Dry Case	72MHz	Aircraft
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(This is no illusion. It's an actual photo of the Clod Buster climbing over 1/10 scale off-road cars. Note the size difference.)