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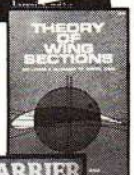

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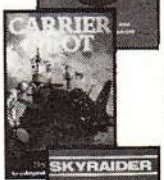

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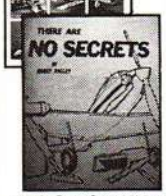

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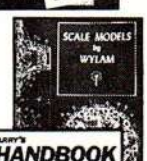

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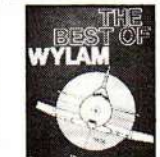

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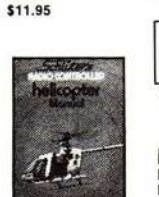

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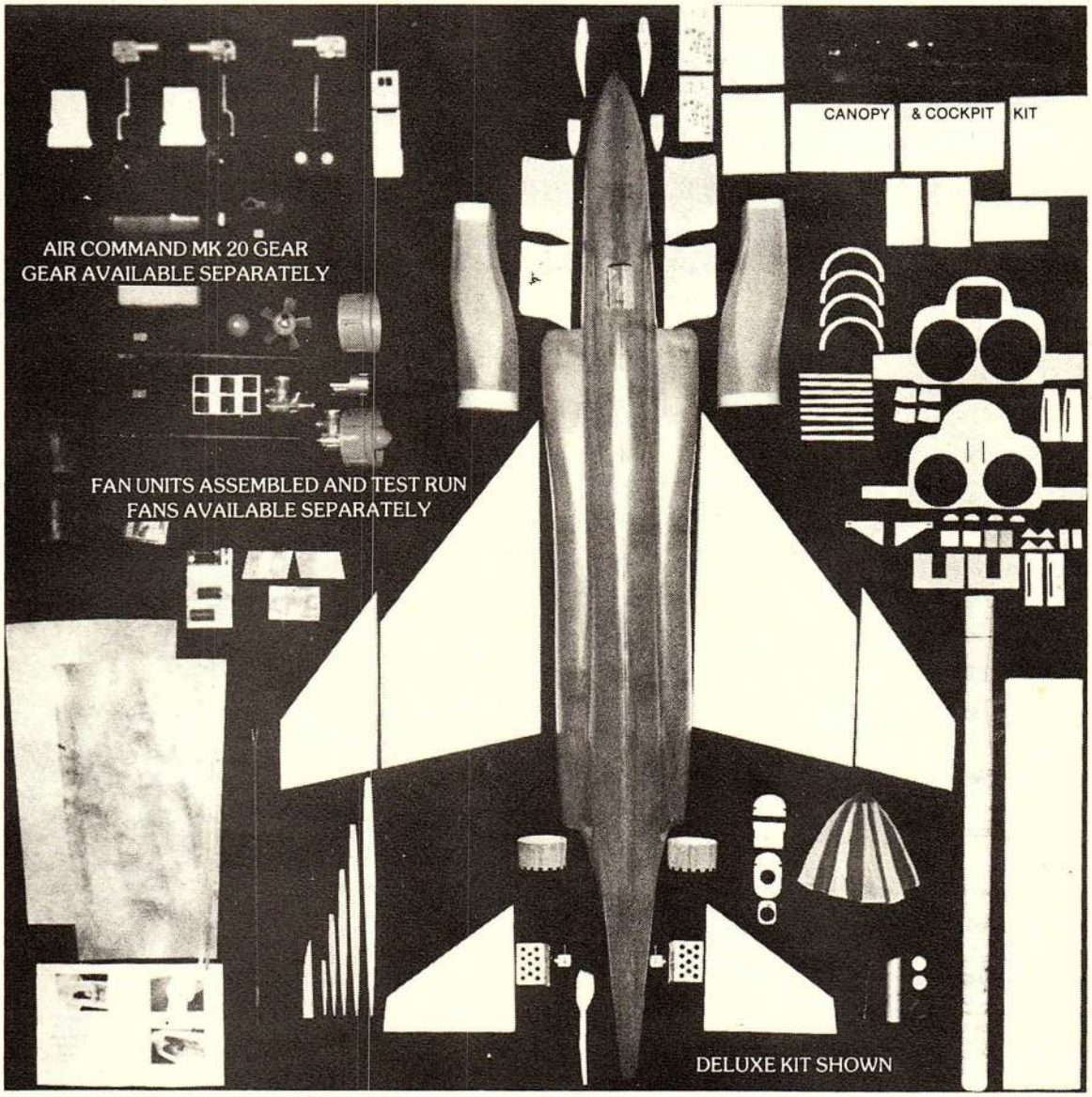

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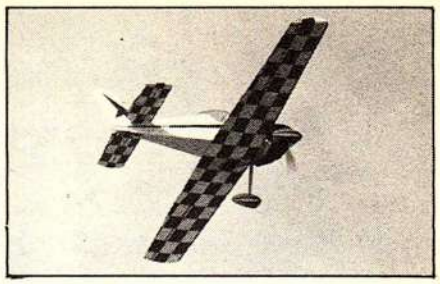

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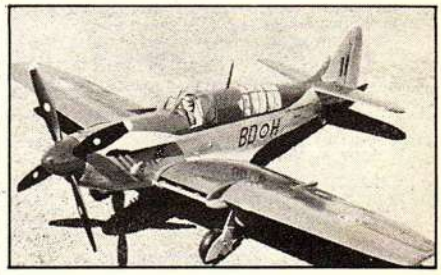

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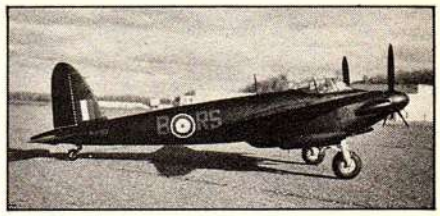

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FEATURES:

DEPARTMENTS:

COVER:
Cindy Layton gets into the jet age with Tom Cook's twin-fanned Phantom. Part II of our special feature on this Masters-winning model is in this issue. (Dave Bahm photo, courtesy Jet Model Products)

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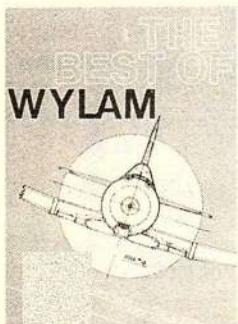

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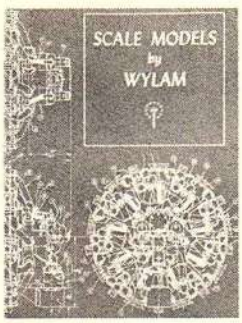

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Information Supplied Courtesy Pettit Paints

In response to many requests, we are interrupting our presentation of external camouflage colors this month in order to give you the information needed to complete the painting of cockpits, wheel wells, and other interior surfaces. Specifically, our colors are the two shades of Zinc Chromate Primer widely used on American aircraft of the World War Two era.

Zinc Chromate Primers are anti-corrosion coatings applied to bare metal surfaces of an aircraft structure before final painting. On combat aircraft, the primer was usually left unpainted on interior surfaces in the interest of lighter weight and faster production. In its standard form, Zinc Chromate Primer is a greenish-yellow color, leaning more heavily toward the yellow side.

For use in cockpits, it was decided that a more olive-green shade would be appropriate, and a specific color designated "Interior Green No. 611" was standardized for use in both U.S. Army Air Force and U.S. Navy aircraft. This color was achieved by tinting the yellow Zinc Chromate to make it darker and greener. Quite often, however, the unmodified yellow shade was used on all surfaces except the cockpit, and would therefore be found inside wheel wells, cowlings, hatches, and so forth.

Here are the formulas for mixing these colors using standard Hobbypoxy Part A colors. After blending, add an equal amount of Part B Flat Hardener for the proper matte finish!

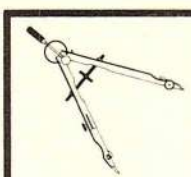
INTERIOR GREEN NO. 611:

Five	Parts H49 Cub Yellow
Three	Parts H47 Bright Yellow
Two	Parts H33 Stinson Green
One	Part H81 Black

ZINC CHROMATE PRIMER (YELLOW):

Three	Parts H47 Bright Yellow
Three	Parts H49 Cub Yellow
Two	Parts H70 Gray

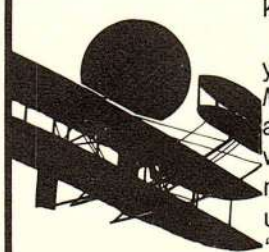
□



HAVE A BETTER IDEA?

Maybe you've got a better way to install scale hinges, or know some deep dark secret about getting a more realistic scale finish. Share your knowledge with the world!

Drop a note describing your better way, to *Scale R/C Modeler* and if your idea is accepted, we'll print it along with any sketches or photos needed to make your idea understandable. Send your "how-to-do-it" technique to: Model Techniques Dept. *Scale R/C Modeler,* 7950 Deering Ave., Canoga Park, CA 91304.



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Book Notes

Reading and research for the builder of the model.

Most scale modelers are familiar with the "Fighting Colors" series published by Squadron/Signal Publications. One of the more recent releases is on the *P-51 Mustang*. Needless to say, the book has met with instant success. Not only does it contain hundreds of photos of the most popular fighter ever to take wing, but there are also a number of those superb Don Greer illustrations to fill out critical details of the aircraft. There are some great color views and profiles, so that one's entire documentation package could virtually come from this one source.

Put this one on your "must get" list, for no modeler's reference library should be without a copy. Published by Squadron/Signal Publications, 1115 Crowley Drive, Carrollton, TX 75006.

The SB2C Helldiver has gotten a lot of attention lately as a scale project. Squadron/Signal Publications has been right on the mark, with their release of this subject in the "In Action" series. As anyone who is familiar with this series knows, they are heavily slanted toward the modeler's documentation, with a profusion of photos, backed up by numerous scale drawings and detailed sketches. There's a center

spread of color profiles to assist in documenting this venerable fighter. This 50-page book is a condensed gold mine of information and data.

As with most of the "In Action" titles, we endorse and recommend them as good values and wise acquisitions. Published by Squadron/ Signal Publications, 1115 Crowley Drive, Carrollton, TX 75006.

* * *

The computer has certainly done some marvelous things, and data retrieval is one of the most important. That's what the *Miniature Aircraft Directory* is all about. Not only is the book printed by computer, but the data storage potentials of the machine make it possible for such comprehensive lists to exist.

The book lists such things as giant-scale kits, giant-scale plans, engines, servos, books and reference sources, etc. Each of the eight sections is a complete listing of the names and addresses of all manufacturers. The kits give span, recommended engine, and other helpful data, for example. There are well over a hundred pages in this notebook bound title, and the listings run two columns on each page. To say that the information is extensive is more than fair.

Because the book is computer prepared, the information is updated and current, which can be a real problem with such directories.

Send for the 1982 edition of the *Miniature Aircraft Directory* direct from: Data Resources, 6 Laurel Avenue, Kittery, ME 03904. Price $10.00 (postpaid).

□

BE A NAME DROPPER

The next time you write to an advertiser for information, drop our name—tell them you saw their product in *Scale R/C Modeler*.

But then, what other magazine would a superior modeler like you be reading except the only publication dedicated exclusively to Scale?!

SUPER SCALE SWEEPSTAKES RESULTS

The winners in our biggest giveaway ever.

It was a moment packed with static electricity and excitement. The entire office staff had gathered around the large boxes in the warehouse. At the edge of the crowd stood a man in a gray, three-piece suit . . . an attorney, there just to make sure everything was done correctly. It was decided that everyone would take a turn drawing one name from the many boxes of sweepstakes entries. The rotation would continue until all 40 prizes were given away.

For the better part of an hour, the employees of all Challenge's magazines poked, dug, sifted and grabbed at the oversized boxes. The Circulation Department, whose job it was to process all of the entries, announced that they had tallied well over 120,000 entries. Some anecdotes went around the room about the people who sent in large numbers of entries . . . one guy accounted for well over 200 individual entries!

As the luck of the draw continued, the crowd's reaction became more intense. The first name out was awarded last prize, and the drawing was progressing toward the Grand Prize winner. Who would win a trip for two in the Caribbean!? How about that Kraft radio, or those bicycles, or all of those great kits and engines! As it turned out, one of the ladies who helps process subscriptions and backorders wound up picking the last name, for the Grand Prize. Everyone applauded, as if the winner were actually in the room.

This was the magazine's biggest sweepstakes, ever. The response was tremendous, and we're glad that we had the chance to make some forty of our readers a little happier. If your name isn't on the list, thank you for participating, and better luck next time.

GRAND PRIZE WINNER

Ernest Harbin
G-8178 Beecher Rd.
Flushing, MI 48433

FIRST PRIZE

Cecil Ross
3830 W. Claremont
Phoenix, AZ 85019

SECOND PRIZE

Thomas Chandler
2603 Olustee St.
Jacksonville, FL 32209

THIRD PRIZE

Robert Davis
2514 E. Vine
Hatfield, PA 19441

FOURTH PRIZE

Lawrence Eads
2140 Crockett
Carrollton, TX 75006

FIFTH PRIZE

Raleigh Redding
1107 E. Walnut
Hanover, PA 17331

SIXTH PRIZE

Richard Tamanaha
1430 W. 187th Place
Gardena, CA 90248

SEVENTH PRIZE

Mathew Ficner
1248—91st ST
Niagara Falls, NY 14304

EIGHTH PRIZE

Dr. H. B. Marggraff, Jr.
698 Main St.
Watertown, CT 06795

9th-20th PRIZES

Dennis Yamaguci
P.O. Box 209
Kalaheo, HI 96741

Charles Shafer
171 Catalpa Rd.
Groton, CT 06340

Bill Dustman
3146 Mt. Olivet
Kalamazoo, MI 49004

John Kidd
P.O. Box 1556
Covington, LA 70434

Michael Frederic
1298 B Commonwealth Ave.
Allston, MA 02134

Godfrey Boudreaux
2337 Minnesota Ave.
Metairie, LA 70003

Keith Jacobsen
731 Mtn. View Dr.
Mt. Vernon, WA 98273

David Nix
Box 754
La Grange, AR 72352

Joseph Pierson
1114 Porthole Ct.
Oxnard, CA 93030

Robert Pollock
Rt. 1 Box 76
Superior, WI 54880

Robert Lewis
14638 W. 89th St.
Lenexa, KS 66215

Frank Rambosek
P.O. Box 73561
Fairbanks, AK 99707

21st-32nd PRIZES

Howard Moore
801 S. Main No. 6
Blacksburg, VA 24060

A. Giuffre
1389 E. 93 St.
Brooklyn, NY 11236

James Everett
13 Cawley Ave.
Bethel, CT 06801

Roger Keyes
P.O. Box 71025
Las Vegas, NV 89170

Peter Anzalone
7515 NW 42 Dd.
Coral Springs, FL 33065

James Castle
624 Morning Glory Lane
Union, OH 45322

Joseph Hodge
37 Tamarack Dr.
New Milford, CT 06776

Ray Balderson
P.O. Box 503
Edgewater, MD 21037

Mrs. Steve Winn
125 S. Pershing
Wichita, KS 67218

Boyd Kinzey
80 Broward Rd. No. I-206
Jacksonville, FL 32218

Cletus Jungels
320—4th Ave. NE
St. Cloud, MN 56301

Vicki Hooper
220 SW 8th St. No. 7
Pompano Beach, FL 33060

33rd-40th PRIZES

Dennis Satterwhite
5015—41st
Lubbock, TX 79414

David Eshelman
2800 Devils Tower Cir
El Paso, TX 79904

Paul Byron Pattak
7401 Westlake Terr No. 802
Bethesda, MD 20817

Paul O'Donnell
Box 331
Elfers, MA 33531

Victor Nieto
186 Oneida Trail
Malvern, OH 44644

H. N. McKellak
5069 Joyce
Saginaw, MI 48603

Ed Cannon
1980 Tucker Rd.
Hood River, OR 97031

William H. Topping
1426 Vadera Ct.
Fenton, MD 63026

C. Rogers
7100 Barcliff Dr.
Charlotte, NC 28212

U.S. Scale Masters Championships

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

1983 U. S. SCALE MASTERS CHAMPIONSHIPS
SEPTEMBER 16-17-18, 1983

Mile Square Park, Fountain Valley, CA

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Harris Lee
20 Corporate Plaza
Newport Beach, CA 92663
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(714) 493-8083 (Home)

1982-83 AMA RULES --- With these exceptions. Only one Category at Championships, combining Sport Scale and Giant Scale - Max. Wt.: 40 lbs. Max. Engine Size: 3.7 single / 4.4 twin. A limit of TWO MECHANICAL OPTIONS in flight routine. Check with your regional CD for local rules.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

The 1983 U. S. Scale Masters program will continue the tradition of selecting the BEST IN SCALE from around the country. This year's expanded regional contests will ensure better representation at the Championships in September.

REGIONAL FLY-OFFS

TANGERINE (Already Flown)

MINT JULEP - KENTUCKY (April 23-24)
John Guenther, CD
R.R. #1, Box 715
Borden, IN 47160
(812) 967-2814

HEART OF AMERICA SCALE REGIONALS MISSOURI (May 14-15)
Kansas City R/C Club
Dick Taylor, CD
7929 Jefferson
Kansas City, MO 64114
(816) 333-9839

SCALE AIR GROUP (June 4-5)
Buddy Irwin, CD
922 Sundown Lane
Desoto, TX 75115
(214) 223-7838

SPOKANE SCALE INTERNATS (June 10-12)
Barons Model Club
Dr. Joe Fox
615 12th St.
Spokane, WA 99202
(509) 624-4910

EAST COAST REGIONAL (June 11-12)
P.G.R.C. (Washington, D.C.)
Tom Bayne
17102 Earlham Ct.
Upper Marlboro, MD 20772
(301) 627-5118

EGYPTIAN R/C CHAMPIONSHIP (June 11-12)
Sky Squires R.C. Club
Williamson County Airport
Lynn Elston, CD
R-3, Box 153
Carterville, IL 62918
(618) 985-4177

SOUTH EASTERN REGIONAL (June 18-19)
Bill McCallie, CD
10501 Sago
Tampa, FL 33612
(813) 932-0622

COVERITE (BLACK BARON) SCALE MEET (July 9-10)
Sparcs R.C. Club
Mel Katz, CD
9200 Bustleton Ave.
Philadelphia, PA 19115
(215) 676-7618

HILL COUNTRY ALL ERAS SCALE CHAMPIONSHIPS MORGAN HILL (July 9-10)
Mike Jones, CD
736 Spindrift Dr.
San Jose, CA 95134
(408) 262-9566

FOURTH ANNUAL ROCKY MOUNTAIN NATURAL LIGHT - R/C CLASSIC (July 16-17)
Sam Pisciotta, CD
1525 Alexander Circle
Pueblo, CO 81001
(303) 545-3142

WESTERN SCALE NATIONALS (July 22-24)
So. California Scale Squadron
Bert Baker, CD
15712 Graham, "A"
Huntington Beach, CA 92649
(714) 893-3364

AMA NATIONALS (July 24-31)
Westover AFB, Massachusetts
Check with AMA for details.

FOR MORE INFORMATION - CONTACT THE C.D. AT A REGIONAL NEAR YOU.

To anyone who has a natural affinity for aircraft of the Second World War, and to single-seater fighters of the period in particular, then the Republic P-47D Thunderbolt would surely rank high on the list of subjects of greatest fascination. Not only did the Thunderbolt excell in speed over its rivals, but it was also one of the heaviest single-seaters of its day. It weighed nearly 15,000 pounds in operational trim (exactly twice that of a Mk. IX Spitfire!) and could take enormous punishment; a factor which endeared it to the pilots. This is easily exemplified when you study the many photographs of battle torn P-47s who made it home after sustaining heavy flak and cannon-shell damage. The machine's ability to protect its pilots during some spectacular crashes earned it the immortal nickname of "Jug" — short for "Juggernaught." Republic's chief engineer, Alexander Kartveli, who had designed and stressed the fuselage belly for six-ton crash landings!

The Thunderbolt was first delivered to the war theater at the end of 1942, to the 56th Fighter Group. It was soon joined by a second Group, the 78th, which arrived in the United Kingdom to join the 8th Air Force on January 12, 1943. The Thunderbolt's initial role was as fighter escort for Fortress and Liberator daylight raids over Europe, during the latter half of 1943.

Toward the end of 1943, a significant change in the role of the P-47 took place. When some 8th Air Force machines began returning from European missions, flying at very low altitude, they took the opportunity of strafing ground targets — truck convoys, locomotives, dockyards and

miss BEHAVE

The saga of modeling that dream Thunderbolt.

By Dave Richardson

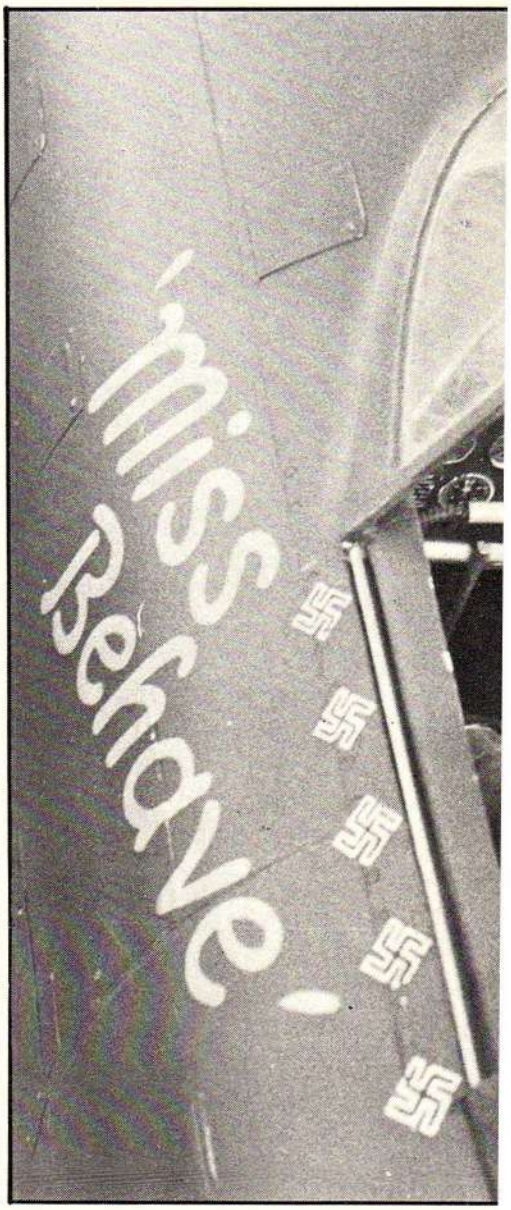
Photos by Geoff Crouchley, Robert Wallace and the author

the like. The success of such strikes led to the adaptation of the P-47 to the role which it was to become famous: that of fighter bomber.

High level missions still continued, but the arrival of the new P-51 Mustangs, in December 1943, saw the official phasing out of the Thunderbolt from this role and, eventually, most P-47 Groups converted to the P-51. Exceptions were the 56th and 78th Fighter Groups, who kept Thunderbolts until the end of the war.

In all, 15,683 aircraft were made. Two-thirds of all P-47s produced eventually found their way to USAAF units in combat theaters. Losses of aircraft on operational missions were only 0.7 percent.

The cockpit is fully detailed. Lots of hours of work here.



The model owes much of its origin to a magical boyhood dream—that one day I would build a super-scale model aircraft on which everything would open and shut. This is something that every potentially "serious" modeler has no doubt experienced. Well, maybe there are still a few things that don't open and shut on my P-47, but it's as close as this modeler will get to fulfilling that boyhood dream. For subject matter, the P-47 seemed ideal.

About the time the decision was made Jemco and Bob Holman kits (and C.A.P. semi-kits) were getting good reports in the mags. I had access to the Brian Taylor plans. It had to be built light (I had learned that much from the reports), but I was confident that twenty years of competitive free-flight modeling would see me right on the weight side of things. I wasn't to be disappointed.

"A light model will fly better than a heavy one" is standard parlance in the model world. You can expect a "heavy" model to come out of a serious ding in better shape than a "light" model, you can choose light, stringy wood (rather than light and pithy) and still come out with a pretty strong model. For adhesives, I stick (no pun intended!) mainly to PVA (thinned 10 percent with water) and avoid, as much as possible, great blobs of epoxy, which probably add more weight than strength. Thinned PVA is excellent, provided that you have tight fitting components. In the U.S., you refer to this family of adhesives as Aliphetic white glues. It's worth appreciating that if you wind up with gaps to fill, since gap fillers weigh a darned sight more than balsa! Incidentally, I've found that once PVA is thinned, it dries harder and sands better than when used straight out of the bottle.

You don't need a lot of imagination to appreciate that a model is built to fly (rather than to crash), and the lighter they are, the better they fly. My P-47 came out at 9½ pounds all up, and that includes seven servos. While on the subject of weight, it is perhaps worthwhile mentioning the so-called "penalty" incurred by adding scale detail. This worries a lot of scale modelers and maybe scares many budding scale builders away.

If the right materials are used, then the weight incurred amounts to next to nothing. I should be careful to stress that there are many good custom-made scale aids on the market—ready-made guns, instruments (even whole instrument panels for certain prototypes), pilots and dummy cylinders, to name a few. These are generally all high quality in detail, but suffer two main disadvantages. They are usually heavier than homemade equivalents, and they cost more. An additional bonus for the scale buff is that you get scale points for homemade detail. My dummy engine cylinders, for example, are made from solid blocks of one-inch light, pithy balsa. The finished products weigh 5 gr. each—that's only 35 gr. (bit over an ounce) for the whole front radial.

The pilot is a commercial head and shoulders, with the rest carved from stuck-on balsa. All the cockpit interior is from light balsa (the instrument facia is simply cardboard) while lithographic aluminum (available from newspapers or printers using offset printing) is used extensively for exposed panels, instrument bezels, hinge covers, wheel doors, louvers, exhaust shutters and cowl gills.

So far as final finish is concerned, here is an area where possibly the greatest weight saving can be made. I use no magic formula; rather, it is the gold old stock-in-trade procedure of dope over bare balsa. This is followed by heavyweight tissue (applied with thinned balsa cement or dope) and three coats of clear cellulose sanding sealer (TRITON L60R is the brand we have in Australia). This sets the scene for automotive grey primer/surfacer, which is then sprayed on and sanded out with wet 280 grit paper. It's at this stage that the clear sanding sealer applied before the primer is appreciated, since it allows the primer to be sanded back each time until "balsa" is visible, without actually cutting into wood. This way, you never apply too much grey primer and yet achieve a remarkably smooth and level finish.

Wherever possible, I use sanding blocks (either flat or shaped to fit contours) to eliminate "wavey" bumps in the surface (hand held paper is a real no-no!) Another firm rule I adhere to is to never allow finishing paper to become worn. Allow the grit to do the cutting and—the second you have to apply pressure—throw the paper out. Finishing paper is cheap compared to the rest of the model!

The only exception to all this is where inset panel lines are desired. In this case, the grey primer has to be built up along the tape lines. The lines are then etched carefully into the primer. *Never* etch as far as the wood or the wood grain will open up with time, allowing oil to penetrate, etc. If that ever happens, the cracks become virtually unfixable and they look terrible (take it from me!). Larger, exposed panels can be made by masking the outline, spraying or brushing grey primer up to the edge, then sanding back to the tape. The result is very convincing. Use thin tape (6mm plastic signwriter's tape is ideal). Remember, you only want to simulate metal panels which are probably no more than 1mm thick full-size. If you feel really keen, the same technique can be used for all panel lines. Remember that panels generally overlap from top to bottom and from front to back.

The final color coat is Humbrol matte enamel, thinned 50/50. This product covers so well that only two small cans of olive drab and two of neutral grey were used. This product is marketed in the United States as a paint for plastic models,

and it is not fuel proof. Weathering was carried out before a final coat of well thinned matte polyurethane varnish was applied as fuel proofer.

Weathering is something you read a lot about these days. My only comment is that I believe subtlety is the key. Ten years ago it wasn't done enough (if at all). But now a common error, in my opinion, is that it is often overdone. Certainly, aging and battleworn prototypes became somewhat tattered, but rarely to the extent that some modelers would have us believe!

Be aware that if you really want to weather a model, make sure that you have evidence of it in your documentation. A good judge won't usually wear the comment: "It must have worn sometime during it's life," if your photos or color pics show a prototype in pristine condition! Rather than randomly applying weathering with a wire brush and a spray can of "gunk," I prefer to scratch paint back in recognized wear prone areas, *e.g.,* along panel lines and other sharp edges, such as rivets, where paint suffered poor adhesion, and in areas where the ground crew usually operated, such as on access panels and the wing roots.

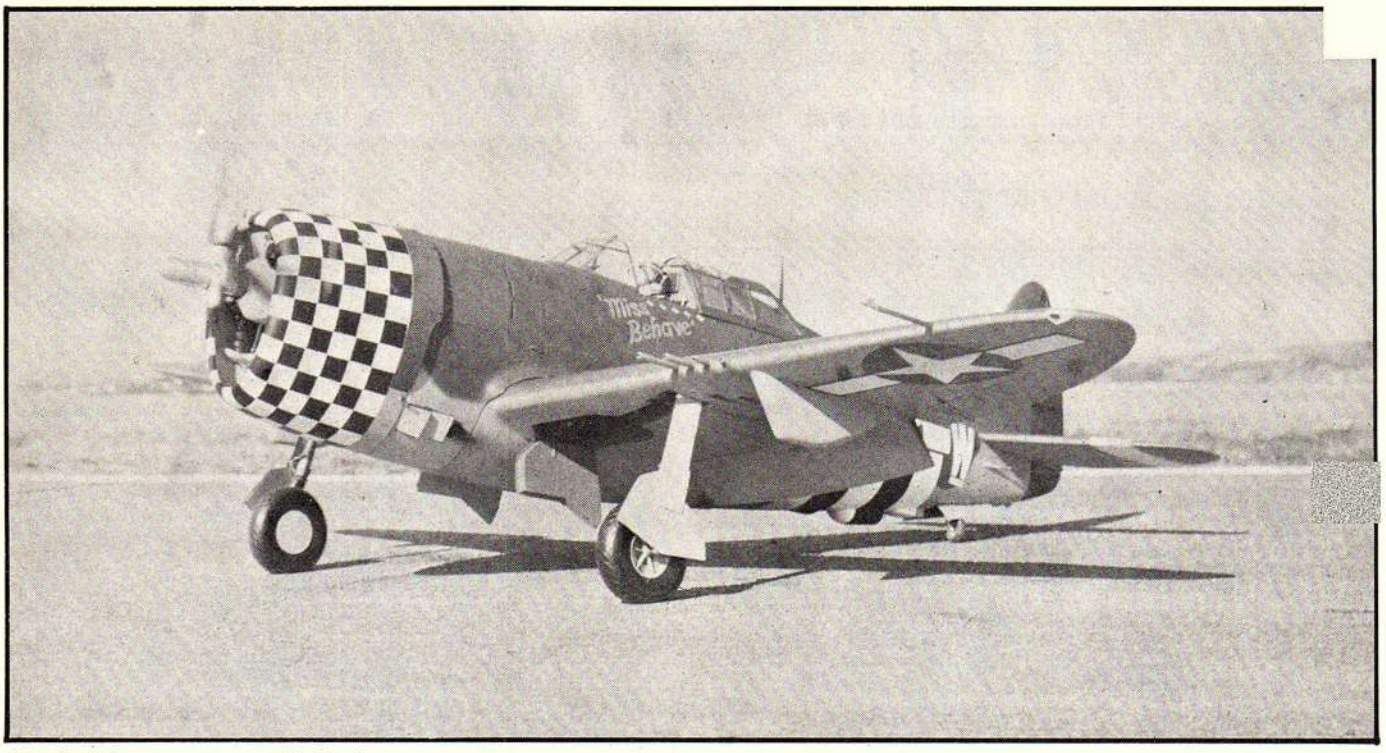
It is generally agreed by most authorities that operational aircraft were seldom allowed to reach a state of deterioration to the point where paint was literally flaking off all over. Such a state would have demanded an instant repaint!

Having some experience in scale model flying (mostly hard earned) I knew that the first essential move was to accumulate three-views, photos and general data on the model. Check out the accuracy of the building plans long before the first rib is cut. I had two options on "Miss Behave." Either the original, as flown in 1943, or a present-day replica, preserved in the U.S.A. The *Aeromodeller* one-twenty-fourth scale die-line drawing looked accurate in outline, but, after research, it appeared that the color representation was based on the "Miss Behave" replica. Unfortunately, the replica does not do justice to the original, *e.g.,* the white recognition stripe over the rudder should be pink and not white (on the original the red had bled through after repainting) and the call numbers were nowhere near standard military style. Other discrepancies also were in evidence. If I had used the *Aeromodeller* three-views, then I would have had to accept the replica color scheme.

Meanwhile, I found a good color side view of "Miss Behave" in *Thunderbolt Described, Part 1* (Kookabura Technical Publications), but still inaccuracies occurred. This time, it was the location of details. However, at least it was supposed to be based on the original, and the colors were accurate. So, I decided to use the latter for squadron color verification and, for accuracy of outline, I found very good three-views in *Aerodata International No. 6—Republic P-47D Thunderbolt.* Standard color specifications were obtained from *Camouflage and Markings No. 15* (Ducimus Books).

I guess the biggest thrill came as I was getting close to the finishing stages of the model. Graham Main had loaned me a heap of good T/Bolt books, among them *Aircam Aviation Series—Republic P-47 T/Bolts in USAAF—RAF—Foreign Service No. 2.* Browsing through it, I stumbled across a picture of a line-up of MX (82nd) Fighter Squadron, based at Duxford, UK in 1944. Second in line was "Miss Behave!" Now I could happily finish the model to a Class I standard of the original.

The model could have been completed within a year if it had not



The P-47 features a scratchbuilt dummy engine, sliding canopy, flaps, retractable tailwheel, etc. The model started life as a Top Flite kit.

The author's masterpiece, a Jug with lots of things that move.

been for two real bugs that slowed progress. The first problem was modifying the top deck to the razorback configuration. I was stuck on the idea that the razorback was the only version of the P-47 that looked like a "Jug." Unfortunately, the Brian Taylor plans showed the bubble canopy version. It wasn't until I started to draw up the formers from diminutive 1/72-scale cross sections that I realized that it wasn't going to be easy (at this stage I conceded full admiration of kit manufacturers for their work in developing ready-molded top decks!). It took three attempts before I was satisfied that I had the complex curves and taper of the razorback looking as it should.

The second problem was more frustrating and concerned the operation of the secondary, main wheel doors. Had I foreseen the time it was going to cost me in devising a system that worked without a separate servo, I'm sure I would have seriously considered a fixed undercarriage! The specifications for a workable system were:

1. That the doors should go up *after* the wheels had retracted.

2. They should stay rigid in the open position. Firstly, I tried a simple, Z, torsion bar (.016 wire) to keep the doors sprung open and a 16-gauge trip wire for the wheels to contact on their way in, to pull the doors behind them. This failed because the wheels had to travel *past* the trip wire to locate in their wells, and subsequently jammed against the corner of the trip wire and the door. Every possible position of the trip wire was tried.

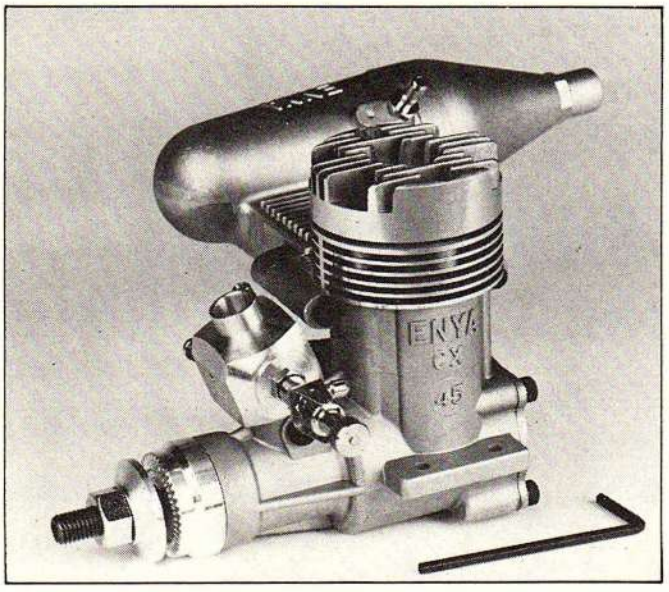
The next method was to use a cable strung tightly across the well. One end was anchored to the outer floor of the well, and the other end was attached to the inside of the door. When the wheel retracted, it was supposed to depress the cable and, thus, pull the door in behind it. It failed, because there just wasn't enough pressure on the cable (even with Rhom-Airs and Hydra Locks) and the doors only came in to about a 45-degree angle.

With the next method, I thought I had the answer. What about a double acting spring, folks? The trip wire once again looked promising as the wheel only had to get the door past center to actuate the spring. The idea came to me when I noticed how my car's gas cover operated. Simple! I then took more notice of other two-way springs in their ubiquitous applications. One that looked really applicable was a side vent in Norm Murton's Toyota "Cruiser" land vehicle. Great idea, but . . . try to get the same thing to work in miniature! After five weeks, I gave up. Anyway, my family, by now,

(Continued on page 80)

SCALE SHOWCASE

Items for the Builder of the Model



ENYA .45CX

One of the most reliable engines we've ever owned is the Enya .45. It starts first flip, every time, has gobs of power and throttles so reliably that we never have to tinker with it. Now, the extra power available from Schneurle porting has been incorporated into the new .45CX. Also, the Aluminum/Chrome piston and liner combo makes for longer and faster running. Twin ball bearings are used on the crankcase, and that big 7mm carb really lets the powerplant open up. This beast is rated at 1.3 hp (without muffler), and will turn up like those racing .40s, yet is gentle and easy to handle.

Look for this one on your dealer's shelf, as imported by Enya Model Engines, P.O. Box 286, Fords, NJ 08863.

* * * * *

RUBBERMAN

One of the neatest pilots we've seen is the vinyl latex rubber version available from D.G.A. Designs. Like a big rubber glove, the 1/4 and 1/3-scale figures are as light as a feather. Because of the molding process used, lots of fine detail can be achieved in the finish. The kit can be either a sportsman or barnstormer style figure, with a leather-like flying helmet, jacket, sport cap or goggles (all included). The instructions show how to make fur collars and how to fabricate sunglasses.

The 1/4-scale version sells for $11.95, while the 1/3-scale pilot is $19.95. A 1/6-scale figure is in the works. Check for these at your hobby outlet, or order direct from: D.G.A. Designs, 135 East Main Street, Phelps, NY 14532.

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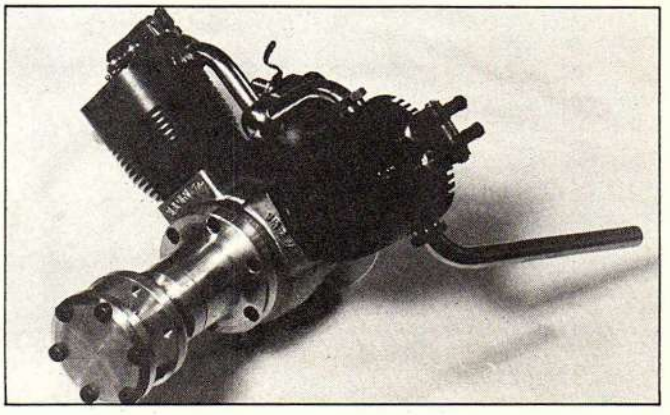

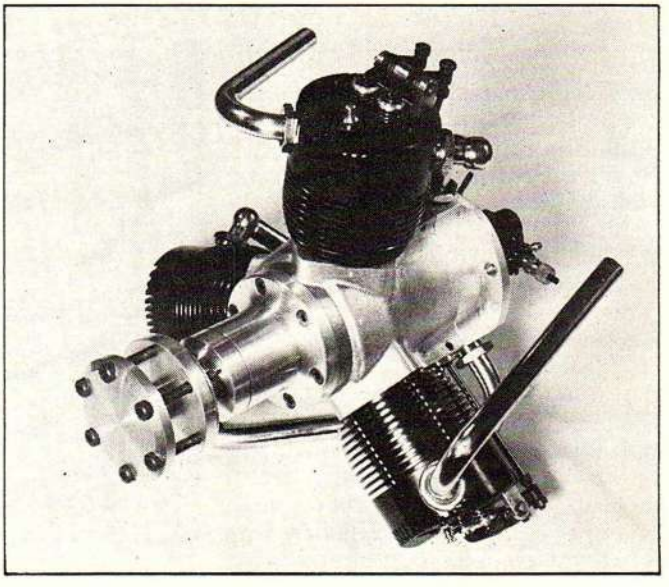

PEARSON POWERPLANTS

Pearson Power Products is importing the new Magnum engines. These are unique engines, being four-strokers. They are available in either glow or spark plug configurations.

The .91 is a single cylinder four-stroke powerplant. It is noteworthy for its small compact size, and its good performance. The glow version is $198, while the ignition model (less coil) is $245.

One of the most interesting engines in the series is the V-twin. We assume that this is a simultaneous firing arrangement. This should make a great engine for the aerobatic giant models, like the big CAPs which are turning up everywhere. The engine turns a 20-8 prop at 6,000 rpm on glow! This 1.82 c.i. powerplant sells for $450 in the glow configuration, and $510 as a spark engine.

The three cylinder version is only available currently as a glow engine. This unit will swing a 20-10 prop at 6,500 rpm. The $675 price includes shipping.

For more information on these engines, contact: Pearson Power Products, RR #2, Box 64, Effingham, IL 62401.

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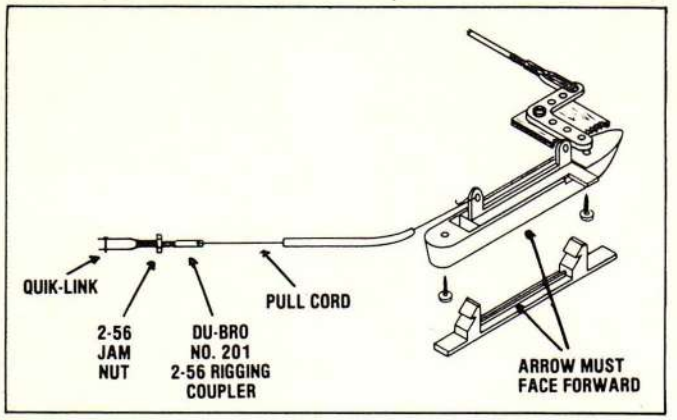

NEW BOMB MECHANISM

Vortac Manufacturing has revised and improved their bomb release mechanism. The new mechanism is easier to operate, requiring only 1/16″ of servo travel. There is also a release arm, which allows the ordnance to be released manually, without turning on the radio. Either cable or bellcrank can be used to actuate the mechanism.

Look for this improved gadget, and the other Vortac accessories at your retailers, as manufactured by Vortac Mfg., P.O. Box 469, Oak Lawn, IL 60453. Price $6.98.

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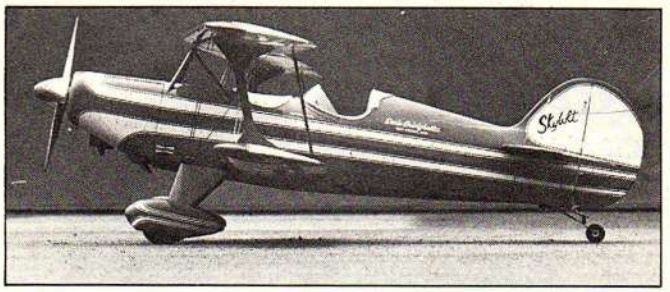
STEEN SKYBOLT

Dario Brisighella has just released the plans for his new giant-scale Steen Skybolt. Dario developed these scratch-builder's drawings working directly with Mr. Steen. The 78″ span model is scaled at 3.75 inches-per-foot. The bipe sports a generous 1,600 sq. in. of area. Dario says that the finished model will weigh in at 17-22 pounds. He recommends 2-3 c.i. engines, and says that the Q-50 Quadra delivers outstanding performance.



The plans give listings for suppliers of various components, such as cowls, landing gear, etc. The plans are shipped rolled, via UPS. Price is $30.00 (add $2 for C.O.D.) Order direct from: U.S. Quadra, 1032 E. Manitowoc Avenue, Oak Creek, WI 53154.

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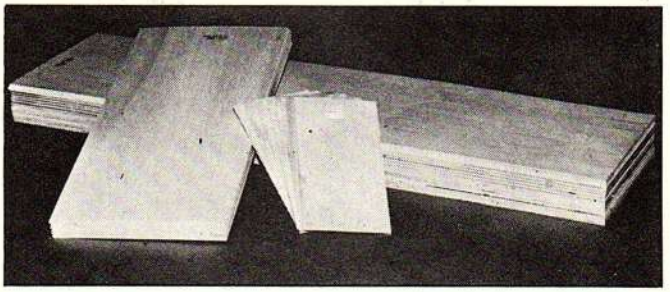

GIANT-SIZED LITE-PLY

Modelers who are into giant-scale can now take advantage of the special properties of Midwest's Lite-ply. The lightweight plywood is now being shipped in 3 and 6mm thicknesses (approx. 1/8″ and 1/4″). If you are looking for ways to save weight, yet still need the strength of plywood, Lite-ply is the answer. It's not as strong as aircraft-grade

ply, but for applications like gussets, doublers, etc. it gives more than ample strength.

Lite-ply is sold in 6x12″, 12x24″ and 12x48″ sheets, and is available at hobby retailers. Manufactured by: Midwest Products, P.O. Box 564, 400 South Indiana Street, Hobart, IN 46342.

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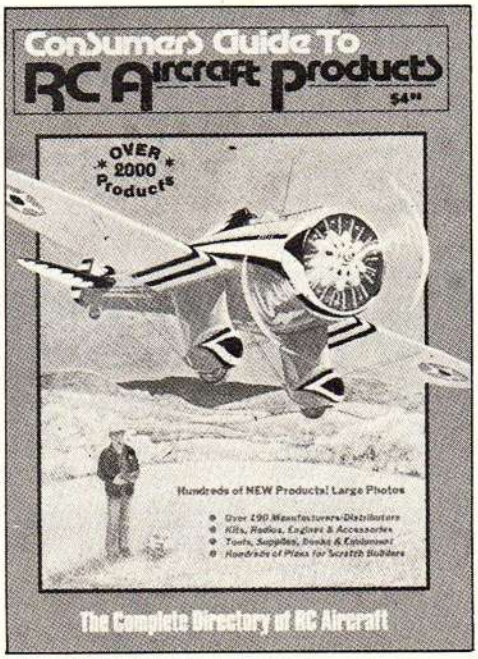

CONSUMERS GUIDE

You don't always get the complete picture of what's available by reading the magazine ads or visiting the hobby shop. Some companies are so small that they just can't advertise and often aren't stocked by the retailers. That's where the *Consumers Guide to R/C Aircraft Products* comes in. It has over 2,000 products listed in its 242 pages. There are over 80 pages just listing kits! There's also a nice chapter on plans, which details scratchbuilder plans from various sources.

The *Guide* is available at hobby shops, or direct (include $1.65 postage if ordering direct). Priced at $4.95, the book is published by Kaufman/Sumner, Inc., P.O. Box 376, Great Falls, VA 22066.

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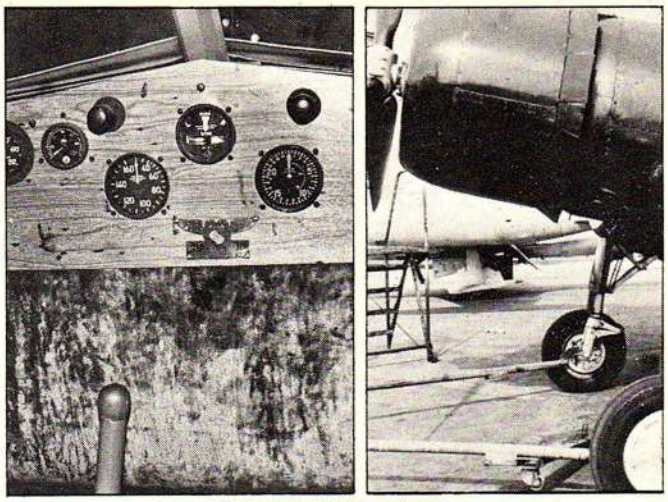

AIRCRAFT IN DETAIL

Photo documentation can be one of the most frustrating areas for the scale researcher. Getting documentation from books can be expensive and time consuming. If one strays from the fixed path of documenting WW II fighters, the task of finding good pics can be almost impossible. Try to find materal on planes like the L-19 "Bird Dog" or Curtiss Robin and you'll be lucky to locate a half dozen usable shots.

A new company, Aircrafts In Detail, has solved all of that. A professional photographer has traveled the circuit of the museums and airfields of the world and taken literally thousands of high-quality photos. The list we saw had over 250 aircraft, and another 50 were being added from a trip to the airfields and museums of England. There's more here than your typical snapshots. There are cockpit photos, undercarriage and external details, and even some airframe (uncovered bones) pics. The depth of some of these photo sets makes them usable for even Precision Scale, with some 65 shots of the JN-4D Jenny, 69 for the Curtiss Hawk, 58 for the Boeing F4B-4 being typical.

The only flaw we found was the lack of color shots, but the serious scale documentation package is not going to rely on the inaccuracies of color photos as proof of color, anyway. The modeler can order 3x5″ prints, as complete sets, for very reasonable prices (usually for about what one or two reference books would cost). If desired, custom 8x10″ or 5x7″ prints can be individually ordered.

A complete catalog is available for $2 from: Aircrafts In Detail, P.O. Box 2516, Van Nuys, CA 91404-2516.

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Become an active supporter of living history by joining the AAF and contributing to the restoration and operation of numerous historic aircraft. Be a part of America's aviation heritage and the exciting world of vintage aircraft restoration. ANYONE CAN JOIN—the only qualification for membership is the interest you share in preserving America's proud history of airpower!

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- ★ **The quarterly AAF newsletter that keeps you up to date on museum activities and restoration progress, airshow schedules and other news of interest.**
- ★ **A FULL COLOR in-flight photo of the B-25 *"Executive Sweet"* in D-Day invasion markings.**
- ★ **Special discounts on aviation books sold through the museum bookstore.**
- ★ **An AAF decal proclaiming "WE KEEP 'EM FLYING."**
- ★ **Wallet-sized identification card indicating ASSOCIATE, AIRCREW or FLIGHT COMMANDER membership status.**

In addition AIRCREW and FLIGHT COMMANDER members receive a frameable certificate of membership and enjoy FREE TOURS of AAF museum aircraft at airshows or at the AAF base in California and FLIGHT COMMANDERS receive FREE flight privileges for scheduled orientation flights at airshows in California. AAF LIFETIME MEMBERS receive, in addition to all of the above, special discounts on Warbird checkouts provided they are pilot rated.

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SAILPLANE CATALOG

Wilshire Model Center is the recognized hub of scale sailplane activity in the U.S. This small shop carries everything, from the most elaborate European custom made scale sailplanes, to the smallest hard-to-find linkage. They have just put out a 51-page catalog, which itemizes just a few of the specialty items they stock. If you are into scale sailplanes, send $2.50 for this "must have" catalog. Wilshire Model Center, 3006 Wilshire Blvd., Santa Monica, CA 90403.

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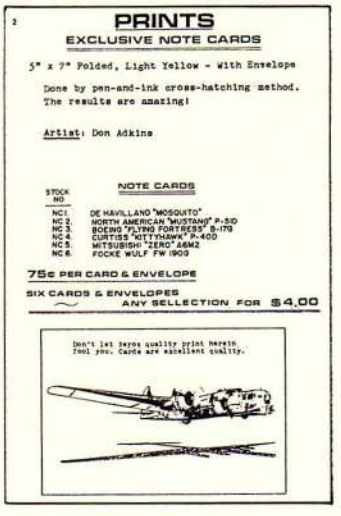

REPLA-TECH EXPANDS

Repla-Tech International has grown from a small one-man company several years ago, to a major clearing house for almost any kind of scale information. The Robert Hirsch drawings have been available through Repla-Tech, as are the Karlstrom drawings. Now, the noted *Aviation News* drawings from Britain, as well as the MAP drawings, are listed in the latest catalog. There are so many drawings listed that it takes an entire evening to work through the catalog. The new drawings are featured in an 11x17″ format, making them much more usable for the scale modeler.

If there is documentation you need, one of the first reference sources you should contact is Repla-Tech International, 48500 McKenzie Hwy., Vida, OR 97488. Catalog #1 (Aircraft) is $2.60, while the Scale Drawings Catalog "A" is $1.75.

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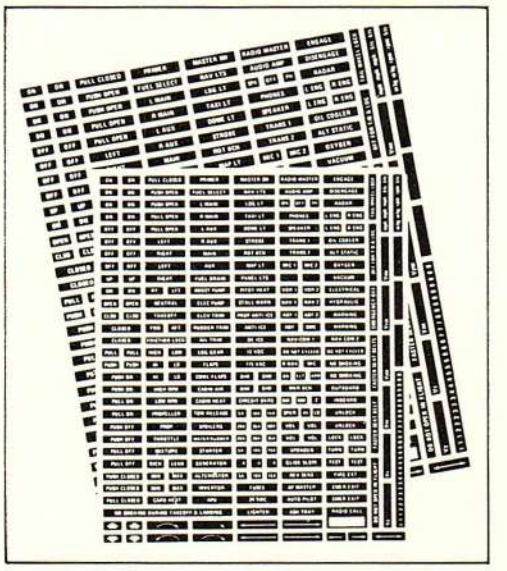

COCKPIT PLACARDS

These aren't instrument faces, but instead these sheets are all of the printed verbage that is on every instrument panel. Such terms as "AUX," "CABIN HEAT," "STALL WARNING," etc. are available in an easy-to-use format. These come in either 1/5, 1/4 or 1/3 scale sizes. Order them at $1.25 per sheet (postpaid) directly from Avco.

If you are in the market for giant-scale P & W cylinder assemblies, Avco has them. Each set includes cylinders, case are optional items. The cylinders are filled plastic, and rocker covers, pushrods, etc. The collector ring and crank-they look most realistic. Set of five ($22.95), seven ($27.95) or nine ($32.95).

You can also order only the front half of a P & W 7 cylinder for $4.95, or a Sakae 21 type engine for a 1/5-scale Zero ($4.95).

Order these items directly from: Avco Model Supplies, 1885 Dyson Street, Muskegon, MI 49442.

* * * * *

CYANO-SET

ACE R/C has released a new accelerator for cyanoacrylate instant glues. Cyano-Set helps those instant glues to bond even faster. One quick spritz from the handy push-button

non-aerosol dispenser and the adhesive "fires off." This is most helpful when working with the slower setting glues, since the time can be taken to correctly position the parts then, when everything is ready, a squirt of Cyano-Set causes instant bonding.

The material comes in a plastic bottle, so there's no breakage problem with Cyano-Set. All of these accelerators seem to evaporate quickly, primarily because they are freon based.

Cyano-Set is on your dealer's shelf, as manufactured by: ACE R/C, Box 511, 116 W. 19th Street, Higginsville, MO 64037.

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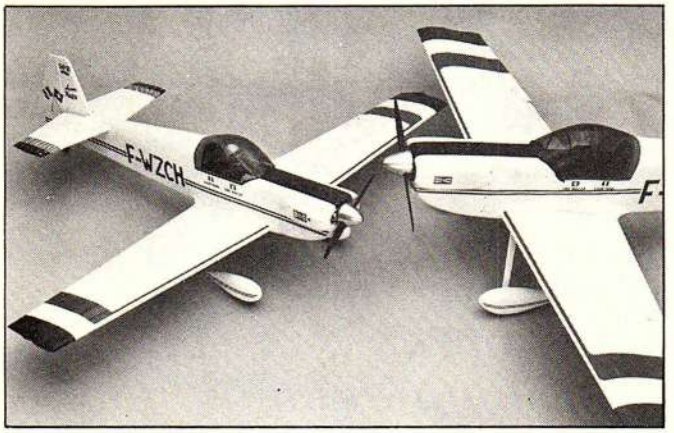

CAP 21

This new release from Great Planes is certain to give new meaning to the term "Sport Scale," because it combines a high performance design in a .60 size, all-balsa scale kit.

The 72" span model (on the left in the photo) is big, as far as .60-size models go, yet it is not so large as to cause problems in transportation. The wing area is 756 square inches, which creates a very light wing loading, since the plane weighs only 7-8 lbs. The light wing loading, combined with long moments and large control surface, makes the CAP 21 a real joy to fly. Aileron response is light and crisp, and rolls are truly axial. Snap rolls will now join your list of desired maneuvers because, with this model they are predictable and precise. And this plane will knife edge like it was made to fly on its side.

What sort of power? A standard .60 will yield standard performance; however, a Schneurle .60 will provide enough power to complete the entire Aresti series of "turnaround" style pattern maneuvers. For those looking for the ultimate, a .90 four-cycle might just be the way to go. The other CAP in the photos is their Giant-Scale version.

Included in the kit are all machine cut and sanded balsa parts, ABS cheek cowl and wheel pants, landing gear, hardware, decal sheet, rolled plans and a completely illustraed instruction booklet.

For a truly outstanding Scale project, see your local dealer for the Great Planes CAP 21. Retail price is $124.95.

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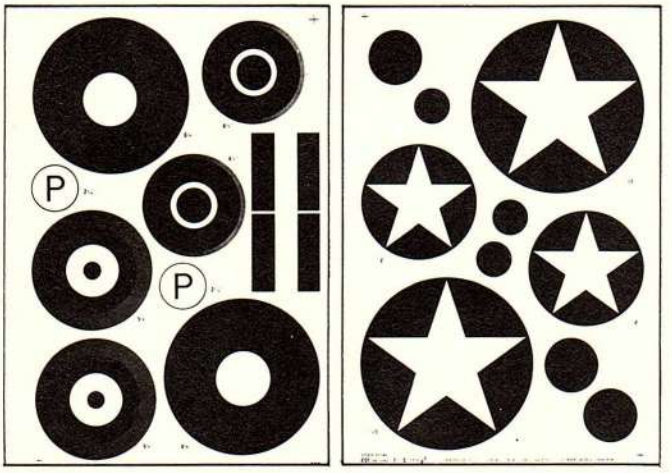
MAJOR DECALS

A new decal manufacturer has made the scene. Major Decals is manufacturing both mylar pressure-sensitive decals, as well as those hard-to-find water transfer types. They are also concentrating on the popular scales, with 1/8, 1/6, 1/5 and even 1/4-scale sizes available. They are currently offering the national markings for U.S. (both pre and post-1943), British, German, Japanese and Canadian aircraft. In the works are Italian and Swedish insignia. They also make a series of letters and numbers in compatible sizes, and in ten colors. The 13x20" sheets are of excellent quality, and the colors and register of the insignia are very good. The water transfers are not flimsy, and proved easy to handle, yet thin enough to look painted on.

Look for the Major Decals at your hobby shop, as manufactured by: Northeast Screen Graphics, 21 Fisher Avenue, East Longmeadom, MA 01028. Since the people at the company are modelers, they might be very helpful to scale modelers who require custom work.



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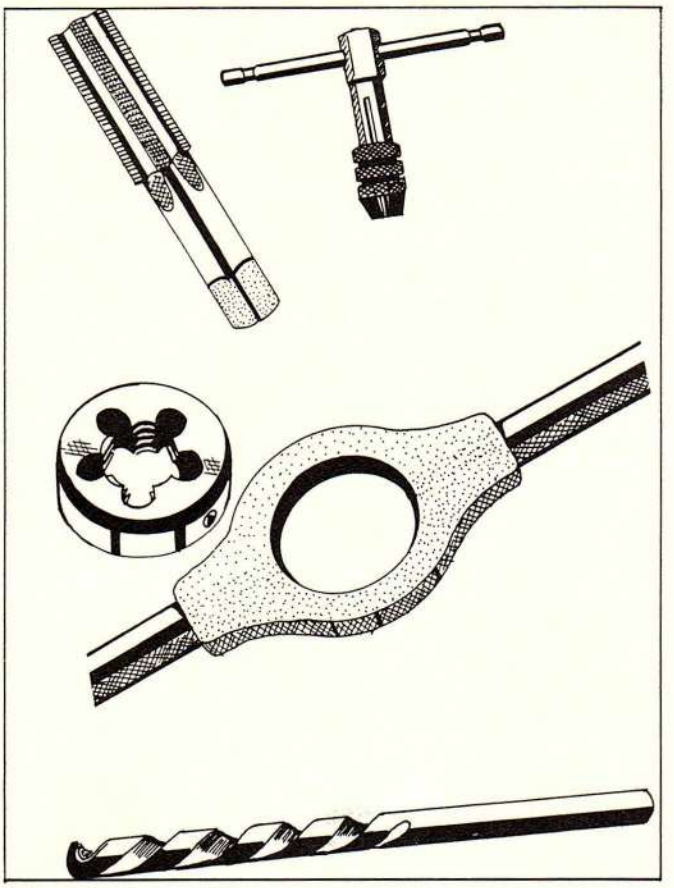
ACE TOOLS

ACE R/C has always been a good source of supply for those hard-to-find tools. They have just added some excellent ones to their line. Aircraft drill bits are impossible to locate. These 6″ and 12″ long drills are real life savers, and every modeler should have a set to drill those impossible holes. These come in 1/16″, 3/32″, 1/8″, 3/16″ and 1/4″ diameters, in either 6″ or 12″ lengths.

ACE also has some good quality carbon steel taps and dies. Available in all common sizes from 2-56 through 1/4-20, the taps or dies can be ordered individually, or in complete sets with T-handle and a die handle. These are perfect for everything from rethreading bolts (or making your own), to doing engine mounts and wing bolts.

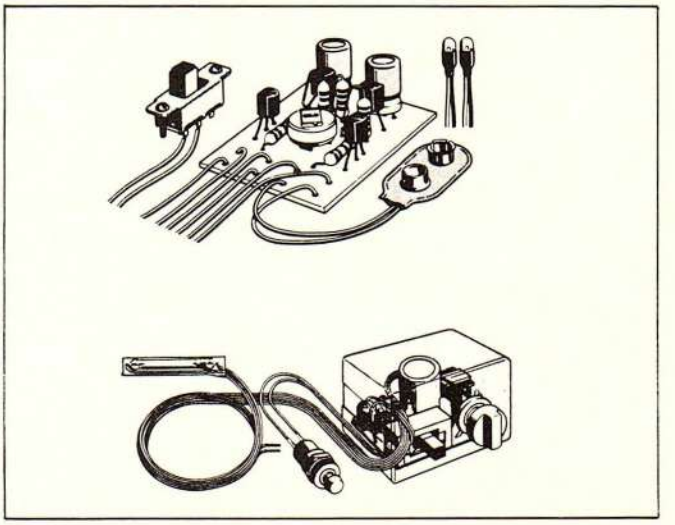
Check these tools out at your retailers, as manufactured by ACE R/C, Box 511, 116 W. 19th Street, Higginsville, MO 64037.



ELECTRICAL GOODIES

MRC has a line of do-it-yourself electronic kits. While these are primarily intended for the model railroad buffs, several of the items adapt ideally to R/C. They make a flasher light set (EC 0001) which is perfect for navigational lights. It can be regulated to pulse at anywhere from 1½ to 15 flashes per second. Price $10.98.

There is also a strobe light system (EC 0005). The literature doesn't specify how many lights it drives, but we suspect that it's one. The unit can be adjusted to control the number of flashes per time interval. Price $26.98.



With these handy units, you can build your own lighting systems from kits. Check for these at your retailers, as manufactured by: MRC, 2500 Woodbridge Avenue, Edison, NJ 08817.

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DREMEL CUTTERS

Dremel is using a new process to make these six extra-sharp carbide cutters. The tungsten carbide is bonded to the mandril in a way which exposes thousands of jagged edges along the cutting surface. These cutters literally tear through almost any material, doing the job in just part of the time normal cutting tools take. Another benefit is that the tips run cooler, and they will definitely outlast any abrasive-type cutter.

Check for these sharp little buggers at your hobby counter, as manufactured by: Dremel, 4915 Twenty-First Street, Racine, WI 53406.

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STANDARD SERVO

In today's fast-moving electronic picture, where servos are getting smaller waterproof, etc., Charlie's R/C Goodies has brought out a good old standard, no frills servo. The servo delivers 20 oz./in. of thrust. With dimensions of 3/4x1-7/16x 1-9/16", the servo is about the size of the old Kraft KPS-12. Weight is 1.38 oz., and the servo is shipped with a Deans connector.

So, you say, what's so great about that? Check out the price. This servo normally sells for $22.95, but it is now available at a special price of $13.95. How can you go wrong?

Order this servo direct from: Charlie's R/C Goodies, P.O. Box 192, Van Nuys, CA 91408.

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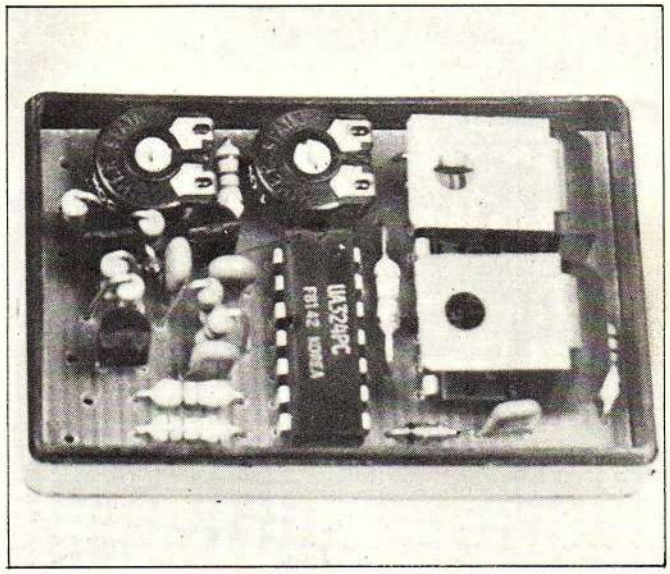

MORE JOMAR

Jomar has added yet another electronic goody to its product line. Besides their popular coupled aileron and rudder black box, and their synchronization device for twin engine aircraft, they now make an Accessory Controller. This little box makes it possible to operate two separate functions (for example, bomb drop and brakes) from one receiver output. It's just like adding an extra channel to your radio! This tiny box (13/16x1-5/16x2-1/8") simply plugs right into the airborne package.

The Accessory Controller is priced at $29.00, and is available through hobby shops, as manufactured by: Jomar, 2028 Knightsbridge Drive, Cincinnati, OH 45244.

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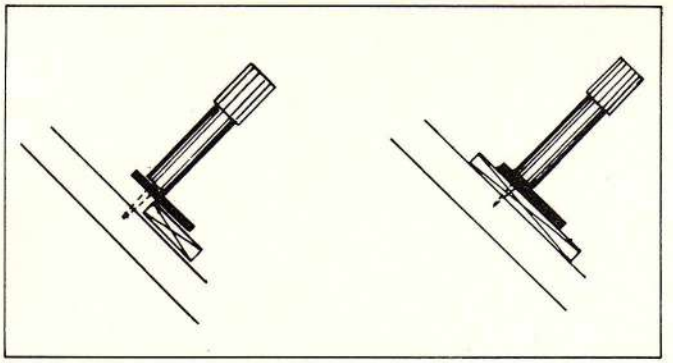
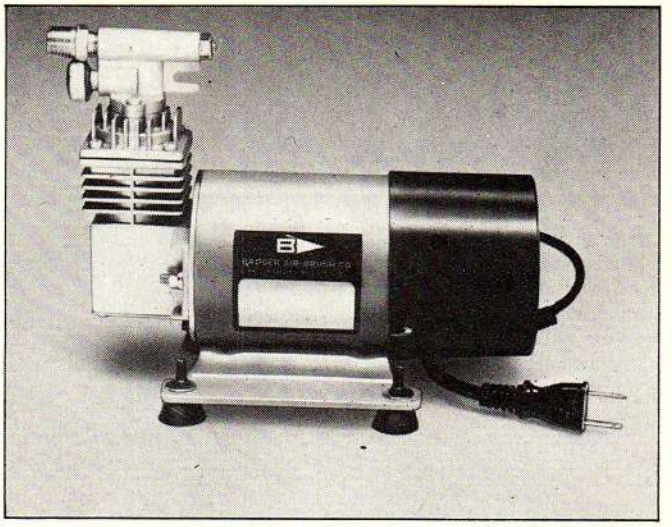


TWIST PINS

Actually, the manufacturer calls them Thumb Clamps, but Twist Pins better describes these nifty securing devices. They are actually small wood screws, molded into the end of a plastic housing . . . it's as if the screws had their own screwdriver already attached. A removable base plate is included, to redistribute the compression load over a broader area. Use these to lock down those hard to glue pieces, such as sheeting, longerons, etc. If securing hardwood, such as a spar, use the base plate and apply the screw in the wood adjacent to the piece being glued. It's like having a handful of tiny clamps, and it really solves those odd building jobs where pins just won't handle it.

Because the screw end is only about 5/16″ long, these Twist Pins are restricted to somewhat thinner pieces of wood, which is the only criticism we have of the product. In 90% of the jobs we did, they were the perfect tool.

If you can't find these at your hobby shop, order them direct from: YUZ, 3800 Barr Ct., Boulder, CO 80303. Prices: $3.00 pack of three, or $9.60 a dozen.



WHIRLWIND COMPRESSOR

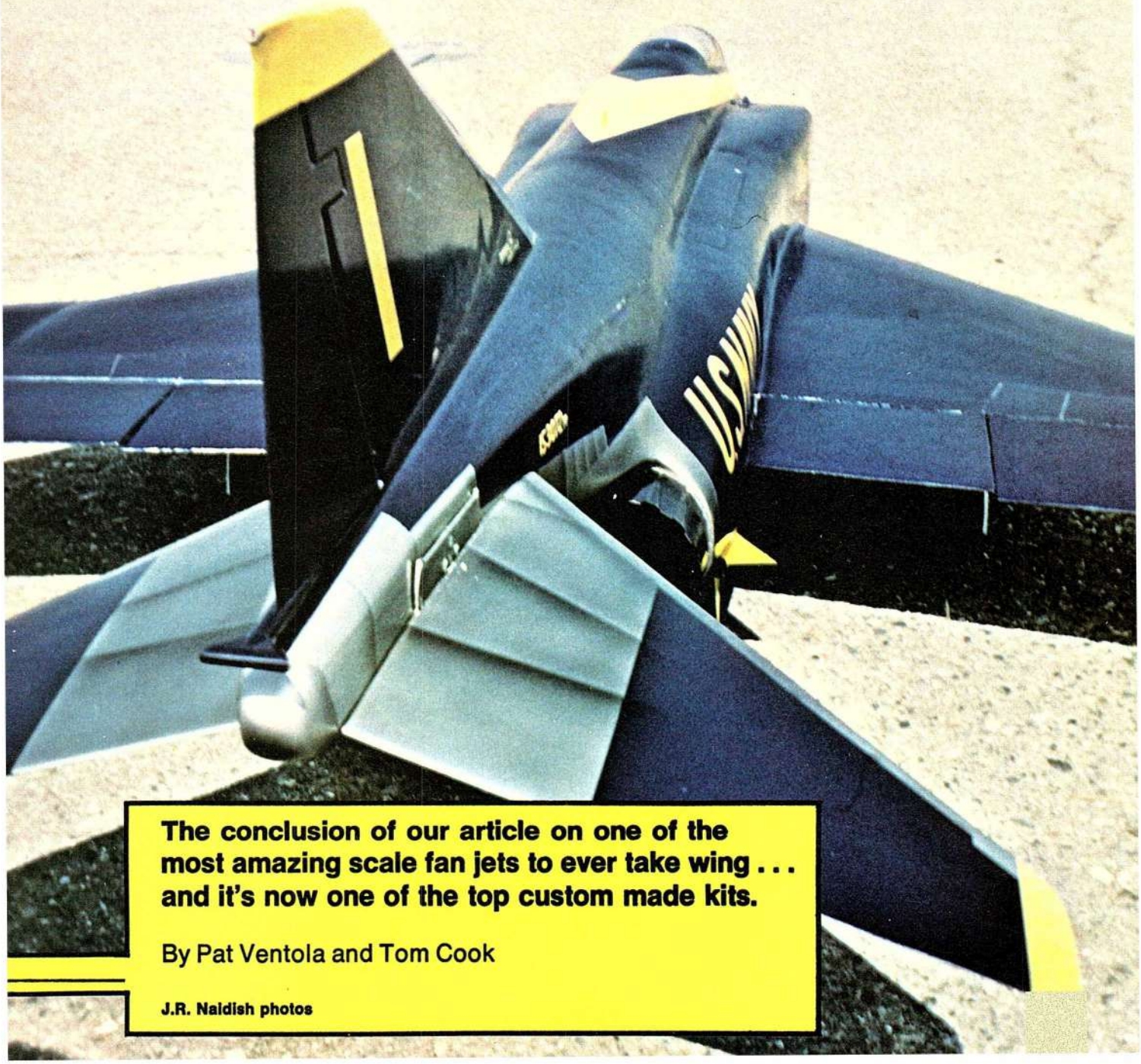
Badger has introduced a new portable compressor, which is a vast improvement over their previous models. The Whirlwind has greater capacity, with a maximum psi rating of 50 pounds. The compressor can deliver .33 cfm at 20 psi That's significantly better than most hobby units. The unit uses a 1/2 hp motor. A nice feature of the compressor is an internal pressure relief valve, so that you don't have to keep expelling air through the gun in order to avoid rupturing the diaphragm. This enables you to leave the compressor running while you change paint pots or do other things.

Look for the Whirlwind at your hobby emporium, as manufactured by Badger Air-Brush Co., 9128 W. Belmont, Franklin, Park, IL 60131.

□

Two-Fanned PHANTOM II

PART TWO



The conclusion of our article on one of the most amazing scale fan jets to ever take wing . . . and it's now one of the top custom made kits.

By Pat Ventola and Tom Cook

J.R. Naidish photos


U.S.N
Blue Angels


FM
AF 482 TFW

Tom Cook poses with his monster jet to give some perspective to the size of this fan-powered brute.

In the first installment (August issue), Tom Cook discussed the basis for doing a kit of his Masters winning Phantom. The model has a seven-foot long fuselage, so you can imagine how much work goes into just laying up one glass fuse. Tom hand makes each kit himself. Let's now get into the twin fan engines, as well as the flying of the model.

* * *

It's even more important in our next step, flying the Phantom. The C.G. must be *exactly* as shown, and control throws set as indicated on the plans. When you're ready to fly, start at the nose of the airplane and work back. Check every part of the model. Make sure every nut and bolt is tight. Don't neglect little items like wheel collars. Make sure the tires run true and spin freely.

After each system is checked out, you're ready to work on the engines. Start each engine and set it independently. Make sure it's running slightly below its peak and accelerates smoothly. You don't want them to go lean in flight. Take your time and make sure each engine is right. After each engine is set independently, run them together. Do a thorough range check with both engines running.

Make sure the radio is rock solid. Cycle the gear and check for air loss. If you're satisfied everything is working properly, refuel the Phantom and check the glow plugs. Glow plugs take a terrible beating in fan units, where rpms are always over 21,000, so a close watch is needed. At the first sign of engine problems, check the glow plugs. Start both engines and make a quick check of all control surfaces. Be sure the engines are running smoothly.

On the first flights, have a buddy hold the Phantom at the end of the runway (I'm assuming you're on a runway, as the F-4 isn't much of a mudder) and station yourself about 300 feet away. Bring the engines to full throttle and allow them to stabilize. Signal your buddy to let go, and the fun begins.

You'll find that the F-4 tracks straight as an arrow. The wide-stance main gear and tandem nose wheels are the best possible arrangement to insure good ground handling characteristics. Allow the speed to build up and, as the aircraft passes you, gently rotate to takeoff. Keep the climb angle modest on the first few flights, until you have a feel for the airplane. Remember you can't get into trouble trying to take off with too much speed, only with not enough.

Ease through the first turn, and you're home free. Very little trim should be needed. Keep the first few turns shallow and allow speed to build. On your initial flights, altitude and airspeed are your best friends. Fly the circuit high and make sure everything is working, before attempting low level maneuvers. When the F-4 gets to speed, it goes wherever you point it. It flies like a pattern airplane, and the rolls are smooth as silk. But keep ahead of the airplane, and go easy on the sticks.

Everyone's going to be taking pictures, kibitzing and otherwise making you very nervous. Concentrate on the airplane. Have someone you can rely on standing next to you. Four pair of eyes are better than two. Besides, a good coach always helps keep the jitters to a minimum. Have him also watch the clock.

After five minutes on the first flight (it will seem like an eternity) set up for a landing. The F-4 is rock solid slow and will take a lot of abuse. It never has given the slightest indication of falling off on a wing tip. Set up at a modest altitude on downwind. Turn base at half throttle, and allow the bird to sink. Pretend it's a clean Pattern ship.

IN MEMORIAM

It is with the deepest sympathy that we announce the untimely passing of Pat Ventola, who was killed in a tragic boating accident just as the first part of this article was going to press. We hope that this magazine presentation in some small way keeps his memory alive. PHP

Turning final, judge the sink rate and add power if the sink rate is too excessive. A good way to judge sink rate is the amount of up elevator needed. If you find yourself using a large amount of stick travel, you can bet you need more power. Remember a fan does not react to power instantly, like a prop job. Just like in a real jet, don't get behind the power curve. Keep the nose down and let it come up only when you know the runway is made. Hold the nose up about 15 degrees when you're over the threshold, and the Phantom should settle gently to the runway. Don't worry about too much speed. You're a jet jockey now! Pop the drogue chute, and you'll find you have the most effective brakes ever. See, it's not just there for looks, after all.

We spent a great deal of time designing and altering the chute profile, so that it doesn't cause the F-4 to slew about on rollout. The F-4 won't taxi with the chute deployed, so have your trusty assistant go onto the runway and unsnap the chute. You can then taxi back to the pits. The only other words of advice I can give on fly the F-4 (or any scale model for that matter) are: Rule #1—*If anything* at all seems wrong . . . land. Rules #2 through 20—Never violate Rule #1.

A real plus for the Phantom is its single engine capability. The close to centerline thrust arrangement eliminates the asymmetric thrust problems common to most twin engine aircraft. The Phantom will maintain altitude from a level cruise on one engine. Handled properly, a normal approach and landing can be made. Again, don't violate Rule #1.

The F-4 has been a real challenge for me. I think it has evolved into a worthy competitor. As I said earlier, my biggest thrill was winning the '81 Scale Masters, closely followed by winning the "Pilot's Choice" Award at the '82 meet. I can honestly say that the only bigger thrill would be to see someone else winning the Masters with an F-4.

No one ever accomplishes anything alone, and I've been blessed with a lot of help along the way. Thanks to George Burlekamp for being the genius he is, and for helping me solve numerous machining problems. Dave Platt and Larry Wolf deserve praise for helping piece the F-4 back together at the '82 meet, when it seemed to be a total loss. I would especially like to thank my dad, Richard Cook (he's the one who stands next to me at contests and unhooks the drogue chute). My dad helped solve all the unsolvable problems in a project like the F-4. Even Pat Ventola was around for comic relief.

If anyone has any problems or questions on the F-4, write to me at: Silvertop Road, Raymore, Missouri 64083, or call anytime at: (816) 331-0356.

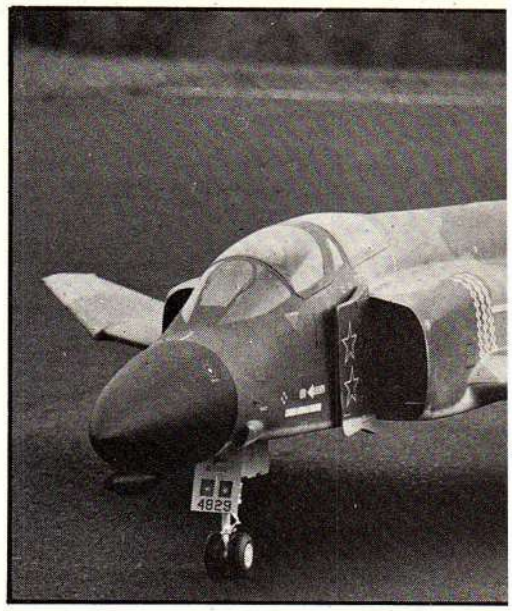
EDITOR'S POSTSCRIPT

After reading Pat Ventola's and Tom Cook's write-ups on the Phantom II, we felt it only just to interject some further comments on the amazing flight characteristics of the F-4. No, we haven't handled the sticks of the big jet, but we did have a rare opportunity to see, up close, just how smoothly and gracefully the jet flew. Tom's really too modest in his evaluation of the plane but that's his style.

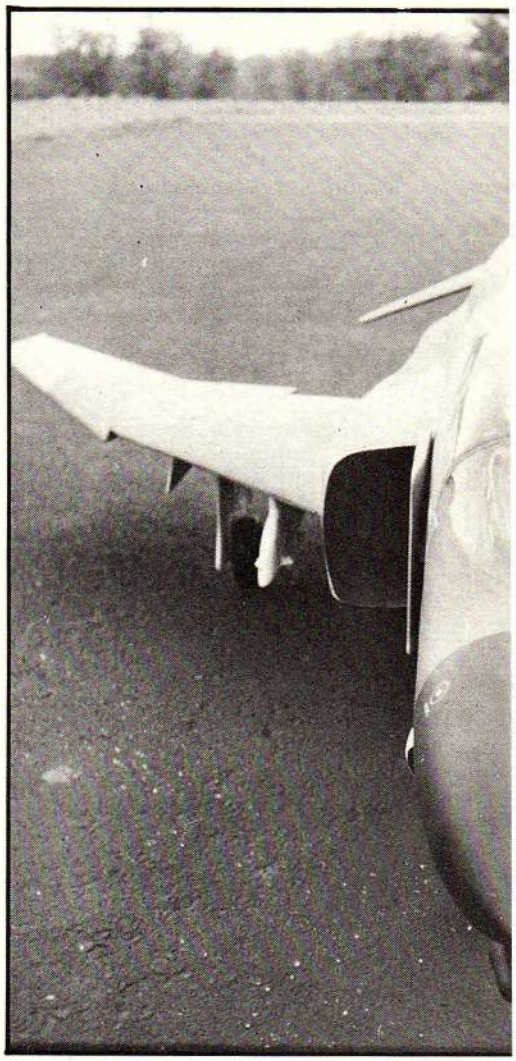
It was the '81 Masters. While the Phantom had scored among the best in the static competition, no one thought that the model was a serious contender among the usual field of superb WW II fighters. After all, the F-4 was too big, too ungainly—and it would probably prove to be woefully underpowered. It looked as if the deck was stacked against this type of model taking any hardware. The Kentucky runway was short, and not very wide . . . not the optimum place for an oversized ducted fan model.

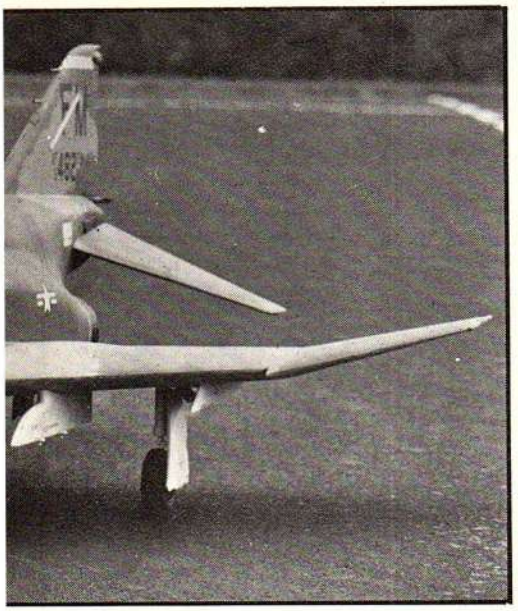
The pilots agreed that Tom had his work cut out for him to even avoid damaging the model on a blown takeoff or landing. Just flying the F-4 was akin to operating a jumbo jet from a hayseed rural airport. During the pre-contest practice sessions, Tom's father had to hold the model at the end of the runway while Tom revved the fans. By releasing the plane at full power, successful rotations were possible on the short runway . . . but those sort of antics would not be permitted during the contest. Everyone realized that even a small correction in direction during the takeoff roll would be enough to put the model into the rough grass at the end of the runway, instead of into the air.

Tom's a real pro, and he reacted well under pressure. He knew that each takeoff and landing had to be right on the numbers. The error factors were calculated in inches, not feet. The touchdowns had to be within the first plane length of the runway, otherwise, the big jet would simply catapult off the runover at the other end . . . even with the drogue chute! A slight miscalculation of airspeed could spell disaster. To add a twist to the situation, the run-



Done up in Vietnam colors, Tom's latest version of the Phantom II is a further refinement of the original design. (Cook photo)





If this shot doesn't turn you on, then you have no appreciation of the aesthetics of jet design! What a bird! (Cook photo)

The nose wheel just rotating, the F-4 is off the runway in an amazingly short distance.

way was perched on top of a knoll, so that it actually looked as if you were flying up a slope before touching down on the plateau. Even the smaller, more traditional planes found it problematic to hit the runway.

From the first flight, Tom showed his cool. He taxied the model out, blasted the engines, accelerated through a small puddle of water on the tarmac, then made the smoothest takeoff possible. The Phantom has a tremendous amount of power, because there are two big fans in a plane which is nowhere near double the weight of a typical one-engined jet. Also, of course, the "swept blade" effect found on prop-driven twins also exerts a positive effect on the Phantom. It's not unsurprising that the F-4 will fly fine on one fan.

Once airborne, there wasn't another airplane on the field which could hold a match to the Phantom's capabilities. The model is so big and dynamic that it captures your attention. The sound of synchronized fans screaming is awesome. The F-4 does very large maneuvers. The loops eat up lots of sky, and the rolls are from horizon to horizon. The machine is so prototypical as it goes through the paces that you feel as if you are watching the Blue Angels at an airshow.

We noticed that all activity in the pits stopped when Tom flew. Everyone was spellbound by the majesty of the F-4. Scale modeling history was in the making, and everyone seemed to sense it. A ducted fan airplane was showing the potentials of winning the Masters. Not only that, but ducted fans had come of age with a plane which no one ever though could even fly, yet alone win a contest. The Phantom II was at the fringes of what we all thought was the current technology, yet we were witnessing a model which flew with the ease and assurity of any "standard" plane. It was big, yet it wasn't complicated. It was unique, yet there were no scratches on the score sheets because the engines wouldn't run right, etc.

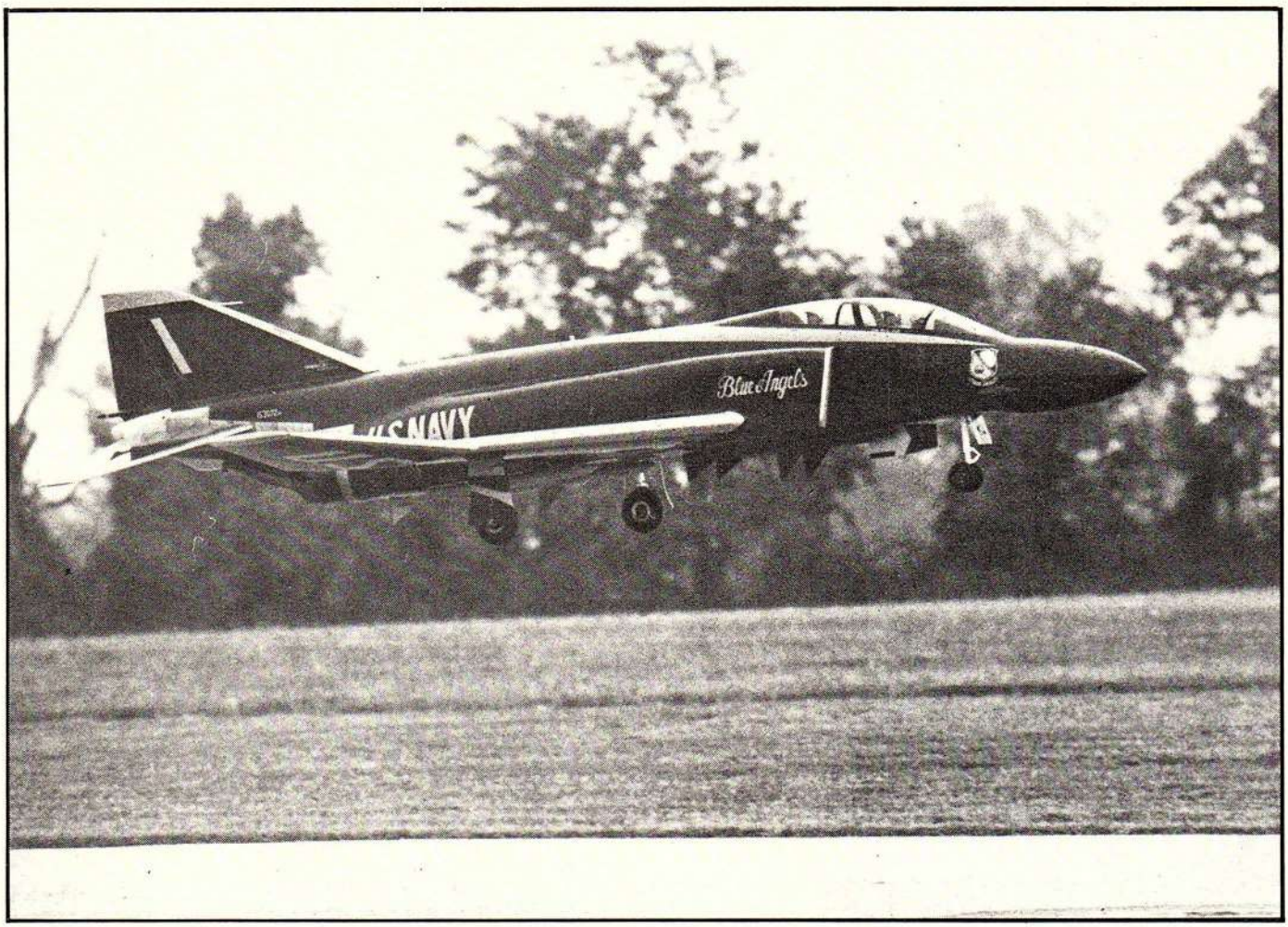
After each flight, the mutterings in the pits were that it had just been lucky, and that Phantom would start to behave like all of the ducted fans we had seen. The engines were bound to go sour, the plugs would blow, the nose would come up in a maneuver and there wouldn't be enough airspeed to complete the maneuver . . . yet these things just didn't seem to happen.

At the time, we din't know that Tom had done his homework so well that the engines in his F-4 were probably better tuned than the powerplants in any of the other planes on the field. With the deluxe kit which Tom manufactures, you get the engines already reworked and adjusted, just like Tom's. He even runs them in and sets up the pipes, so that you can literally fly the powerplants as they come out of the box.

By the end of the first day of flying, Tom's name was right up there near the top. The skeptics (which were most of us) were beginning to reevaluate their opinions. Maybe such a "novelty" model could give the pros a run for their money. It was obvious that Tom was a real champion . . . his landings showed that. Consistently, time after time,

(Continued on page 62)

Streaking into the wild blue, the "Blue Angels" Phantom has proven itself a top-caliber contest machine.



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If you ever wanted to fall in love with a starlet, here's one that will make a fan of you.


Starlet

By Jerry Nelson

The Corby CJ-1 Starlet is an Australian designed, Volkswagen-powered homebuilt. The all-wood structure is designed and stressed for advanced aerobatics. The wingspan is 18 feet 6 inches, with an overall length of 149.9 inches and a gross weight of only 630 pounds. That's a very small airplane, by anyone's standards. (Additional information on the full-size Starlet can be obtained from: *Hapi Engines, Inc., Eloy Municipal Airport, RR #1, Box 1000, Eloy, AZ 85231. Phone (602) 466-9244.* An information package is available for $7.00.)

My reasons for selecting the Starlet as a model subject were threefold:

1. It would be an aerobatic model, capable of all FAI maneuvers.
2. It would be 100 percent accurate in scale outline.
3. The plane would be giant-scale (¼-Scale) and still be a practical size to transport.

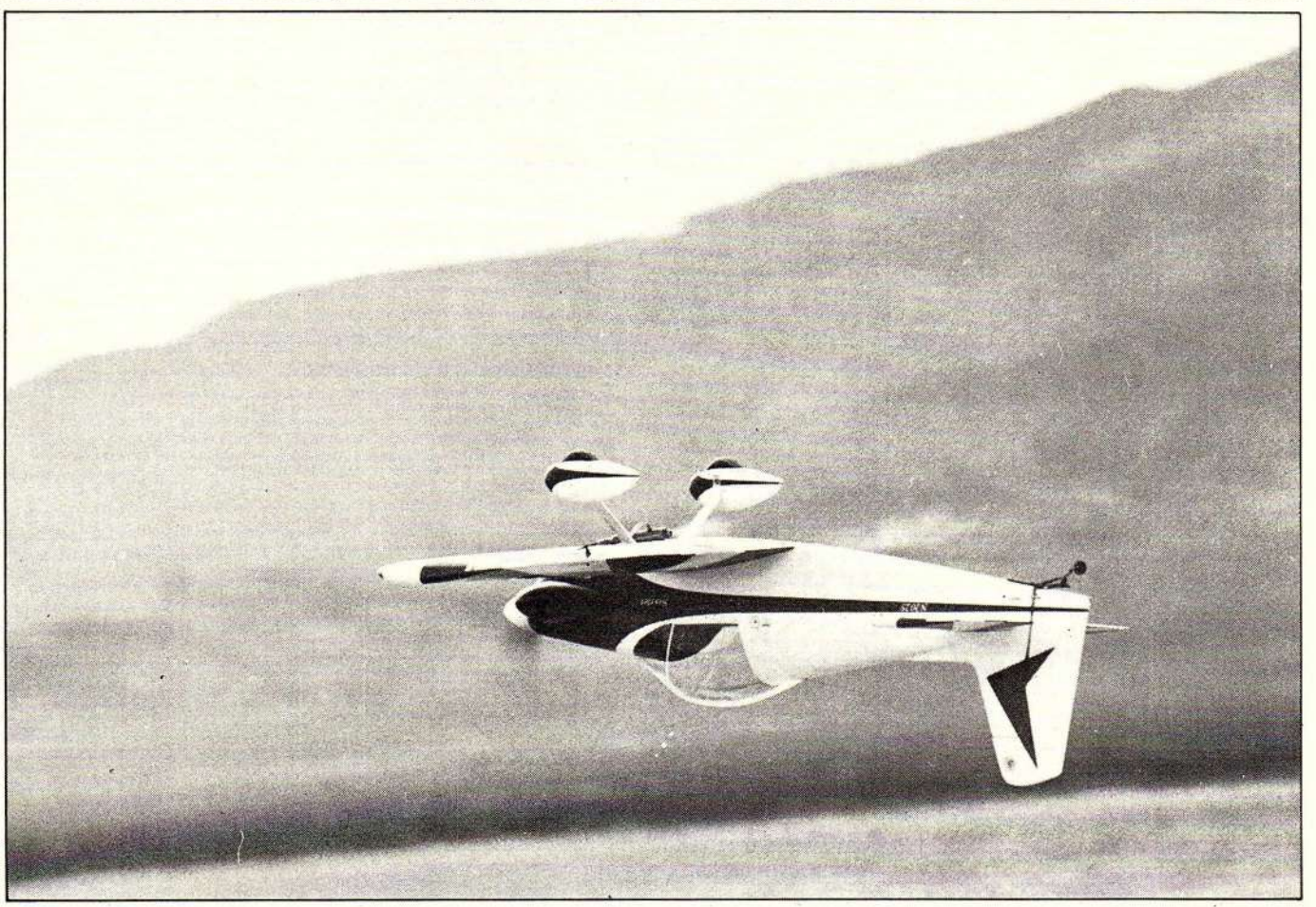
All of these objectives were achieved with the Starlet. The model has done all of the FAI aerobatic maneuvers, plus quite a few full-scale aerobatic stunts not normally done with models. This is not intended to suggest that the Starlet could steal the world championship title from Hanno Prettner, but the model can do all of the maneuvers with a reasonable degree of proficiency, and it certainly can be considered a true contest model. The model, as shown here, is rendered in exact scale. Admittedly, some changes could be made which would improve the aerobatic qualities, but this would mean deviating from the scale outline. More on this subject later.

Don't let the short-coupled look of the Starlet frighten you. While the C.G. is critical, as is the amount of elevator travel, the model has no serious longitudinal stability problems. If you put in too much elevator travel, the snap rolls are truly spectacular. Three, and sometimes four, simultaneous horizontal snap rolls can be performed, yet the stall characteristics are quite gentle, and the Starlet has no tendencies to drop a wing. Four point rolls are easily done . . . maybe not perfect, but quite respectable.

The Starlet is exact scale, as referred to the factory 3-view drawings. The outlines of the structure are also duplicated, such as the rudder and elevator rib locations. The airfoil is a NACA 2415 as the model plans are drawn, which is a deviation from the scale airfoil. The semi-symmetrical 2415 is a stable section, with good aerobatic qualities. As built from the plans, the model is very competitive in Sport Scale, and it could easily be made into a very fine Precision Scale entry. A full-blown cockpit interior could be installed, since there's so much room beneath that big bubble canopy.

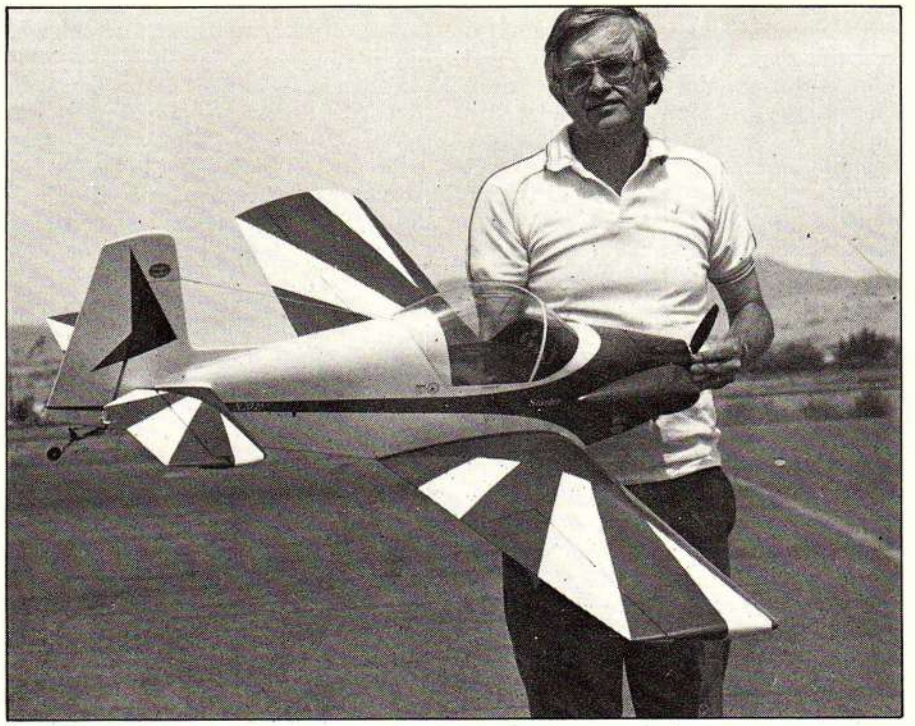
The model is designed to a scale between ¼ and 1/3-scale. The model is based on a 3½-inch C.B. Associates spinner. The scale came out to 3.46 inches-per-foot, thereby qualifying it as Giant Scale (or ¼-Scale), even though its wingspan is less than 65 inches! Don't forget that the full-size aircraft had a span of only a little over 18 feet.

The powerplant for the model can be any engine between a .60 glow, to an O.S. 1.20 twin four-cycle. I feel that the O.S. 1.20 twin would be the perfect engine for this aircraft. I selected the Webra .90 four-cycle, with the throttle mounted directly into the cylinder head. The reason



On a low inverted fly-by, the Starlet struts her stuff. An amazingly docile airplane, yet with so much aerobatic performance.

J.R. Naidish photos



The author holds his bird. A very small machine for giant-scale.

for this selection was to allow the model to be qualified for FAI aerobatics, as well as AMA aerobatics (a .90 four-cycle counts as a .60 in glow). I also wanted that fantastic sound that can only be had from a four-cycle.

The Webra .90 four-cycle has sufficient power to do the required maneuvers. Using a 14-6 prop and 15 percent Nitro fuel, over 9,200 rpm are obtained. Even at my home field in Reno, with density altitudes over 6,000 feet, there is ample power to do maneuvers. A noticeable increase in performance is found when the plane is flown at flying sites at lower altitudes.

The realistic low sound levels produced by the Webra four-cycle, coupled with the very scale appearance of that big fuselage, makes the model

seem much larger in the air than it actually is. The relatively small size of the assembled model is very desirable, since you can put the fully assembled Starlet in a small station wagon.

The original prototype weighed in at 10¾ pounds. That was more than expected, but that's because no special effort was made to keep the model light. Mostly hard balsa was used, to ensure strength, but this was not necessary. I would estimate that at least a half pound could be saved by the careful selection of wood and the choice of R/C equipment. That 10¾ pounds is perhaps about two pounds too much for any serious aerobatic work.

If the aerobatics are more important than the scale appearance, then some changes could be made. The fuselage should be lengthened about two inches, between the wing and stab. This alteration would hardly be noticed in most Sport Scale events (I hope no judges are reading this!), and the model will have improved roll characteristics and the elevators will be less sensitive. If desired, the fuselage can be lightened by using 3/32-inch balsa, instead of the 1/8-inch called for on the plans.

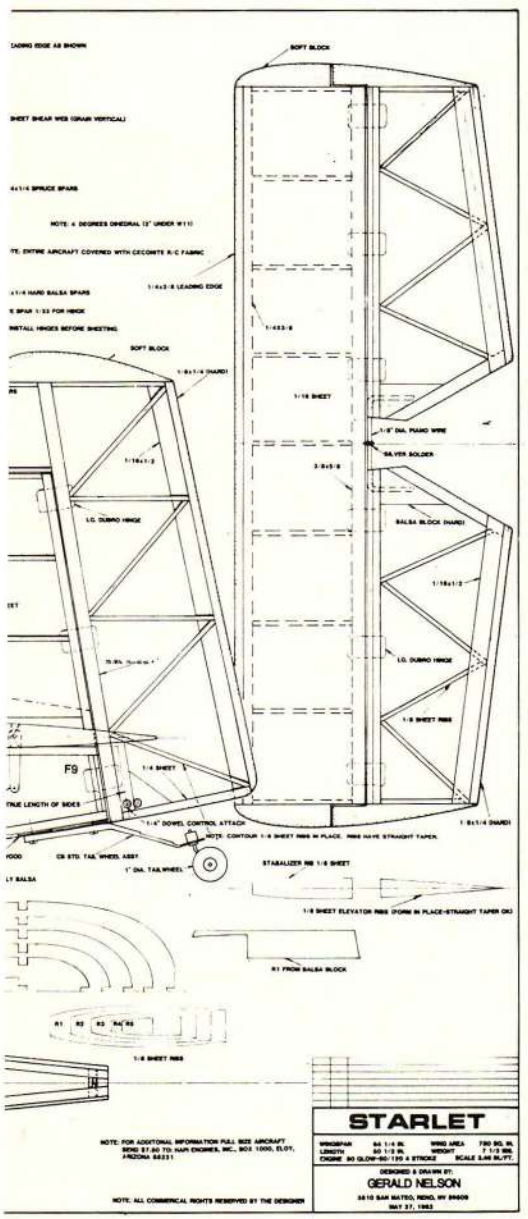
To further improve the maneuverability of the Starlet, the wing dihedral should be only half of that shown on the plans. This will improve the rolling maneuvers, especially the four-point rolls and knife-edge flight. A significant weight savings could be made if the landing gear were changed to a wing-mounted system, using 5/32-inch wire located between ribs #4 and #5. The heavy plywood mounting block system currently used on the fuselage would be eliminated. About a half pound of weight can be saved by this change. The revised landing gear would not be scale, but it sure would be a lot lighter. The wing sheeting can be reduced to 1/16-inch balsa, but make sure that only high-quality wood is used to maintain strength. The ¼x14-inch spruce main spar could also be rock-hard balsa, but such changes aren't going to make much of a dent in the overall weight.

A good alternate powerplant would be the Webra geared .61 engine. This would give a savings in the total power package weight in the nose, plus the added increase in horsepower would make a dramatic change in the vertical performance of the Starlet. With such an installation, an external silencer would have to be fitted, however, it would be possible to redesign the fuselage layout to have a concealed tuned pipe.

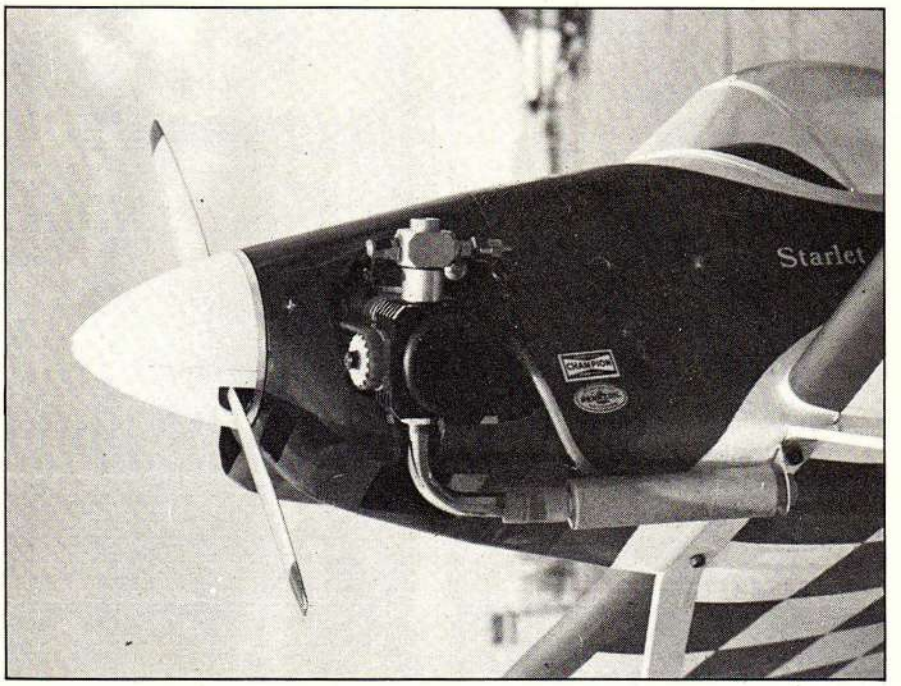
With the changes outlined above, and the Webra geared .61, an eight pound aircraft is possible. At this weight, aerobatic performance would be fantastic, especially when performing Aresti-type maneuvers in a limited aerobatic frame.

The Aresti-style maneuvers bring up another reason for selecting the Starlet. I believe that the future of R/C aerobatics on an international level, including the World Championships, will be to do maneuvers in a limited aerobatic zone or "box." This emulates the full-scale Aresti system of maneuvers and scoring. The models would be required to be scale versions of the actual aircraft designed (or capable of) advanced aerobatics. The Starlet is perfect for this type of event, which is a happy marriage of the best of the scale rules, and the excitement of true stunt flying.

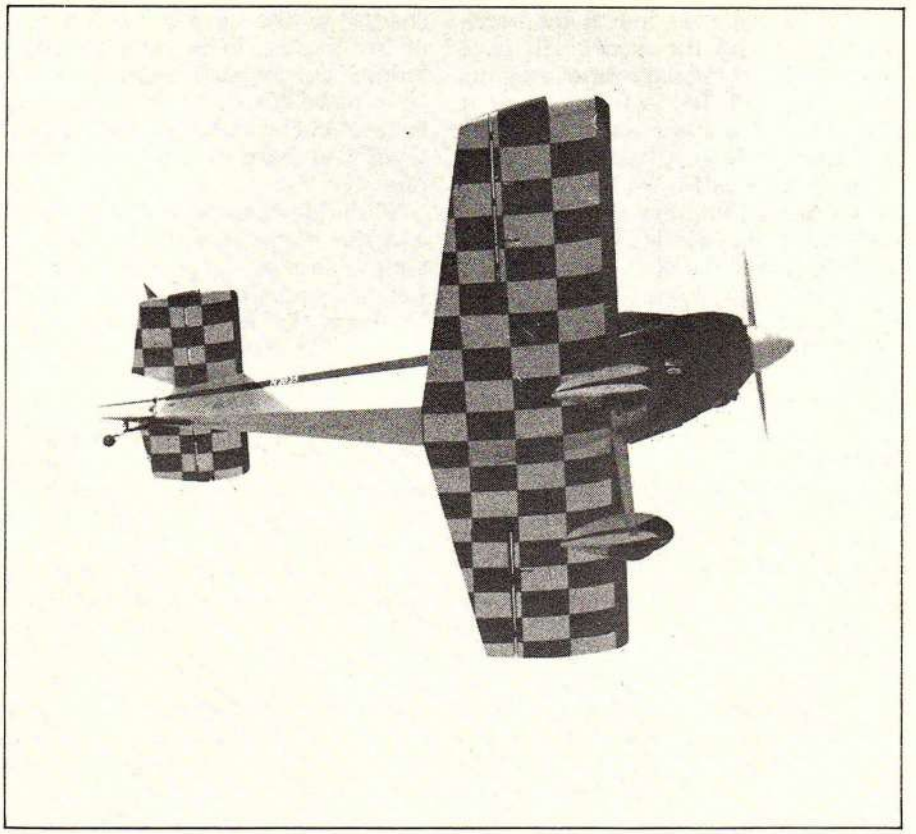
It seems almost ridiculous to have to say that the Starlet is definitely not a beginner's airplane. Some stick time is necessary to handle this type of performance. Going into step-by-step details on how to build the model won't be necessary, but here are a few helpful pointers.



FULL-SIZE PLANS AVAILABLE FROM THE AUTHOR. CANOPY, COWLS AND OTHER ACCESSORIES ALSO AVAILABLE. SEE TEXT FOR DETAILS.



The Webra .90 four-stroker makes for a nice installation. Cheek cowl totally hides the engine. (Nelson photo)



The full aerobatic paint scheme, right down to the checkerboard. As shown here, model is to exact scale outlines. (Nelson photo)

The wing is a simple, all-wood structure. Since the airfoil is a tapered semi-symmetrical type, it will be necessary to block up the spars. We prefer to build this type of wing in a good jig.

The flat sides of the fuselage are very easy to build. There is quite a bend in the forward portion of the sides at the area of the leading edge of the wing. It may be necessary to steam the wood in this area to help form the curvature. The bulkheads and formers are from laminated balsa. The extra time to do this is worth the effort, since these pieces are very light, yet strong and rigid.

In the tail group, I suggest that the rudder and elevator ribs be made flat, instead of the slightly curved shape of the true airfoil. Making the ribs flat makes building the empennage a lot simpler.

The model is covered with aircraft-quality Ceconite R/C fabric. This material is adhered with dope, then tautened with heat. The advantage of Ceconite is that it stops shrinking at 400 degrees. This eliminates any concern for warps or structural damage by over shrinking, especially on the Starlet's lightweight aileron, rudder and elevator structures. The fabric will give an exact-scale appearance, is very durable, lightweight, and the covering job can be done at a low cost.

(Continued on page 73)


Starlet


Starlet

FAIREY FIREFLY

A unique scale project, offering some interesting challenges to the scale enthusiast.

By Carl Small

Photos by the author

The elongated turtleneck makes the Firefly look humpbacked.

In 1939, the British Admiralty issued specifications for a new two-seat fighter. The British were so tied to the idea of carrier aircraft serving a secondary but important role as antisubmarine planes that they found it impossible to conceive of a fighter without such capabilities. In the absence of any navigational aids on board—British military aircraft were not fitted with so much as a radio compass until the 1950s—carrying a navigator was regarded as essential to get carrier-based aircraft back to their ships. Besides, two pairs of eyes were 100 percent better than one pair for airborne surveillance. For the British, the second seat was sacrosanct, and the two-man Fairey Firefly, which soon evolved into a prototype (a mock-up, really), was approved. Production began immediately, and the first example was delivered on March 4, 1943.

The Firefly had a rather undistinguished career in World War Two. History says it participated in the campaign that led ultimately to the destruction of the German battleship "Tirpitz," but its participation was said to have been limited to reconnaissance. It was soon recognized as a strike aircraft of merit, however, and Firefly squadrons were successful in accomplishing significant raids against enemy refineries and shore installations in the Indian Ocean. Later versions served with distinction in Korea; still later, it evolved into a pure antisubmarine weapon, its cannons traded for sonobuoys but its observer still riding behind the pilot, faithfully watching the waters around England for the shadow of a hull or the tell-tale streak of a snorkel.

Although the Firefly failed to achieve as glorious a battle record as other, better-known airplanes, it established itself as a worthy design on the basis of longevity alone. Descriptions of it always begin with the admonition that the Firefly is to be respected for its twenty-five years of service to its country. This it did achieve, but it was not so much this record as the plane's overall handsome lines and striking appearance that have made it the favorite of Canadian Warplanes Heritage, Inc., which found a Firefly A.S. 6 in a field in Georgia and restored it to Mk.5 colors and markings.

It is an immense airplane, one that totally dominates the group's home field at Hamilton, Ontario. Consistent with the aims of the foundation, Heritage's airplanes are meant to fly, not to sit in museums. Luckily, the Firefly, when it was found, had only 670 hours on the airframe and 60 hours on the engine.

With the Mk.4, the Firefly's oil cooler was moved from the chin to the wing roots. The resultant nose configuration recalls the Spitfire, an impression that is enhanced by the semi-elliptical wing, which had its tips clipped when the oil cooler was moved in order to keep the same wing area. A somewhat awkward extension of the vertical fin was necessitated by longitudinal-stability requirements. Not that the Firefly is stable.

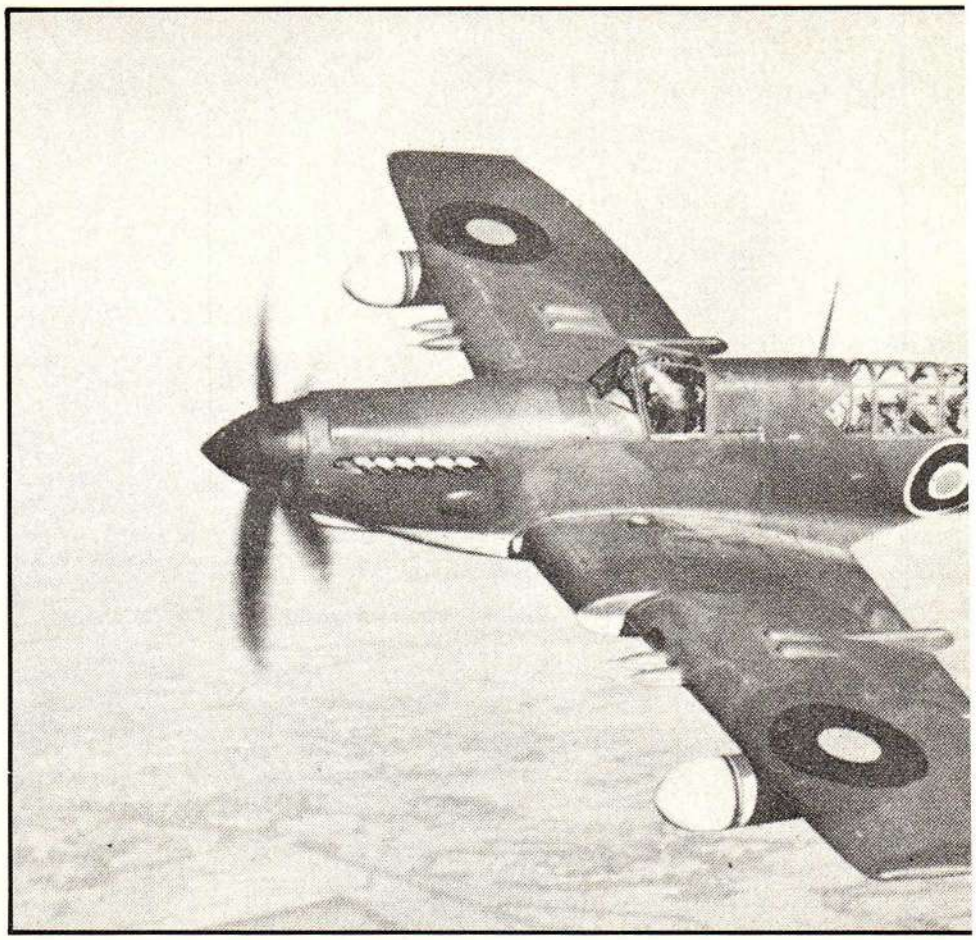
"These machines were never intended to have inherent stability like that found in the average lightplane," says pilot and Heritage partner Dennis Bradley. "It is this characteristic that makes the Firefly, even with its enormous weight and size, a joy to handle."

Part of the handling this airplane is in deploying the Youngman flaps, which, unlike conventional flap systems, can be extended in two ways: at an angle, like conventional flaps, to produce drag for landings; or parallel, to the so-called cruise position, to increase wing area and effectively provide enhanced maneuverability. The idea behind the Youngman flap was to allow the pilot to increase wing area by deploying the flap into the cruise position: three degrees of incidence and with the flap chord line roughly parallel to that of the wing. Once deployed, effective wing area was raised and wing loading lessened. When no longer needed, the flaps could be "housed" and add no drag; it was one of the earliest and cleverest variable geometry arrangements.

A walk around a parked Firefly with wings folded reveals the intricate wing-locking mechanism that was mandated by the Youngman flap linkages, the pushrod (not cable) control connectors, and the sheer weight of the airplane. The Firefly's wings rotate about their hinges when they fold, so that they end up parked flat against the sides of the airplane, trailing edge down. When they unfold, they pronate as they swing forward. The locking pins are inch-thick, precisely machined slugs of steel that would look quite at home in a bank vault door. To lock the wings, a manual lever swings forward until it aligns with the wing chord to indicate that all the pins are home; the lever stows neatly by telescoping into the wing root adjacent to the oil cooler ducts.

The A.S. 6 has the more powerful 2,250-hp Griffon 74 that was introduced on the Mk. 4. Along with the aerodynamic advantages that were incorporated, beginning with the revision of the oil cooler layout, the engine's greater output improved the Firefly's top speed to 386 mph at 14,000 feet. Bradley flies the airplane in more gingerly fashion, ever mindful of the need to preserve the rare engine. He says he has never approached the 66 inches of manifold pressure available from the two-stage supercharger at full power. The Griffon turns a giant Dowty Rotol four-blade prop that is 14 feet in diameter. The prop turns counterclockwise, meaning that Bradley must have a strong left leg.

Fairey devised a unique jigging system for the construction of the Firefly. The fuselage was constructed in two halves, joined at the centerline. The semi-monocoque design had no stringers, relying instead on the structural strength provided by half-bulkheads and stressed skin. Fairey also incorporated a quick-engine change assembly in the Firefly, which became one of the first British airplanes to have what was then called the "power egg."



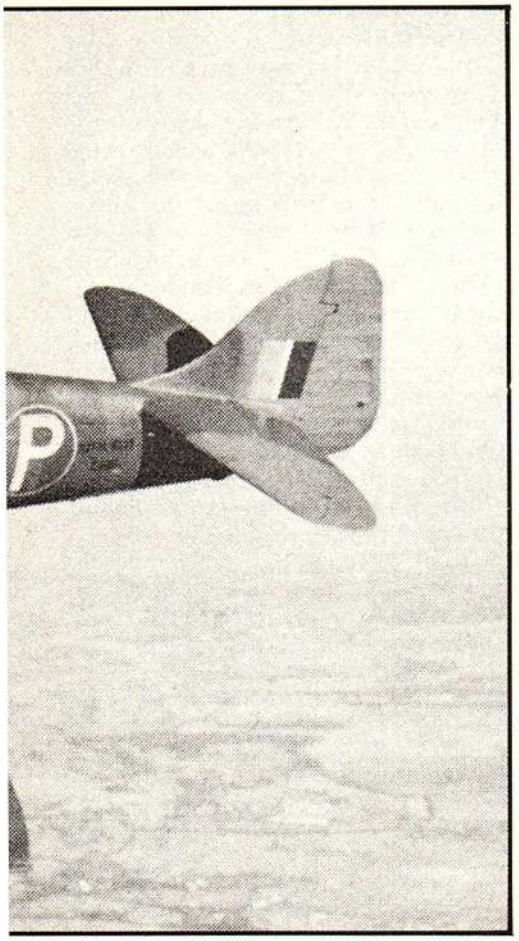
The Mk IV prototype with anti-sub radar pods underwing. The circled "P" on the fuse was yellow, indicating prototype. (File photo)

Part of the two-hour preflight Bradley conducts is taken up with charging the braking system to 400 psi with nitrogen. The Griffon starts eagerly and with comparatively little show of oil combustion. After warm-up and run-up are accomplished, the flaps are deployed to an angled-down takeoff position that varies with loading. The tail wheel is locked once the Firefly has taxied to takeoff position, and the tail is held down firmly so that the locked wheel can help the pilot fight the engine's frightful torque. At 55 knots, the rudder takes over and the tail can be lifted; rotation comes at 90 knots. Boost is reduced from the takeoff value of eight to 10 pounds to about four pounds, and rpms are reduced from their maximum 2,750 to about 2,400. Bradley babies the climb at a mere 1,500 fpm.

Besides the pushrod control feet that make Bradley's eyes light up when he describes the aircraft's response to the stick, the Youngman flaps, a system unique to Fairey aircraft (the company patented the device), give the Firefly a turning radius that belies its weight and size. Flap operation is hydraulic, and the devices can be deployed to the cruise position at 175 knots. Two hinge points in the flap—one on the leading edge and one at mid-chord—swing the flap back and down in such a way that it moves parallel to the wing chord line throughout its arc of travel. Once in position, airspeed can be increased to 250 knots. Even with the ingenious Youngman system, a Firefly was no match for such agile aerial cats as the Zero, and the British fighter relied on a diving one-chance-only pass at the target with all four cannons blazing. Any hit at all would stand a good chance of downing the comparatively lightly constructed Japanese types.

For landings, the leading edges of the flaps do not move downward but remain flush with the wing; only the mid-chord linkage arm moves out and down, deploying the flaps in the customary configuration.

The Heritage Firefly is one of very few operational Fireflys left in the world. For just plain keepin' on, this warplane has no peer.



Fortunately, my home is about ten miles from Mount Hope, Ontario, which is located between Niagara Falls and Toronto. At the Mount Hope Airport resides the home of The Canadian Warplane Heritage. This group is dedicated to preservation and flying of WWII aircraft flown by Canadians during WWII . . . and the Fairey Firefly is one of them. It was acquired in 1971, then reconditioned and flown in 1972. It is the only one in flying condition in North America.

Each year the Canadian Warplane Heritage has an air show which is generally loaded with all kinds of WWII aircraft. The Firefly always stood out among all those P-51s because of its size and that enormous red spinner. It attracted me right away. After getting a few other scale models out of the way, I decided to start on the Firefly. At the air show in Mount Hope, I had the opportunity to take a couple of rolls of film of the airplane. As it sadly turned out, that was my last chance.

In September of that same year, at the Canadian National Exhibition in Toronto, witnessed by 100,000 people, the Firefly apparently stalled at the top of a maneuver and nosedived 1,500 feet into Lake Ontario. I have a newspaper article which included pictures showing the airplane as it plunged into the lake and the twisted wreckage being pulled from the lake; an unbelievable sight, as it looked as if it had gone through a paper shredder. The wreckage was brought back to Mount Hope and the remains stored in the corner of the large hangar which it once occupied. This enabled me to cut some small one-inch pieces of metal from the wreckage which were used as paint chips in my documentation for color verification.

For some outstanding flying shots of the Heritage Firefly, look for the April 1974 issue of *Flying* magazine. Although the color changes from page to page, it will show the markings and you should be able to use them in your presentation if you are contest inclined. Also, *Aeroplane Monthly* (October 1977) had an interesting Firefly with British Royal Navy markings. *Sport Flying, 1976* which is a hardcover book features the Canadian Warplane Heritage Firefly. The colored prints I took are very good and are more than adequate for color confirmation. They show both sides from many angles, and anyone interested in this particular Canadian Navy color

scheme can contact me for reprints of these at cost. My address is: 2 Wendakee Drive, Winona, Ontario, Canada L0R 2L0.

First thing to do if you want to build a Firefly is send to Bob Holman for a set of plans. I do not know if he has three-views or not. If you want a set look for *American Aircraft Modeler* (November 1973). These three-views are by Dave Platt and are excellent. There must be a few of these issues still around. The three-views show flap location and the correct wing tip shape (which is incorrect in the Holman plans).

Available from Bob Holman is the canopy, lower cowl and spinner. The spinner is spun aluminum and has a back plate 4½ inches across. Get yourself a "High Point" balancer and balance that back plate. The spinner itself won't fit between the balancer's wheels but the back plate will. I had to drill a half dozen small holes in it to get it balanced. Just drill easily and don't go all the way through. Keep checking the balance each time you remove a little material. The "High Point" balancer, along with the "Robart Incidence Meter," have to be the two best investments anyone can make for their models.

The Holman plans in some areas are a little vague. Everyone has their own methods for doing things so, as we go along, I'll tell you what worked for me and you can do as you see fit.

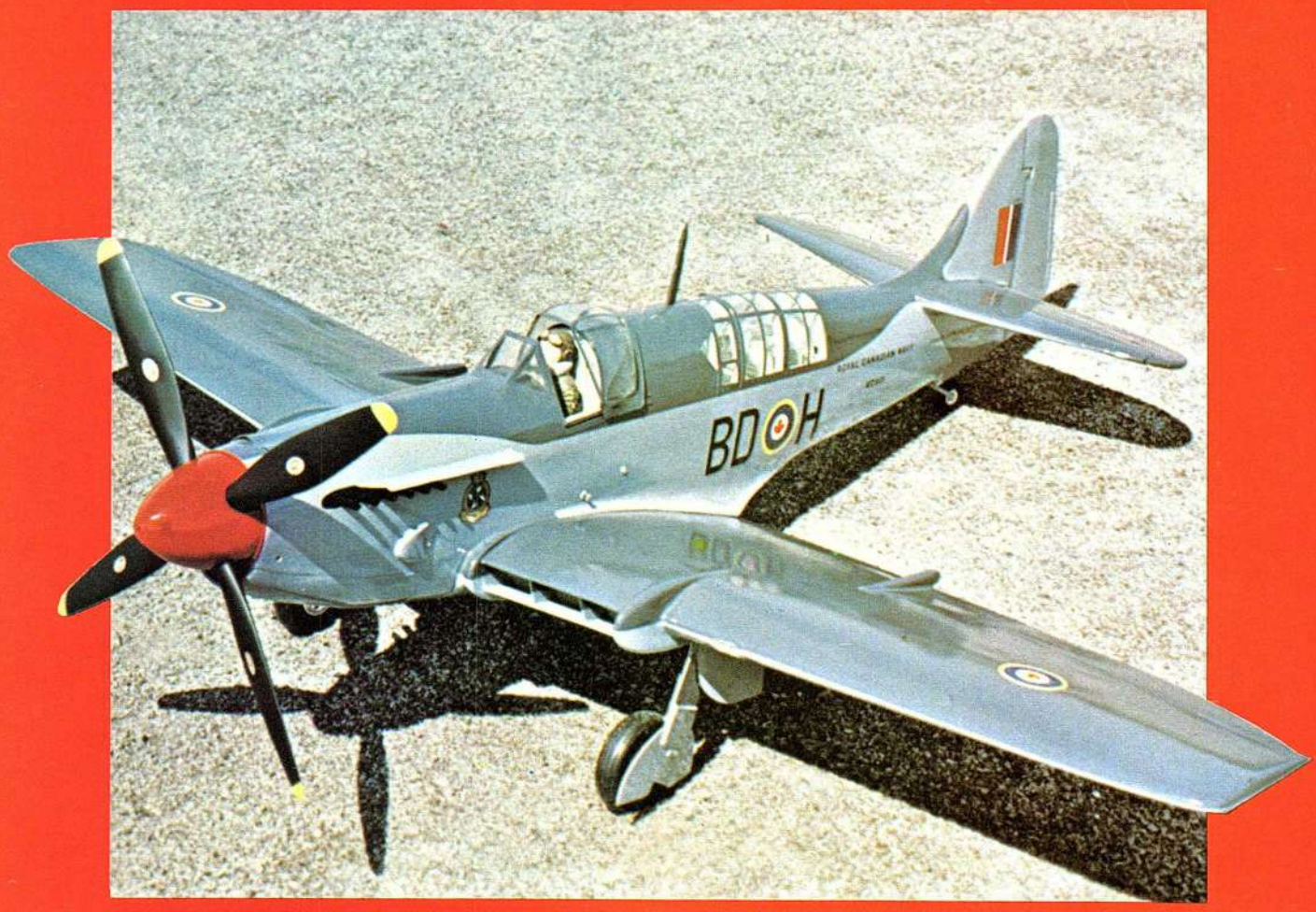
The wing has quite a few parts as you will see from the plans. I built the wing as shown. You may want to lighten it up a bit at the landing gear position. I did not. Refer to the three-views for the correct wing tip shape. To devise a mechanism for scale operating flaps was way beyond me, but I'm sure someone out there can probably do it. After a week of nights at about three hours per night and a couple of weekends and a dozen different linkages, I gave up and opted for split flaps. The few extra points at a contest weren't worth it.

There will have to be some modification to the wing trailing edge for these. The flaps are very large and, if built out of solid balsa, may have a tendency to warp. You can prevent this by gluing a piece of 1/16-inch ply along the trailing edge. The wing is very strong, but the plywood spars are somewhat difficult to work with. The tabs on the wing ribs have some washout built in, so make sure these sit tight on your workbench.

The thickness of the leading edge of the rudder is not given. You will have to laminate it, or use one-inch balsa. For the leading edge of the fin I used ¼-inch balsa glued to the ribs, then I added 1/16-inch balsa sheeting to both sides of the entire fin, and finally added ½-inch balsa to the leading edge and shape. The stab is the same, only I added 1/16-inch balsa to the leading edge and then ½-inch balsa. The trailing edge wood size for the elevator is not given, either. Glue the top and bottom sheeting at the trailing edge. The double thickness of balsa makes it strong enough at this point.

The plans show the crutch layout for the fuselage. Install the 3/8-inch exhaust doubler before unpinning the assembly from plans. F3 has to be cut in half vertically to fit inside the crutch. Mount the crutch on a couple of blocks and insert the formers. I found it impossible to fit some of the fuse formers between the crutch without either cutting the former in half or cutting out the cross braces where necessary at each station as I went along. If mounting a Robart retractable tail wheel, F17

(Continued on page 66)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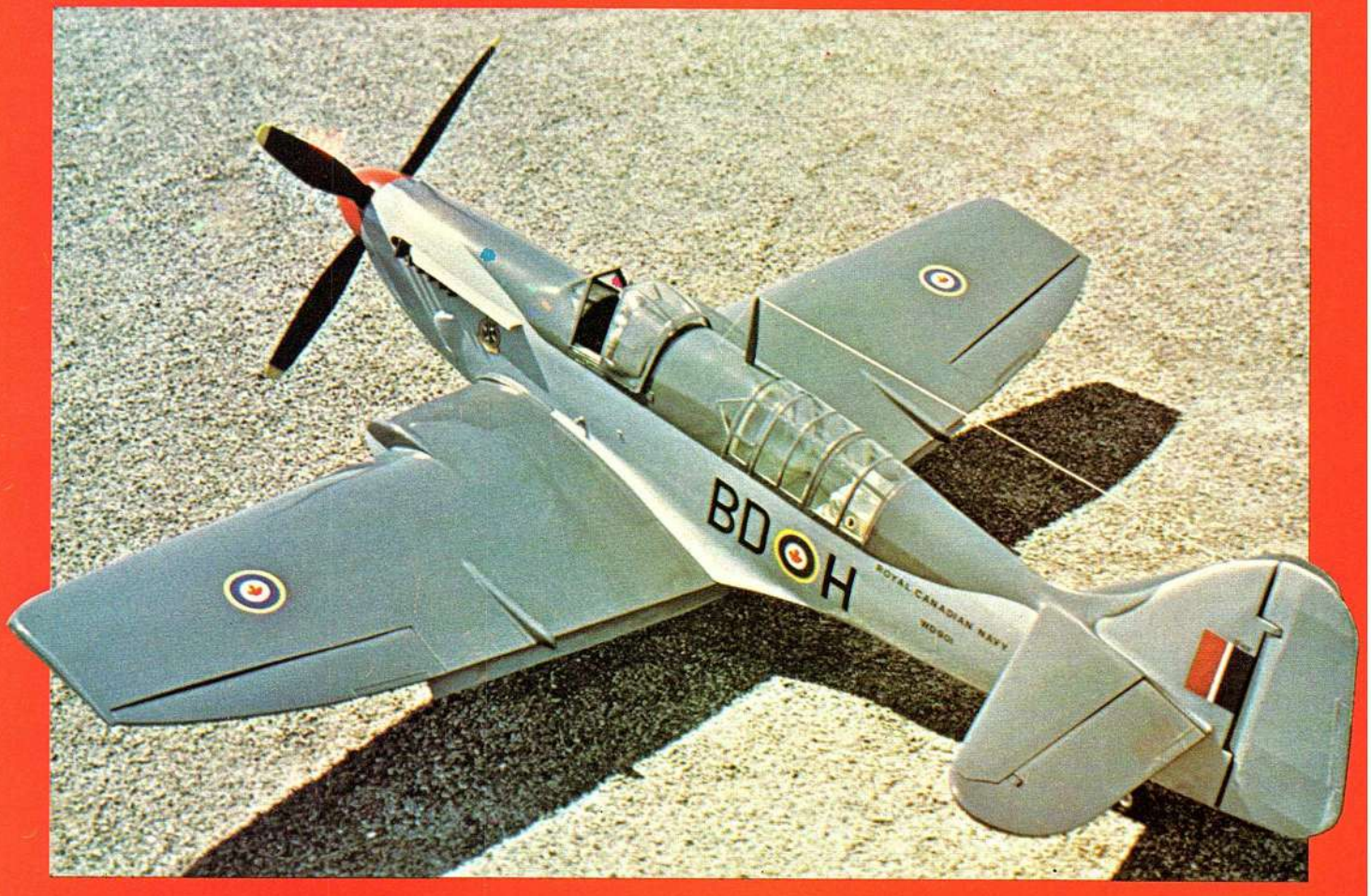
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ROYAL CANADIAN NAVY

When one looks at the great aircraft that went to war for Britain and won fame while doing so, one eclipsed them all . . . the Mosquito. It is strange that the Mosquito never won its rightful place in the public's esteem. The reasons for this are varied. One reason is that it was born in wartime and, therefore, great secrecy surrounded its operational career. Another reason is that it was not an airplane of the "Establishment." It was a plane that, from the moment it commenced action, proved supreme. Since the end of the first world war, de Havilland was building mainly light sportcraft as well as transports. These were mostly biplanes, which performed well.

No de Havilland design of the 1930s created more excitement than the D.H. 88 Comet racer, its speed of conception and construction were remarkable, being completed almost virtually in months. Variable pitch propellers and retracting undercarriage made it seem very advanced for its time. Another aircraft which played an important part in Mosquito evolution was the D.H. 91 Albatross airliner, an extremely graceful and elegant design of wood construction.

When in the mid-1930s the RAF

MOSQUITO

Everyone likes a winner, and this Mosquito is identical to the one which won the Reno World Championships.

By Sepp Uberlacher **Photos by the author**

announced its expansion scheme de Havilland was eager to participate with something other than trainers and transports. The answer came when the Air Staff decided it needed a new medium bomber of twin-engined configuration. With a prerequisite of a crew of four to six, nose and tail gun turrets were specified. A top speed of 275 mph at 15,000 feet was needed, with a range of 3,000 miles, carrying a bomb load of 4,000 pounds.

Geoffrey de Havilland wanted to design an aircraft of exceptionally high performance, as he had concluded that speed in a bomber was a better means of defense than guns. It was concluded that the weight and drag of the gun turrets would result in a bomber of mediocre performance with a top speed of only 260 mph, once operational equipment was added. De Havilland, therefore, started to work on the radical unarmed proposition under the designation D.H. 98 Reconnaissance Bomber.

They opted for a bomber which was small, had a crew of only two, and which was built of wood for strength and rapid battle damage repair. Fitted with powerful Rolls-Royce Merlin engines, it was estimated that a cruising speed of around 330 mph (and top speed in excess of 400 mph) could be obtained.

To construct an aircraft out of wood, at a time when most military aircraft were built of metal, seemed like a step backward. It did, however, have some great advantages. Such an aircraft would be light, and would be simple and cheap to produce. A very smooth finish could be obtained and, in the event of war, wood would be in ample supply. Also, the skills of woodworkers and cabinet makers could be utilized.

The proposal initially met with considerable skepticism among Air Ministry officials, and the notion of an unarmed high speed bomber was

The lean and hungry lines of a twin-engined nightfighter. The Mosquito is a very respectable flying machine as a scale model.

turned down. Their skepticism was more than confirmed when, in December 1939, a force of heavily armed Wellington bombers were shot down. The chance of a safe return for an unarmed reconnaissance aircraft would be surely less. However, if the new machine could fly high and fast, the command agreed that there might be a place for it. Also, Sir Wilfred Freeman (air member for the development and production) had become fully won over and argued strongly for its cause. Finally, in March 1940 a contract was concluded for 50 aircraft, including the prototype.

This all-important airplane would be built in a newly erected building in Salisbury Hall, away from the de Havilland factory at Hatfield, as it would be safer from possible air attacks. This site is today the home of the Mosquito Museum. The project so strongly fought for finally became reality . . . but what would this advanced machine be called? What is small, gives a death bite and does so over a wide area? The exact moment when "Mosquito" was chosen will possibly never be known.

While, during that summer of 1940 when the sky over England was filled with aircraft engaged in the most deadly air battles the world has ever seen, the Mosquito prototype took shape at Salisbury Hall. By the start of November 1940, the main assemblies of the prototype were trucked to Hatfield. There, the first prototype aircraft was put together and the engines installed. Three weeks later came one of the great moments in British aviation history, when Geoffrey de Havilland (the son of the designer), took the all-yellow aircraft on its maiden flight. Like all other de Havilland designs, it had lines of its own. It was beautifully streamlined, with a shark-like fin and rudder. When Geoffrey de Havilland landed it after a forty minute flight, he confirmed that all was well with the new design.

During December, the prototype flew nearly every day and by mid-December, fourteen fuselages were built. Construction was lagging behind slightly, because furniture manufacturers had to learn to work with very fine tolerances. Mosquito development problems were nearly non-existent, and the basic shape of the design would hardly change over its long service life.

In February 1941, the aircraft arrived at Boscombe Down for its initial official handling trials. The design team from Hatfield was confident that their new Mosquito would perform . . . and perform it did! When the flying concluded, military and civilian observers were speechless and in total disbelief. This aircraft with two heavy engines and twice the wetted area of the Spitfire, could outpace the Spit by over 20 mph, achieving this when flying much higher, at about 2,200 feet. To the amazement of the de Havilland team, one official nastily told them that they should have informed his department much sooner about this aircraft.

The prototype could reach speeds up to 400 mph. It handled with an astonishingly fluid maneuverability for an intended bomber design. It would be untrue to state that the Mosquito encountered no design or service problems. The cockpit was rather small and packed with instruments and crew—too tight some said. Also, its radiators, which were located in the wings' leading edges, were prone to battle damage. Pieces of exploding destroyed enemy aircraft often punctured the radiators, and many Mosquitos arrived back home after successfully engaging the enemy with only one engine operating.

As bomber production was getting into full gear, de Havilland's design team was already working on a fighter variant prototype, as it became clear that such a machine was urgently needed. Only small changes from the bomber version were required. The nose glazing was omitted and instead four Browning machine guns were installed. Also, four 20mm cannons were carried under the cockpit floor. The pointed windscreen was replaced by a flat bullet-proof one, as demanded by Fighter Command. Eventually, of all Mosquitos produced, the most important was the fighter aircraft version. Entering RAF service originally with the Photographic Unit at Benson, the first bomber versions were issued to 105 Squadron at Swanton Morley, Norfolk, in November 1941 and commenced operations in the latter role on 31 May 1941.

Mosquitos soon began to replace Beaufighters in the nightfighter role. This type of aircraft had centimetric AI radar with its characteristic "arrowhead" aerials, early models being painted flat black. Flying missions by day or night, Mosquito crews quickly established an unsurpassed reputation for precision attacks on individual targets, leading eventually to their employment with the Path-

finder Force as target finders and markers for the heavy bomber streams.

By 1944, Mosquitos were also replacing Beaufighters in Coastal Command as antishipping strike bombers. Several squadrons of Fighter Command were specializing in night fighter escort and intruder roles, roaming the skies over Germany and creating havoc among Luftwaffe night defenders. Total Mosquito production throughout the British Empire amounted to 7,781 aircraft, including 1,134 Canadian examples and 212 built in Australia.

When the war in Europe ended the Mosquito stayed in RAF service until 1963. Surplus aircraft were sold to foreign powers and today there are only a few examples left in various museums around the world.

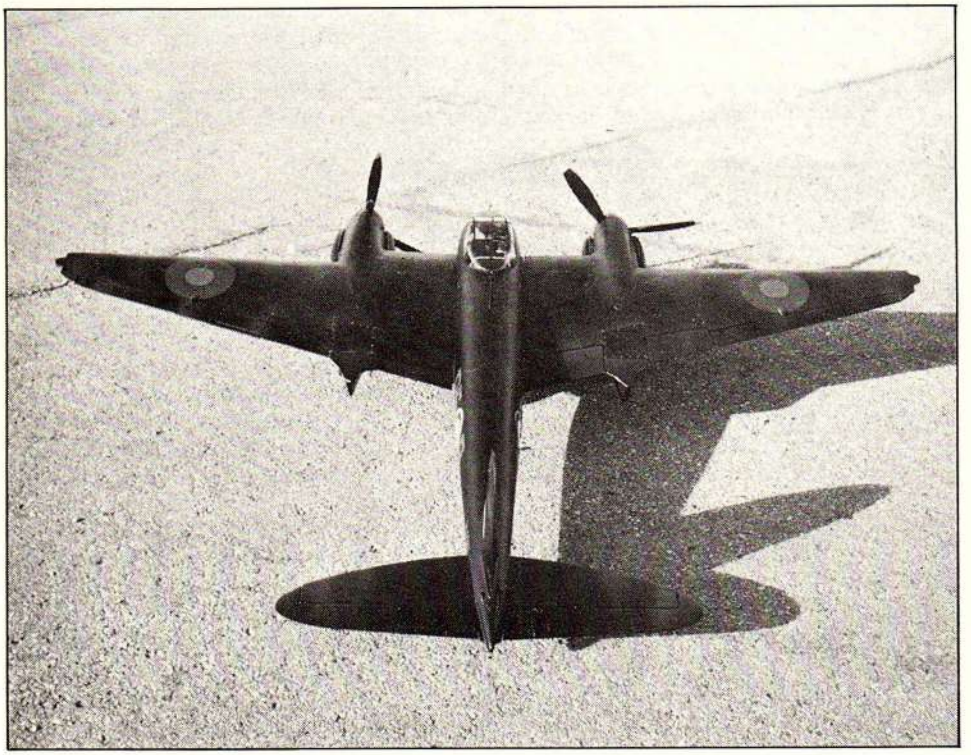
This, then, was the Mosquito. To evaluate this versatile aircraft is not difficult, as its record speaks for itself. It will be remembered by the men who flew it and historians alike as one of the greatest airplanes of all times.

* * *

With the 1981 Canadian Nationals over and, having qualified for a place on the Stand-Off Scale Team, I was looking for a new project. As usual, I found it difficult to make up my mind. The only thing I knew for sure was that my trusty old FW 190 was simply not good enough to compete at a World Championships and, therefore, something new had to be built.

In evaluating what was needed I came to the conclusion that my new model had to be of a prototype capable of aerobatics, in order to perform the flight options I wanted to do. Also, it had to be complex, to take advantage of the F.A.I. bonus system. I am fascinated by World War Two military aircraft and I felt that a twin-engined fighter of that era would fit my requirements perfectly. After looking at all the various types designed during that period, the aircraft I liked the most (and finally decided to build), was the Mosquito.

Several advantages in building a model of this famous aircraft could be seen. The prototype was, not unlike a model, constructed entirely out of wood and, therefore, would be easy to duplicate accurately. The machine was fully aerobatic, and with clean elegant lines that would be hard for the judges to ignore. There is plenty of information available on the prototype, so to make up suitable documentation seemed easy enough. On the negative side, the rather complex undercarriage would pose its own problems, and to hide and cool the engines also needed some consideration. As luck would have it, Brian Taylor had just then released the plans of his Mosquito. Being familiar with the excellence and accuracy of Brian's plans, I used them. The plans are sold through Bob Holman. Bob supplies the hard-to-find parts, like metal spinners, canopy, fiberglass gear doors and cowls. These are all high quality items, as one would expect from Bob Holman. I received my Mosquito plan-pac, and work on the model was started.



The top planform reveals almost no nose moment, a very long tail and a generous stab. Good proportions for a twin.

CONSTRUCTION: The plans come on three sheets. They are accurate, highly detailed and well laid out. All parts needed to construct the model are clearly drawn. Also shown is the retracting gear and working flaps, but more on this later. I hate to say this, but to state the obvious, this is not a beginner's model and it will take considerable time to build, so keep that in mind when considering the Mosquito.

In my case, building time seemed secure, as the Canadian Winter had just arrived, and to fly model airplanes for the next five months would be out of the question. On this model, with its long tail moment and relatively short nose, it cannot be over emphasized to use only the lightest of woods, particularly at the tail. If you use, as I did, two O.S. .25 FSR engines, the need to build a light tail section is even more apparent, as these engines are quite light.

I started with the tail section. Not much to say there, except that I opted for a built-up elevator, rather than the solid balsa one shown on the plans. After the rudder was built, all the center core sheeting between the ribs was removed, in order to drop some weight.

Next step was the fuselage, which is built very prototypical, on a flat building board, in two halves. On my model the fuselage halves (from the cockpit aft), were sheeted in two large sections. The sheeting was first soaked in ammonia and hot water, then taped over the framed-up structure. Do not glue, as the wood will shrink while drying and a warped fuselage would result. Let dry overnight and the next day, presto, you have your own custom molded fuselage shells. All you need do now is trim and glue them to the framework. The whole nose section was then strip-planked. After completion of all the sheeting the two fuselage halves were removed from the building board.

At this point, you will have to make a decision on a fixed or retractable tail wheel, as all the necessary hardware has to be installed before the halves are joined. I wanted mine retractable and, as the Robart unit was a perfect fit and seem-

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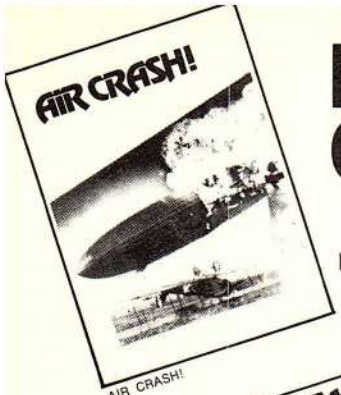

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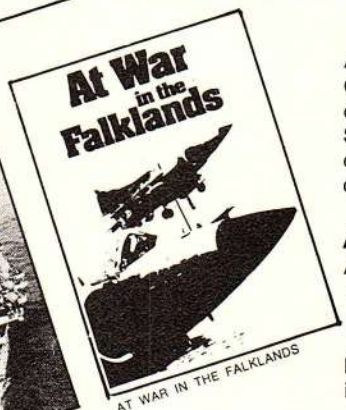

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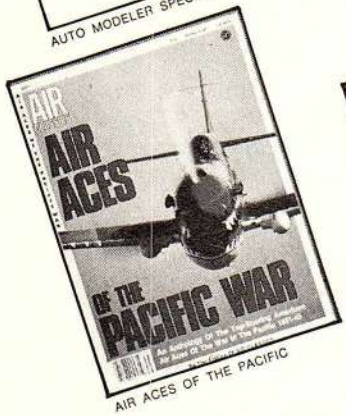

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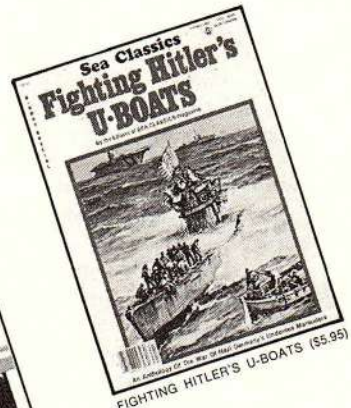

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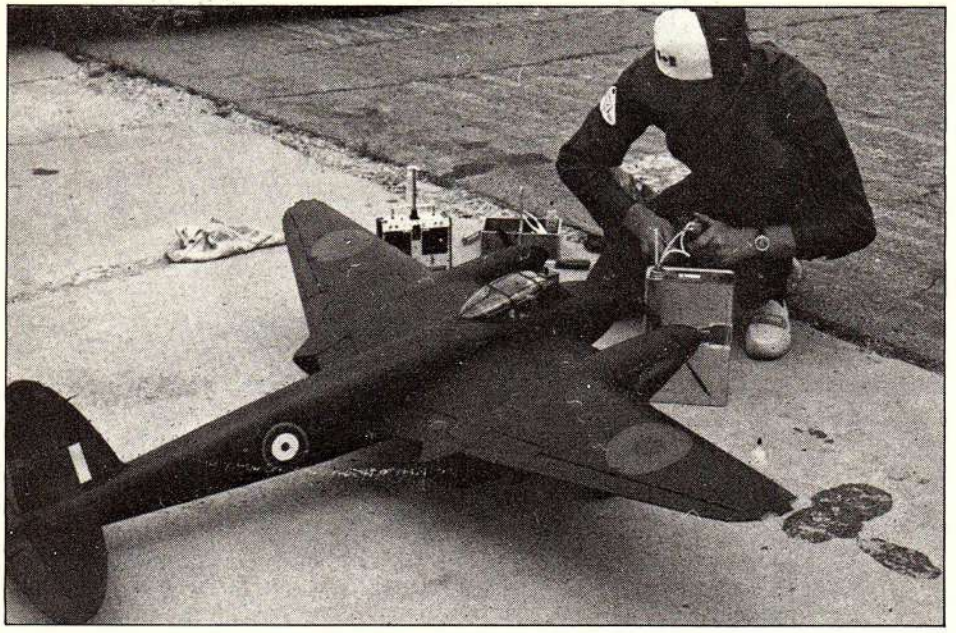


The author cranks some fuel into the engines. A big model, by any standards.

ed reasonably light, I used it. There are no gear doors to worry about and, in the retracted position, the tail wheel simply stops against the tailplane. Actuation is accomplished by a Sonic air cylinder situated behind the cockpit, connected to the retract unit is via a NyRod. For steering, nylon coated steel cables were used.

To clear the elevator, rudder, and retract pushrods, it will be necessary to trim away large portions of bulkhead #16. Make sure everything is working perfectly because, once the fuselage halves are joined there is only limited access to the retract unit. If your two halves were built accurately, they will fit together without any problems, and all that's left at this stage is the nose block, removable hatch and all the ply wing hold down pieces. After sanding the nearly completed fuselage the easy part can be considered as done, and the next step will be the wing.

Before you start with the actual construction of the wing, some thought should be given to the operation of the undercarriage. The plans show the use of a retract servo to raise and lower the gear. This is probably fine, unless you plan to do any aerobatic maneuvers. The undercarriage on this model is fairly heavy, and I felt that exerting any G-forces on them would almost certainly result in damage to the servo gears. Therefore, in place of the servo, two Sonic air cylinders were used.

Although they worked well, I must admit that the gear did cause me some problems initially. Not that there is anything wrong with the basic design, but twice the clevis connecting the gear to the bellcrank came undone and, as a result, the gear could not lock in the down position. To fix it was simple, a keeper was fitted over the clevis to prevent it from opening again, something I should have done in the first place.

More serious was a sagging of the gears in high-G situations. There is a mechanical down lock but no up lock, the gear being held up by air pressure only. The obvious solution is a mechanical up lock, and this should be given some consideration. Also, the coil spring to counterbalance the gear (as shown on the plans,) must be retained, since the power of the air cylinders alone is not sufficient to retract the gear. For the most part the landing gear was fabricated out of aircraft-grade aluminum and no problems regarding strength were encountered. Brass sleeves and bushings were used on all the bearings.

The ribs use indexed tabs and, if cut out accurately, ensure a straight wing with the correct washout automatically built in. Initially, only the leading edge, back to the main spar is sheeted. When removed from the building board the structure is very flexible. Extreme care must be taken when sheeting the lower surface in order not to twist the wing. Because the aileron horn is so short, this results in an extremely sensitive set up. Any play in the bellcrank and linkages must be avoided.

The construction of the ailerons and flaps is straightforward. Actually, more time is needed in adjusting and setting up the flap crank, than to build them. The flap hinges initially were made from aluminum but they proved to be insufficient and wore out rather quickly, despite brass sleeving. Therefore, substitutes from solid brass were made. I mounted my engines inverted, as shown on the plans. SIG T-type mounts were incorporated. There is no way to fit a commercial muffler inside the rather narrow cowls and, if you don't want to spoil the clean lines of your Mosquito, you have no choice but to fabricate your own. They could be made from brass and silver soldered, or done in aluminum. I chose the latter and, although I had no previous experience in aluminum welding, believe me, it is not difficult. As an added bonus, the scale flame damping shrouds make an ideal exit for the exhaust gases.

There is little to say about the nacelle construction, other than it will be necessary to trim some wood here and there to clear the undercarriage legs. The gear doors on this model work in the same manner as on the full-size Mosquito. Sonic Tronic's Phoenix hinges fit perfectly, and they proved to be extremely strong and durable.

To properly cool the engines, two openings were cut into the bottom of the cowls. The front opening exposes the cylinder head, while the rear one lets the hot air exit from the cowl. Although these openings were kept to a minimum to make them less visible, they work well, as no problems with cooling were ever encountered.

Just a couple of words about the removable belly hatch. In order to save time, I wanted to sheet mine in two large sections. This was tried twice and the resulting product was always the same . . . banana-shaped and unusable. Finally, I got the message, I strip-planked it. Wouldn't you know . . . perfect.

There is not much to caution you about the rest of the model, just a few words about the radio installation. The aileron-throttle and flap servos are all mounted in the wing center, their position dictated by their respective linkages. Access to these servos is through the top of the wing only. In the fuselage, just behind the wing break point, a bellcrank assembly was installed. Pushrods lead from it to the elevator and rudder. Also the tail wheel steering cables attach here. Short pushrods lead from the bellcrank assembly to the rudder and elevator servos. These are removable in order to take off the wing.

The battery and the receiver are

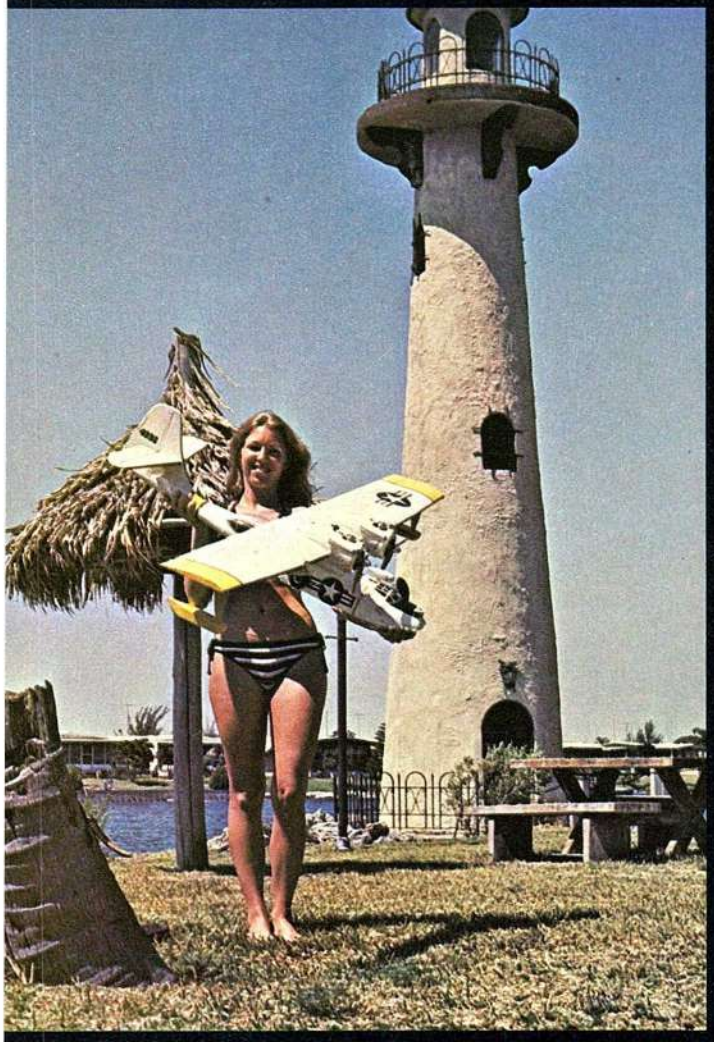
(Continued on page 64)


W4087

Aviation Album

This section of *Scale R/C Modeler* is dedicated to you, the talented craftsmen who build those beautiful scale ships. You are invited to submit photos of your latest project for publication. Here is an opportunity to show the world your skills, and to allow those who most appreciate the time and effort involved in executing a scale subject to see that you have met the challenge.

Photos must be either black-and-whites, or color slides (no Polaroids). Please send relevant information and statistics about the model. We'll pay $5 per photo published. Send your best shots to: "Aviation Album," Scale R/C Modeler, 7950 Deering Avenue, Canoga Park, California 91304.



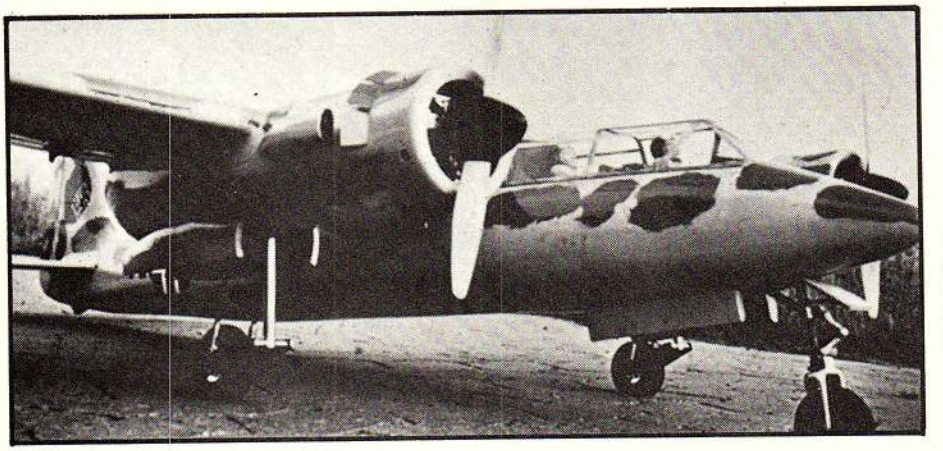
Deana Harding (Ft. Lauderdale, FL) with father Paul's PBY6A. Working lights, full cockpit, scratchbuilt landing gear (retractable), etc.

Jerry Farr (Abilene, TX) used unusual lighting to accentuate Bill Kimbrell's Stuka. 48" span model uses K & B .40 for power.

Deana Harding holds aloft her father's Heinkel He 162. K & B 6.5 engine, Rhom retracts, flaps and full cockpit.

Bruce Probert (Australia) sent this shot of his Dragon Rapide, built by Ron Goostrey. A three-year project!

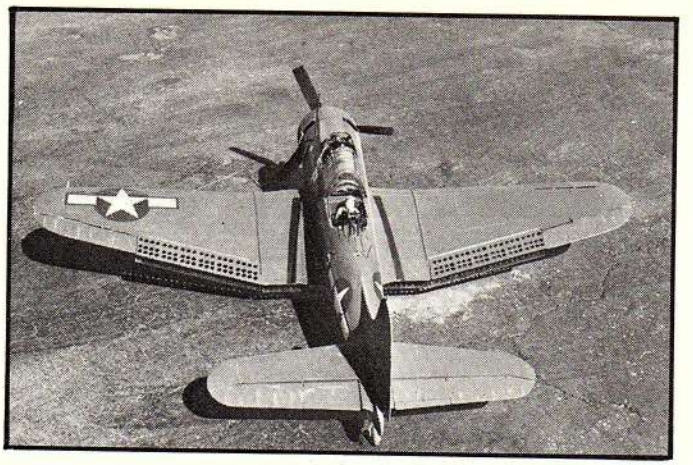
Dave Pastor (Pleasanton, CA) built this Acrosport from scratch.



From Germany, Eberhard Palm sends this shot of his Focke Wulf TA 154. Built from his own plans, from data supplied by the VFW-Fokker plant in Bremen. Scratchbuilt retracts are featured.

Corbin Supér Ace, from the VK kit, built by Bruce Boldner (Australia). Plane weighs only 3¾ pounds!

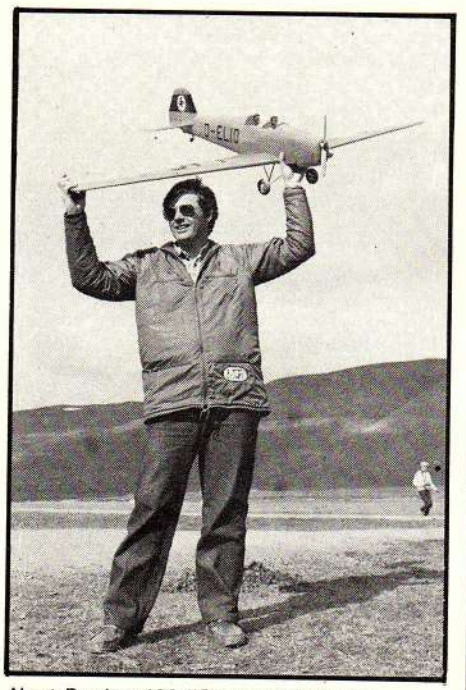
Tony Kameen (Riverside, CA) took Best of Show at the '83 MACS Show with this Brian Taylor Mosquito. The ten month project is covered with silkspan and acrylic lacquer, which helps keep the weight at only ten pounds.



This Jemco SBD-5 was Jim Deutsch's (Chagrin Falls, OH) first effort on a Sport Scale project. Webra .91 power, and Kraft radio with eight servos.

Using the Bf-109G on display at NASM, Bill Weinberg (Landisville, PA) modeled this Platt Kit. O.S. .90 powered.

Done up in Chinese markings, Duncan Stone's (Dallas, TX) Byron MiG-15 weighs 8 pounds, and flies with an O.S. .60 FSR.



Neat Bucker 180 "Student" from the Hobby Lobby kit, was built by Einar Einarsson (Varma, Iceland). His father introduced R/C to that country in 1954, and the first scale contest there last year hosted 10 models.

Emil Agosta (Elmont, NY) really tricked out his Platt Jungmeister.

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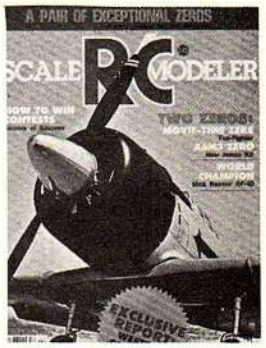

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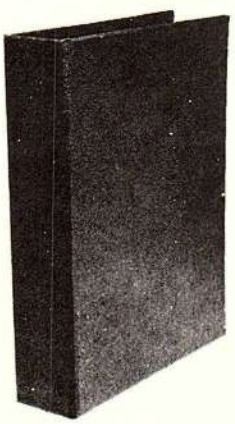

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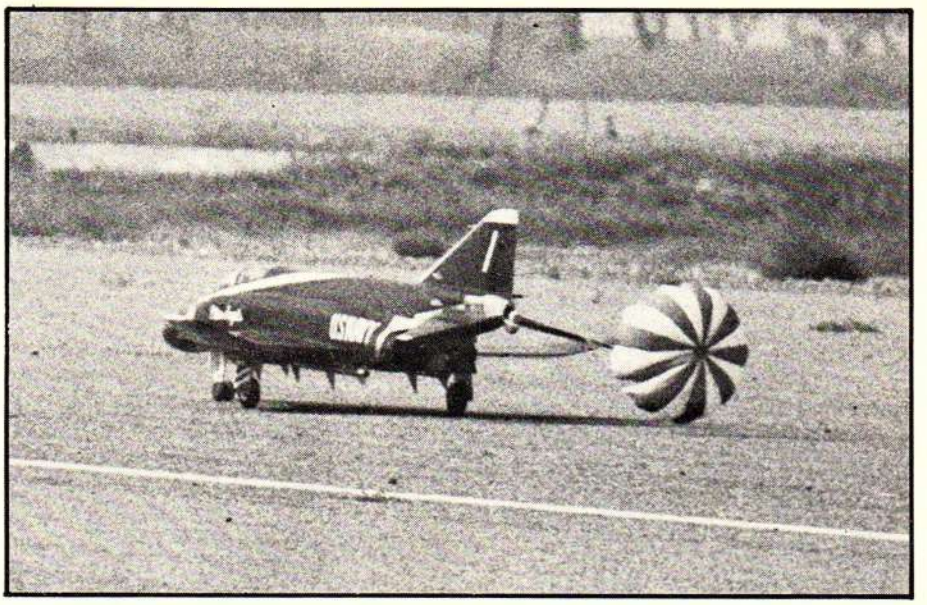
two-fanned PHANTOM II

(Continued from page 33)

he planned the Phantom perfectly on its mains within feet of the beginning of the runway. The drogue chute would pop a few seconds later, and the model would decelerate and stop just short of the other end of the runway. The margin for error was zero, and that's just the margin that Tom flew on every attempt.

What we witnessed on the second day was a perspective of the F-4 which few modelers would ever get a chance to observe. The layout of the field permitted us to cross the runway and set up our cameras along a tree line at the end of the field. From this vantage point, the planes were taking off almost right toward us, yet we were fully protected by the trees and a fence. What a thrill to have the planes buzz just scant feet above your head!

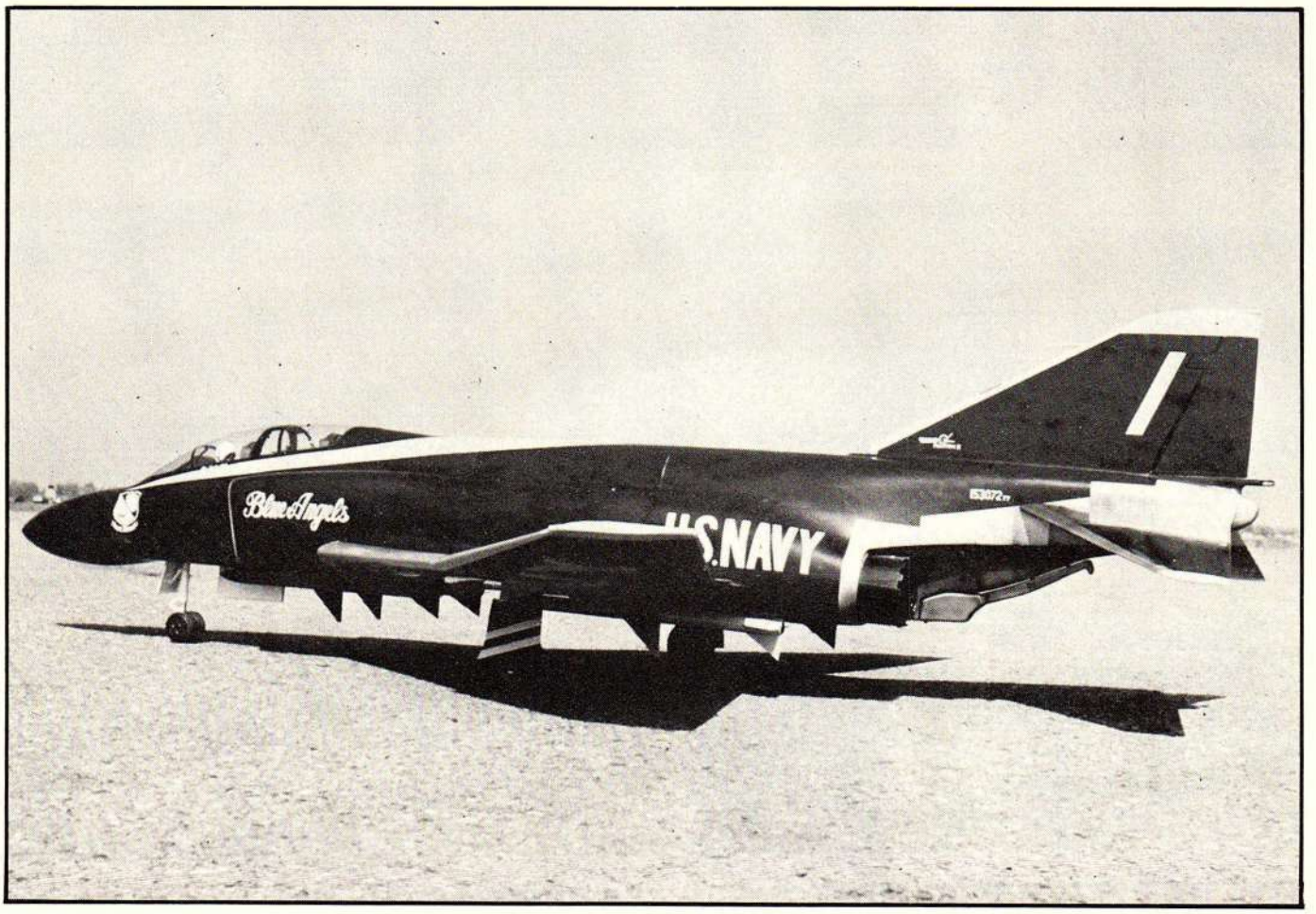


Chute deployed, the Phantom is unable to taxi because of the extra drag. A good idea to have a release override, which would get rid of the chute should it accidentally deploy in the air!

From our little spot, we were perfectly in line to see the maneuvers from an on-end perspective. We could see what the judges would never detect. Each loop that got slightly crooked looked disasterous when seen from the end. Rolls wobbled all over the place as the pilots lost their heading. Of course, these maneuvers were probably getting eights and nines from the judges, while we were giving them fives!

We were shocked to see how bad things looked from where we were situated. None of the models were even doing level flight very well!

When Tom Cook was up to fly,



the difference was astronomical. The exit from the loops wasn't slightly to the left or right of the entry . . . it was right on the money. The Phantom didn't wander aimlessly through the rolls. The fuse was if on a string. The difference from the other models was so dramatic that we hung around that spot until the second round, just to make sure that our eyes weren't deceiving us.

It happened again on the next flight. It was no fluke. The Phantom flew better than the other models . . . and that was a fact. We had some stick time on ducted fan models, and we could understand why the F-4 tracked so well. The thrust is generated near the C.G., so that the model isn't pulled through the turns by a prop quite some distance from the balance point. Anyone who has flown a fan model appreciates the axial rolls which these planes can do, because there is no torque to contend with. All of the plane's weight is located near the center of its mass, so the moment arms are light and they pivot easily.

We knew all of these things, intellectually, but it took this amazing demonstration to convince me that it really worked. The Phantom had a definite inherent advantage over the other models, just by the way it was designed. Add to this the great power-to-weight ratio of the Phantom, and throw in some excellent pilotage, and you have a natural combination for a Scale Masters Champion. Tom came up with that magic formula, and he walked off the winner.

Tom has carried over the pride of workmanship which he put into his own winning model into the kits and semi-kits he is offering. He's not farming anything out, but is doing the glass work and everything else himself. We have seen one of the fuselages, and its a superb job. The kit isn't cheap, but there are so many man-hours in each one that we're surprised that Tom is making anything on them at all. With handmade retracts, custom made wheels, and lots of special extras, the kit is a definite cut above anything else you have ever seen. Tom doesn't just want to sell kits; he wants those who buy them to succesfully build and fly them. What other manufacturer takes the time and effort to rework the engine, replace and adjust the carb, mount them and even bench run them. That's a day's work in itself!

So, when you see the stiff price tag on the kit, don't recoil and reject it. The Phantom is far more than any other model, and it carries a price which reflects that difference. The F-4 has taken kit modeling past today's technologies, so you are shopping in a whole different market when talking about this kit.

The pleasant surprise with the Phantom is that it isn't just a one-man airplane, which only Tom Cook can fly. From reports of others who have flown the big twin-fanned model, it is really a piece of cake. It's actually better than most traditional ducted fan models, having better thrust potentials, and a much broader safety margin. The response to the controls is light and positive. With its light wingloading (plus the benefits of scale effect in so large a model), the F-4 turns out to be a very gentle machine, with all the stability even an intermediate-grade pilot could want. Tom has often stated that the jet has hands-off stability, and those who have tried it agree.

Our apologies for going on at such great lengths about the F-4, but it is one of the truly unique and original models of the decade, and it certainly deserves all of the attention. **(PHP)** □

Not the kind of airplane you'd make first choice for contest flying, yet it won the World Championships.

MOSQUITO

(Continued from page 57)

The nightfighter paint scheme may not be the most dramatic, but there are plenty of other schemes available.

located in the nose of the model. So is the on/off switch and the filling valve for the retract system. Everything is easily accessible through the removable hatch. In the event of the hatch accidentally opening during flight, resulting in a flying battery pack, everything was firmly secured with two rubber bands.

To avoid a heavy wing loading, special attention should be given to the finishing and painting. Only a light finishing method should be considered. Heavy resin type finishes are not recommended. Enough has been written about finishing and detailing techniques, therefore, I will not elaborate on the subject. With weight savings uppermost in my mind, I chose the dope and tissue finishing method. This resulted in a very light finish. The tissue covered

model was given three coats of a sealer mixture, consisting of non-shrinking dope (available from SIG) and talcum powder. The talcum powder sands off very easily and it does not take long to accomplish a smooth surface, ready for painting. Before painting, however, all the detailing was added. For the most part, thin aluminum sheet to duplicate inspection panels, fuel fillers, etc.

There is plenty of information available on the Mosquito and to find a suitable color scheme should be no problem. As I liked the all-black night fighter finish, I chose to duplicate an aircraft of 157 Squadron, based at Castle Champs in March 1942. For paint, two light coats of thinned-down Hobby Poxy was all that was needed. I have used these paints for some time now and had good results, also the finish is 100 percent fuel proof. All the insignia and markings were painted on using stencils. The stencils cut from adhesive-backed vinyl shelf paper. The weathering of the model concluded the finish, and after a long, long winter my Mosquito looked like it wanted to fly.

FLYING THE MOSQUITO: Under normal circumstance, I would have now sat back for a while to admire my new creation, but the planned and well deserved rest did not materialize. The World Championships were only one week away. There was the need to test fly the model, and a transport box had to be constructed to get it to Reno. Needless to say, I decided to wait with the box and do the flying first. Also, as the weather was practically perfect every day, no excuse could be found.

It was on a typical, sunny Canadian Spring day when my good friend Mike Portugais and I left for our local flying field with that all important flight in our minds. Mike, who besides being one of Canada's top Masters Pattern pilots, also has the talent of getting the most out of model engines. His know-how was greatly appreciated at Reno. Some time was spent to properly set the engines, especially to obtain a perfect and synchronized throttle response. With everything adjusted, the engines were set very rich, turning 10-6 Rev-up propellers at around 8,000 rpm. It was all systems go.

Although I was advancing the throttle very slowly, the model was swinging to the left. Holding right rudder had little or no effect. Then, when sufficient airflow over the rudder was obtained it would bite suddenly, resulting in a sharp turn to the right. Despite all this swerving, the model lifted off cleanly. The engines were barely two-cycling, so the Mosquito felt a bit sluggish. This necessitated a quick retraction of the undercarriage. With the model cleaned up, it started to look and fly like a Mosquito. Incredibly, no trim was required, and the control response was smooth and positive.

This first flight ended in a dead stick landing. The overly rich running of the engines resulted in a higher fuel consumption than was estimated, leading to the stoppage of the starboard motor for lack of fuel. No attempt was made to fly the model on only one engine. Instead, the running motor was throttled back. The following landing was without any excitement. The model

(Continued on page 78)

FAIREY FIREFLY

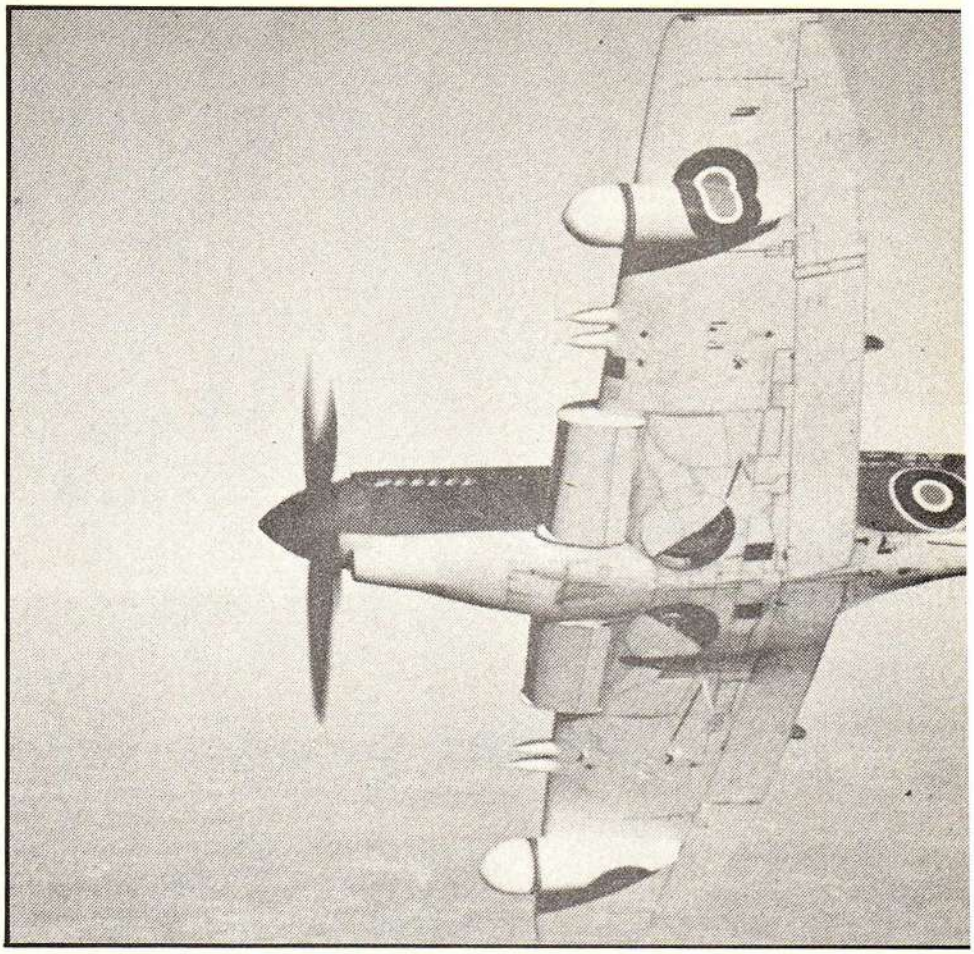
(Continued from page 48)

will have to be moved ahead a bit so that it can extend at the scale position. Glue in TWB1 and 2. Look at the F17 cross-section and you will see the position of these. Glue them before adding stringers.

Before installing the stringers, the ply doubler and 1/8-inch top decking on the nose, first install the engine mount. Hardwood engine bearers are shown on the plans. I substituted F4 with ¼-inch ply and used a Fox radial aluminum mount. Wrap a strip of 1/8-inch balsa around F1 and F2 on top temporarily, then attach the spinner back plate to the engine. Install the engine and align everything to the nose ring.

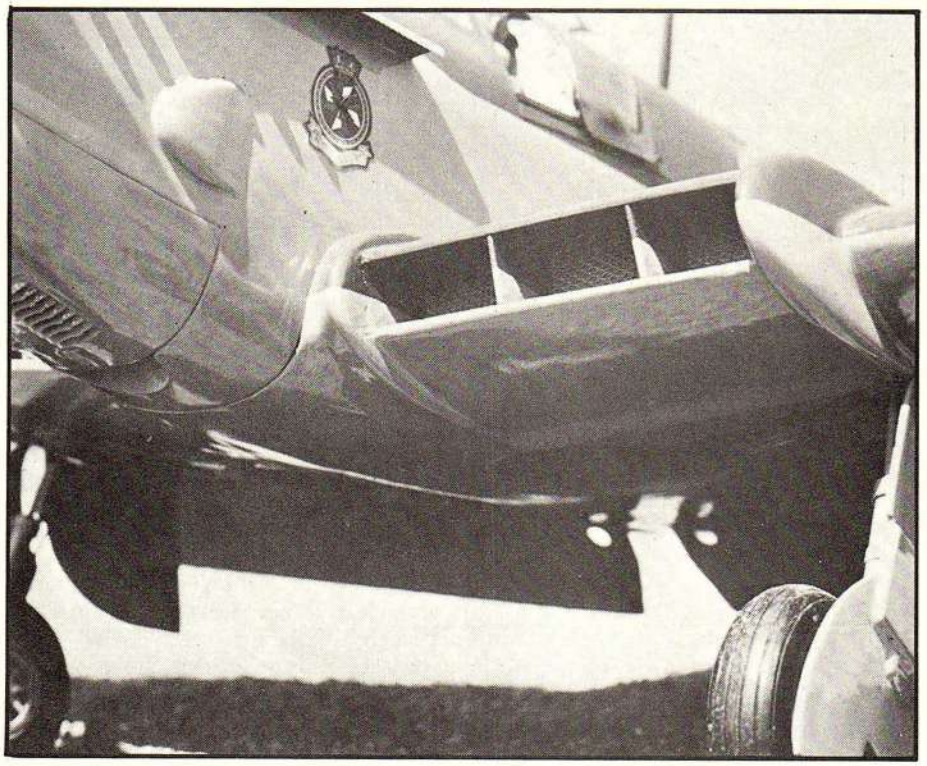
Mount the elevator bellcrank to the crutch now. A Sig ½ A Nylon bellcrank was used for this. It comes complete with bearings and mounting screws. Fasten it on a piece of ¼-inch ply and glue it to either side of TWB1. Linkages for rudder and tail wheel steering should be made now, while the fuse is open at the rear. A Robart "feed-through" bellcrank was used for this. Mount it before gluing the stringers and 1/16-inch balsa planking on fuse. A piece of 1/16-inch ply between formers F16 and F17 will hold it. Position it so that just the arm protrudes through the side of the fuselage. Connect the outside arm to the rudder horn. I used arrow shafts for my control rods. They make a very solid connection between the servo and control surfaces—providing that the kwik-links are tight.

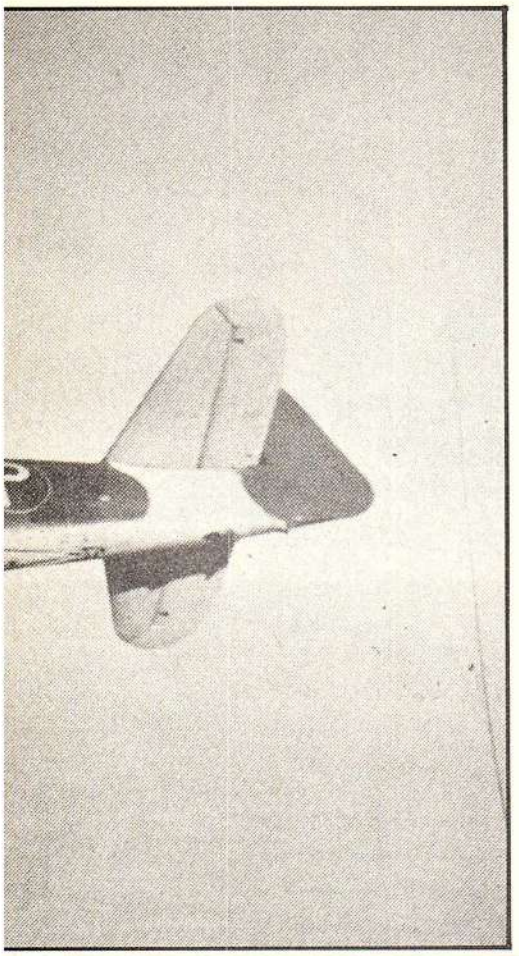
To steer the tail wheel, solder a piece of braided cable to the music wire which is connected to the arrow shaft and the Robart "feed-through" bellcrank inside the fuse. Make it about 6-7 inches long so that it will flex when the tail wheel is retracted. I found that if it is too short, that it will kick the rudder to one side when retracted. The tail wheel is actuated by a Sonic air cylinder mounted just behind the servo tray. An aluminum arrow shaft from here back to the tail wheel works well. It may seem a long



Look at all the panel lines under the wing! Note very peculiar painting of insignia. The rearward gear angle is very evident here. (File photo)

Detail of the cooling radiators. Lots of external goodies on this model to impress the static judges.





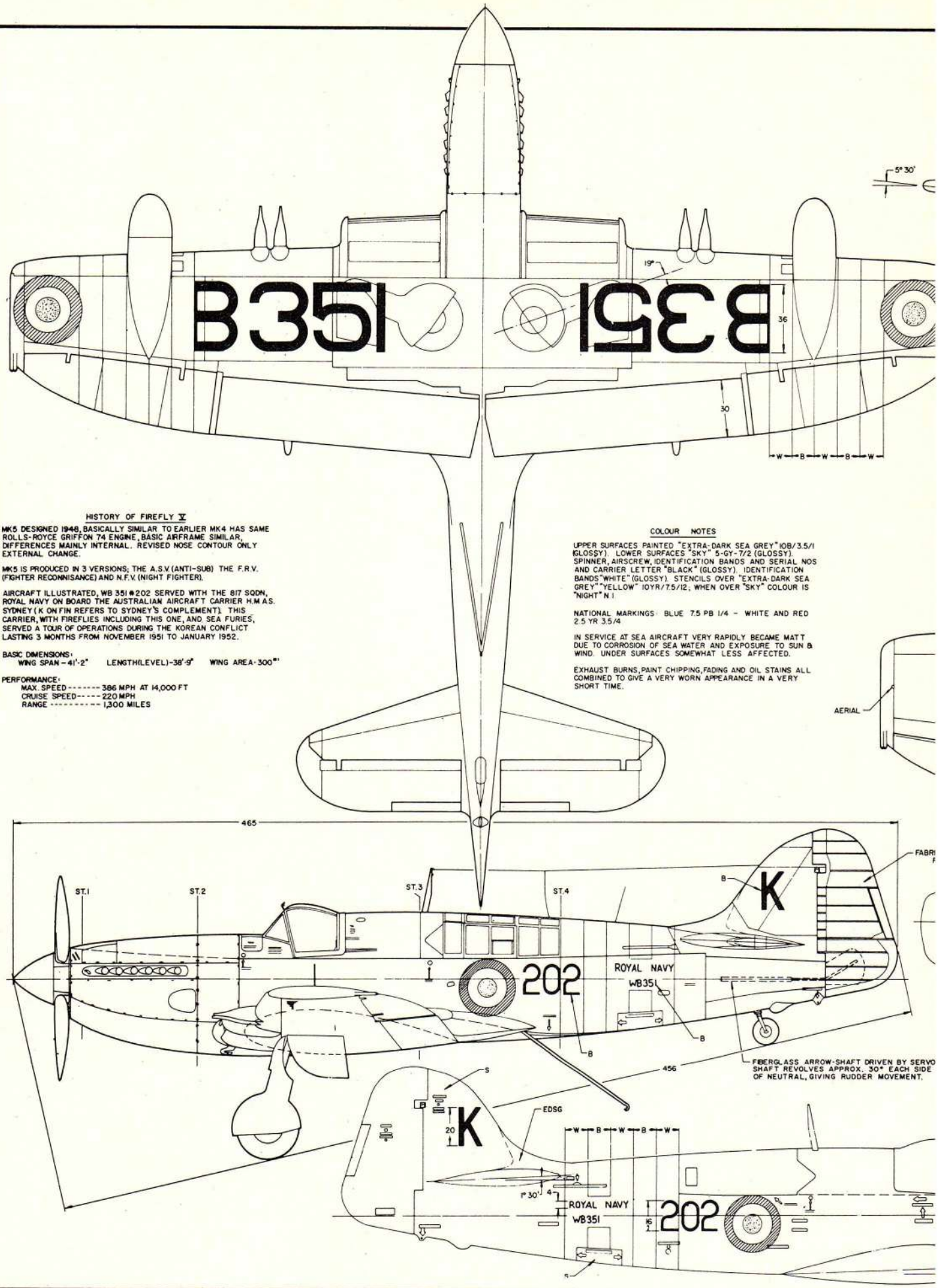
way from the tail wheel, but you don't want all that weight in the tail. One last thing on the tail wheel, discard the tiller arm and make up a new one from brass. Solder a wheel collar to it and file a flat on the music wire for the wheel so your new assembly won't turn.

After completion of the wing and fuselage, attach the wing to the fuse. Another area on the plans which does not give any information is the wing's incidence setting. Refer to the Dave Platt three-views. He has indicated 2.5 degrees positive for the wing and 1.5 degrees positive for the stab. I used this with no problems. Take all the time that is necessary for the wing and stab alignment or you will end up with another pig in the air (I have built so many).

The Rhom-Air system was incorporated and worked to perfection. Installation of the Fliteglas restrictors in the air lines make scale-type retraction very realistic. The wheel doors are not actually what you would call wheel well doors. They are more of a strut cover in that the strut is covered and half of the wheel. The wheels, when retracted into the wing, are still partially exposed. The upper part of the strut cover, which is separate from the bottom, is hinged to the wing. Because the wheels retract rearward at a bit of an angle from the leading edge, a piece of music wire will have to be attached to the bottom cover, and another piece shaped to the outside edge of the upper strut cover so that the bottom strut wire will slide inside the upper strut curved wire. There is quite a separation from top and bottom covers when the wheels are down but, when retracted, they come tightly together. This all sounds a little complicated, but it's actually just another one of those fiddly things we run into when building scale. Making the covers removable for test flying probably would be a good idea.

Although I like to have a sliding canopy I have not been too successful in the past with gluing pieces of music wire to canopies with epoxy without making a mess. You might try gluing the wire and square tubing to the canopy with Wilhold RC-56 first. It can be held in place with a clamp until it sets. The advantages with this glue is fast setting and, if you happen to accidentally get any glue on the canopy where you didn't want it, it can easily be wiped off

(Continued on page 71)



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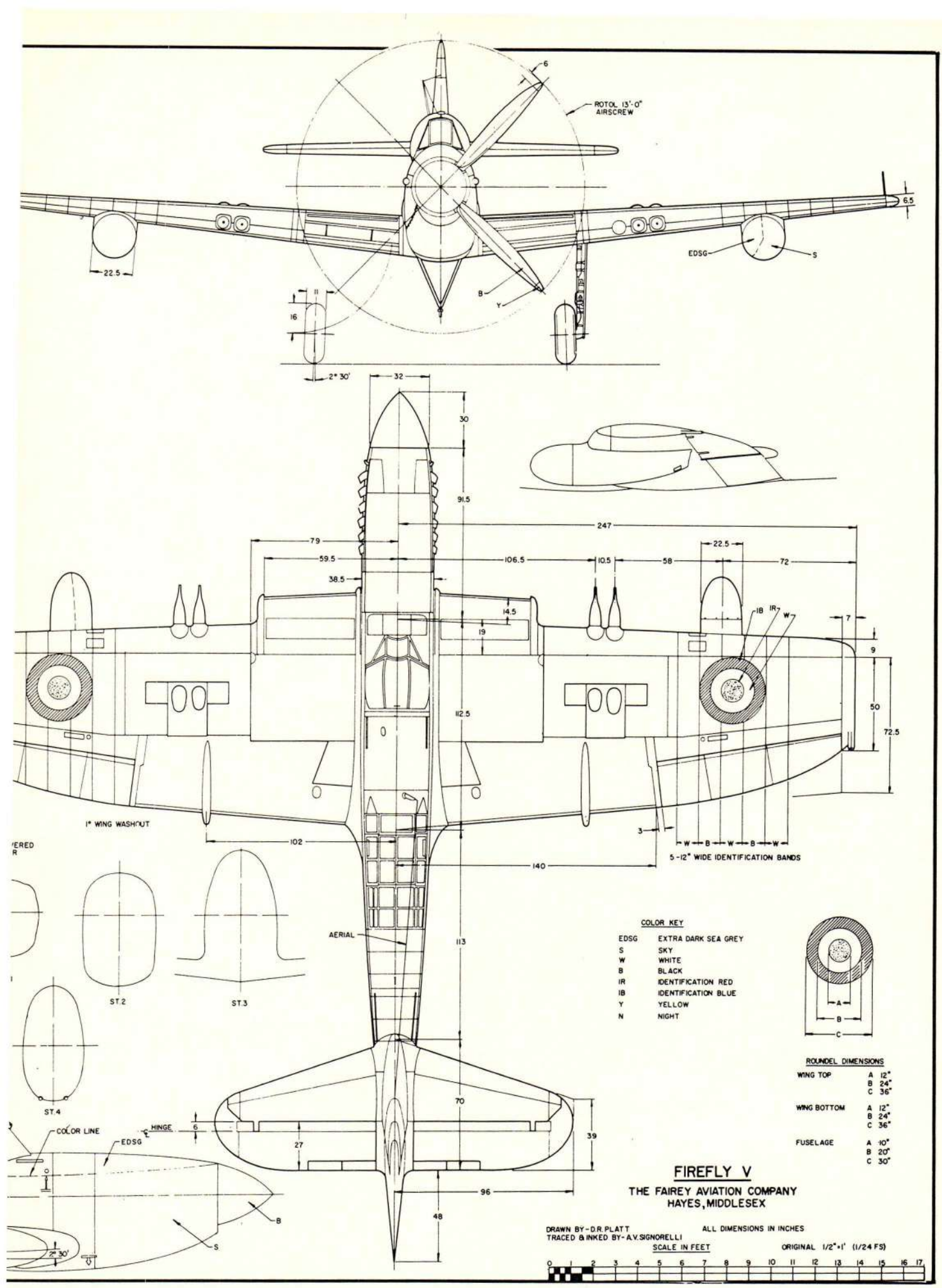
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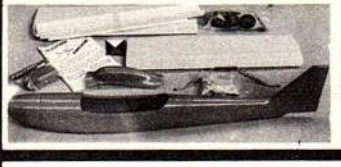

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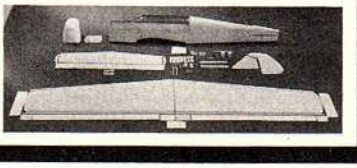

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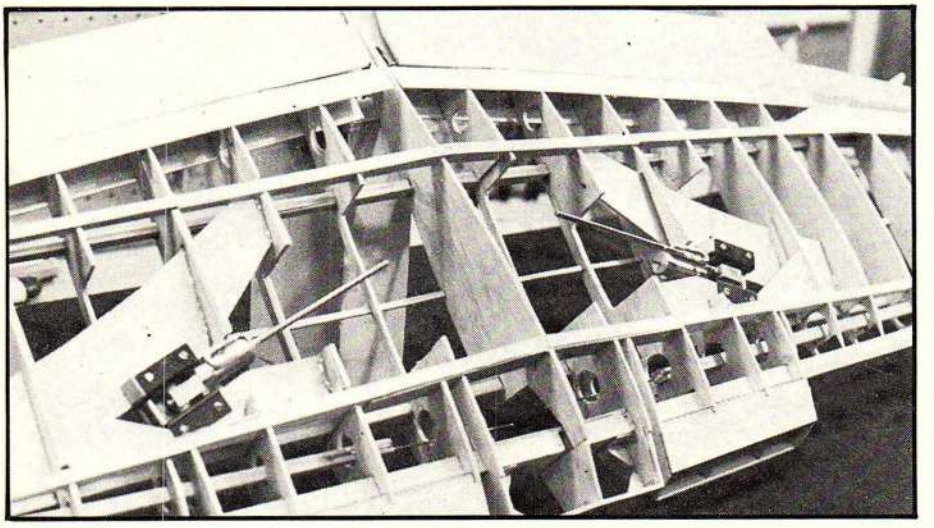
The Swordfish is a weird looking duck, with those garishly large wing root radiators and that long turtledeck.



The author's wing, under construction. Note extreme rake of the undercarriage. Aileron pushrods are between spar and the leading edge!

with a damp cloth if done right away. It also dries clear. This is not really sufficient to hold it strongly enough. A small piece of celastic (dipped in thinner) to just cover the wire melts the plastic enough to make a very good bond. The canopy I purchased from Bob Holman was extremely thin and when trying to trim it the plastic split. Be extremely careful when cutting it, as it does split quite easily. For rivet detail on the frame of the canopy, take a ball point pen from the inside out at about ¼-inch intervals and press hard enough to make a dimple. Put a piece of cardboard under the canopy while you do this. After the canopy is glued to the fuselage, spray or brush on a heavy coat of Liquid Masking Film. This will protect it, plus you will be able to strip off the frame outline when you are ready to paint.

Engine cooling is certainly a prime concern. On my model, I left the front of the cowl open. Take your Dremel Tool and grind the rear portion of the cowl till you leave a 1/8-inch lip all around. At a point about a quarter of the way up the side of the cowl at the rear, leave it a little wider so that you can install a couple of 1/8-inch music wire pins to hold it to F5A. Leave the bottom of the fuselage open from F5A to F6. Make it in a half circle shape and not too large, so that when you view the fuselage from the side, you should not be able to see it. Line it with 1/64-inch ply and it's finished. With the opening in front and rear, plus the louvers, there will be no problem with overheating.

There certainly seems to be a never-ending deluge of ways to finish our models. I must have tried them all at one time or another, from dope to epoxy, to acrylics, to iron on, to resin . . . you name it. At one of our club meetings, a fellow demonstrated covering wings with newspaper and wallpaper paste but, I must admit, I haven't tried this one. The system I used is fairly quick and will yield a good base for your color.

First, take a trip to your local fiberglass supply store and purchase a material called "Q Cell." It's as good as micro balloons at a quarter of the cost. Mix this with your glass resin (just enough to discolor the resin) and brush it on the bare wood to seal it. You can dry sand this with not too much wax buildup on your sandpaper. Next, add ¾-oz. glass cloth. Lay the cloth on dry, cut a piece of foam about 1½ inches wide and about three inches long (the type you wrap your battery pack in) and fold it in half. Use this to dab the resin through the cloth. When you are finished, just throw it away. This beats using a brush that continually pulls at the cloth. Wet sand this with 220 wet-or-dry paper lightly and don't go through the cloth.

For the final filler before color, mix a batch of resin and "Q Cell" to a fairly soupy consistency and brush this on the glass cloth and wet sand. This will fill the weave of the glass cloth. Spray on a coat of K&B primer and wet sand again. Sand the primer *all* off . . . it weighs a ton. The airplane is two shades of grey. By adding black to white, I

(Continued on page 74)

STAR-STRUCK STARLET

(Continued from page 40)

The prototype model was given one coat of Ceconite R/C Filler Coat, applied with a foam brush directly over the raw (undoped) fabric. Five coats of butyrate dope were sprayed on, plus three coats of butyrate dope trim.

A. J.R. 8-channel system, with 2001 servos, was used. Two tandem servos were used on the elevator, joined by a C.B. Associates Servo Doubler assembly. The unit was not used because the additional power of an added servo was needed, but to improve the reliability of the R/C system. If one servo should ever fail, partial elevator control is still available. The extra weight of one more servo is a small price to pay for a major improvement in safety and reliability.

To simplify scratchbuilding the model, I can supply not only a set of building plans, but I also have a molded canopy, ABS cheek cowls, wheel pants, the 3/16-inch aluminum landing gear, and even the Ceconite covering materials. Write or call for complete prices and details: Jerry Nelson & Co., 3510 San Mateo Ave., Reno, NV 89509. Phone (702) 322-0664.

The Starlet may not exactly grab you the first time you look at it. It looks big and clumsy . . . not at all what you'd expect of a refined aerobatic model. Yet, turn it loose in the sky and you'll immediately fall in love with its smooth and precise response. That bulky little putt-putt is a real handful of airplane. It almost turns itself inside out, doing the hairiest snap rolls you'll ever see. If you ever wanted to fall in love with a Starlet, don't make it one from the silver screen, but make it a Corby CJ-1 instead! □

Touching down on a deadstick landing, the Starlet proves itself stable. A very honest airplane.

FIREFLY

(Continued from page 71)

got the lighter color, and white to black yielded the darker top color. Because the original airplane was in such immaculate condition, it was very shiny and consequently, no weathering was necessary.

Part of my method was borrowed from a technique used by Jim Kimbro in *Model Airplane News* (September 1978). You might want to look this up and try his entire system. As he states in his method, if you don't like to sand it's not for you.

The oil cooling radiators on the wings were made from plastic radio speaker grills picked up in an electronics surplus store. I have found these places to be gold mines for bits and shapes, particularly for cockpit detail. Silver elastic thread works well for the radio aerial with small fish line swivels on the ends. The antenna mast can be mounted with a piece of Rhom Air air tubing about three inches long glued in the bottom of the mast. This keeps it flexible and prevents it continually breaking off.

The cowl louvers were made from house sofit vents picked up in a hardware store. Some of these are just the right size and look very realistic. Just cut off what you need. Teardrop shaped streamline aluminum tubing was used for the exhaust stacks. From the aluminum spinner, you can make a very nice static spinner for the four-bladed prop. I used the Hobby Poxy "Easy Does It Balloon Method." Attach the spinner and back plate to an old engine, mount it in a vise, wrap

the spinner and back plate with Saran wrap, put on heavy glass cloth and resin and put the balloon over it.

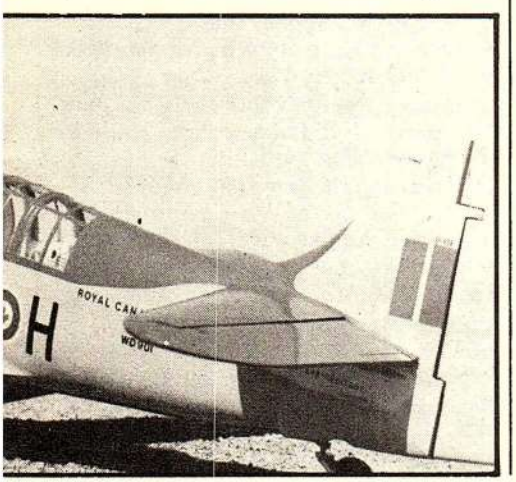
After it sets up, remove the glass spinner from the back plate, fill the pointed end with resin about ½ inch deep and drill it out for the attachment bolt. Put a ply ring around the inside back of the spinner to stiffen it. With a little sanding and fiddling, you will be able to make it fit inside the groove in the back plate.

The insignia on the port side just under the exhaust was cut out of a colored photograph I had taken of the full-size Firefly. It just happened to be close enough in size to be able to use. It certainly saved a lot of delicate hand painting. All other markings are painted and dry transfers.

After just about a year of hibernation in the basement, continually gluing fingers together, fingers to eye glasses, and fingers to pieces of wood with that instant glue, then hours of sanding and putting off painting because I screw it up every time, and threats from the wife of divorce if you spend one more second on that thing, you mean you want me to actually f-f-f-fly it . . . are you crazy?! Well, aren't we? I have never met a scale person yet that isn't three cookies short of a dozen, have you? So, fly we must.

I had to add seven ounces of nose weight to my model. If you have to do the same, put the weight as far forward as possible. By melting some lead into a tin jar lid you can make them quite thin wafers and insert them between F2 and F3. Install the battery pack between F4 and F5.

Another point missing on the plans was the C.G. location. Measure back 5¼ inches from F6. This will get you safely off the ground and flying straight and level. You can experiment moving the C.G. around for your own comfort after its up and

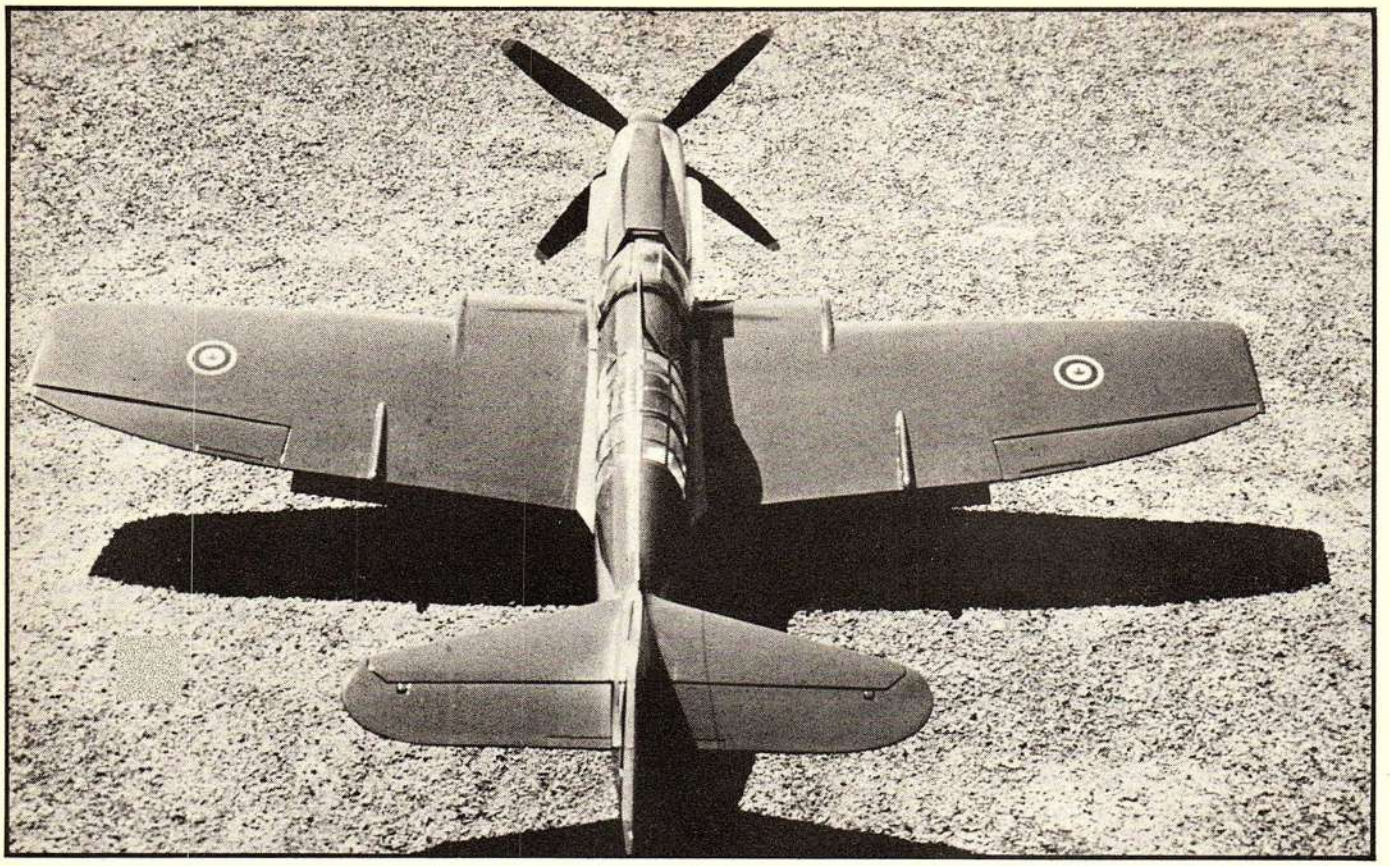


down a few times. My suggestion for the first flight is to leave that huge spinner off and fit a small one on, in its place. Leave the cowl off and the strut covers. This way you can set the engine properly and if you have any problems taking off or landing, it will save any repairs to the landing gear struts. Note that such deletions will change the C.G. a bit. As with any tail dragger, holding right rudder hard over and keeping the tail down till it's tracking straight is the only way to get airborne. My model has a Webra Speed (12-6 prop) which makes for plenty of power and torque. Feed the power easily for the first twenty feet or so, let the tail come up as it comes in front of you, holding full right rudder all the time. Let it roll another 30 feet or so, it looks beautiful . . . keep holding that rudder. Now, just breathe on the up elevator and she'll take off by herself. Keep holding that right rudder in till it hurts. If you don't, it will torque off to the left and cartwheel on you . . . ask me all about it. Keep it flying straight with the rudder and leave the ailerons alone as much as possible until you get a comfortable height, then slowly release the rudder.

My Firefly flew fantastic. Not exactly off the board as they say, because I did have to give a turn or so on the aileron Kwik-links, but the rolls, loops, inverted flight, etc. were all akin to that of a Pattern ship. Slow it down to a more scale like speed and she will handle beautifully. On landing, lower the flaps, keep the speed up and she will land perfectly.

Building light is not one of my better attributes. My Firefly was a couple of pounds too heavy. With the wing area and the wing loading getting around 30 oz. per square foot, you are looking for a little careful flying. Two or three times during the first twenty or so flights, the Firefly, when making too tight a turn at top speed, had a tendency to want to drop its wing. I managed to catch it at these times. Unfortunately, a week before the Canadian Nationals, I did not and it spun in at a very low altitude. It was too late to repair for the contest. So, my advice to anyone building the Firefly is to be very selective with your wood, easy with the glue and finish, to keep it at ten pounds (or preferably under) and you've got it made.

This is one WWII aircraft that has not been modeled to death. Give it a try, you'll be happy with the results. □



The planform of the Firefly makes it a dead giveaway in aircraft identification. Stab area is surprisingly large.

MOSQUITO

(Continued from page 65)

felt stable and responsive right down to the flare out, with no signs of any lateral instability. Happy with the flight performance of the Mosquito, it was decided to risk no more test flights. The succeeding flying (test flying) was done at Reno, but that's another story. . . .

Subsequent flights proved the model to be a truly fine flier. It can be flown safely, very realistically and slowly. The takeoff is best done by holding down the tail with elevator, *very* gradually opening the throttles, and using the tail wheel steering for the initial takeoff run. Also, running the engines at around 9,500-10,000 rpm, using the same 10-6 propellers, resulted in a safer takeoff. There was no shortage of power to do a full array of maneuvers. My Mosquito weighs 10 pounds two ounces (without fuel). In order to correctly balance the model, it was necessary to add seven ounces of lead to the nose (despite building a practically weightless tail section).

By now, it's old news that there were two Mosquitos at the Reno World Championships. Wim Reynerts, flying the other, won the whole shooting match in Sport Scale. What a surprise to have a twin beat out all of the more "traditional" models. The real satisfaction was in knowing that the Mosquito was probably the least desirable model for the contest. At an elevation of over 5,000 feet, the Stead AFB facility had a density altitude of near 9,000 feet in the middle of those broiling June days. A heavy twin was really not the model to be flying in such conditions. More than one model was lost due to tip stalls in the rarified air.

The Mosquito is such a well-engineered design that it triumphed over the lightly loaded planes. It handled superbly in the thin air, with more than ample power and plenty of stability. Wim is to be congratulated for the superb job of flying he did. He made the Mosquito come alive, with stirring low passes and beautifully executed aerobatics. He truly is a world champion.

To sum it all up. Brian Taylor and Bob Holman should be congratulated in bringing us the Mosquito, if you are looking for something truly outstanding in a model, with looks and flying performance next to none, then why not give the Mosquito a try.

REFERENCE SOURCES

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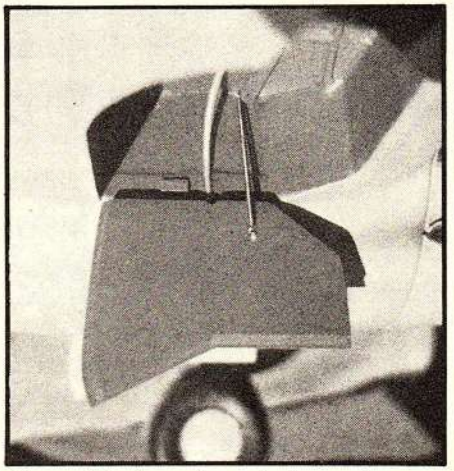
Profile #52, Military Model Dist., 1115 Crowley Dr., Carrollton, Texas.

N.B.: The Airfix plastic kit is also highly recommended. □

miss BEHAVE

(Continued from page 17)



View of the inner door closing system. Cable extends into hollow door, keeping it open. Cable slides back into sheath as the gear collapse, allowing the spring to pull the door shut behind the wheel. Other end of cable is tied to gear strut.

was beginning to comment on my strange behavior!

Then, I had a completely new think. Why should the doors be sprung open? Why not spring them shut? Question: "How do you keep the doors open in this mode?" The following method is what came out of it all and has, so far, withstood six months of flying and dozens of operations:

An aluminum sleeve was fitted into the hinge end of the door, which was in line with the well wall when the door was open. A flexible cable was then fitted to go 'round the well, from the undercarriage leg, to face the sleeve in the door. The best cable tried was .050-inch diameter (10-speed bike brake cable) and was run inside a 1/8-inch O.D. nylon, automotive, pressure pipe. One end was epoxied onto the undercarriage leg; and the length was cut so that the cable was *just* out of the door sleeve when in the retract position. The door was tensioned to close with a light spring.

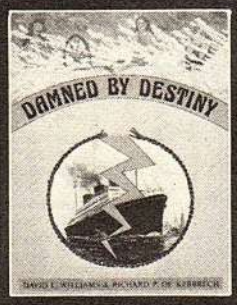
Operation: With the undercarriage down, the cable is seated ¾-inch inside the door sleeve, enough to keep the doors open and fairly rigid. As the wheel retracts, the cable is pulled out of the sleeve. But, it's not until the wheels are almost fully

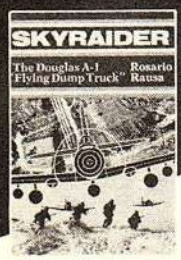
in that the cable slides out of the sleeve and the spring takes over, shutting the doors with a convincing "plop." Reversing the sequence, as the wheel comes out it pushes the door open to at least 45 degrees to get past. By this time, the doors are sufficiently open to allow the cable to locate in the sleeve and push the doors fully open. I found soldering the first inch of cable a help in keeping the door end straight, and also prevented the end from fraying.

Finding the right spring was a real course in trial and error. If it is too light it won't pull the door right in. If too heavy, it hinders the cable in locating in the sleeve and tends to pull the doors away from vertical when open. I found the best spring to be 7/64-inch diameter, low tension. Mine are out of an IBM typewriter; 1¾-inch long cut down to 1½-inch.

The entire project has been a fruitful exercise, with a lot of useful ideas having been learned on the way. Enough of the flying ability of a Thunderbolt has been written in these columns to say only that it flies like a dream. Its first competitive outing won it First Place in the Class I Scale event at the 1981/82 New Zealand Nationals. □

NEW OFF THE PRESS!





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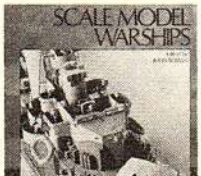

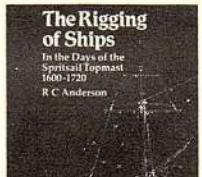

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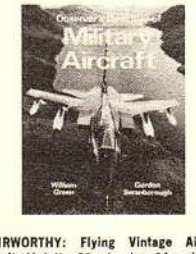

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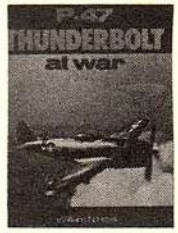

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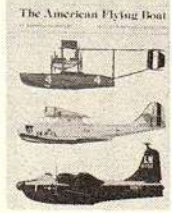

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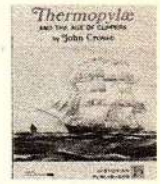

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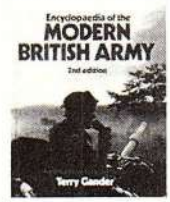

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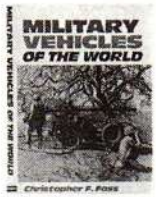

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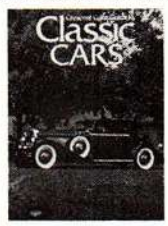

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