

SPECIAL ISSUE: NAVY AVIATION!

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JUNE 1984

\$1.75

**FLYING
MODELS**

flying **models**



Construction:

**F4U Corsair
F6F-3 Hellcat**

Review:

**Jemco's
F6F Hellcat**

PHOTO: BOB HUNT



FM VISITS:
The INTREPID



W.E. says O.S. 4 STROKE ENGINES TEST HIGHER

If you read advertisements for four cycle engines, you may either be amazed or confused by the power ratings that some of our competitors are publishing. We suggest that you look to responsible magazines for more realistic power information. Since we are challenging other manufacturers' in-house test results, we are not going to labor you with the results coming out of World Engines; however, we did get a test by Don Chapman of Dayton, Ohio who has a long history of engine testing and engine work, both in model aviation and automobile racing. According to Don Chapman, on a 16 x 8 Top Flite prop, 15% nitro fuel containing 10% oil, both the O.S. and Enya 90 turned 6,500 RPM's. On a Davis 14 x 9 propeller, the O.S. turned 10,200 RPM's and Enya turned 9,900 RPM's. In both instances the O.S. showed slightly lower numbers at idle. There are other considerations besides power in purchasing a four stroke engine and one of these is weight. O.S. engines are lighter than anything that we have found to compare them with. Another consideration is how much cooling area the engine offers. Here again, the O.S. engines look very good by comparison.

Four cycle engines offer one great advantage - they do not make as much noise as two stroke engines. Four cycle engines also exhibit some problems. To simply push up the power by increasing the compression often causes detonation in the engine. Detonation produces overheating at a terrific rate. So, be careful in selecting your four stroke engine.

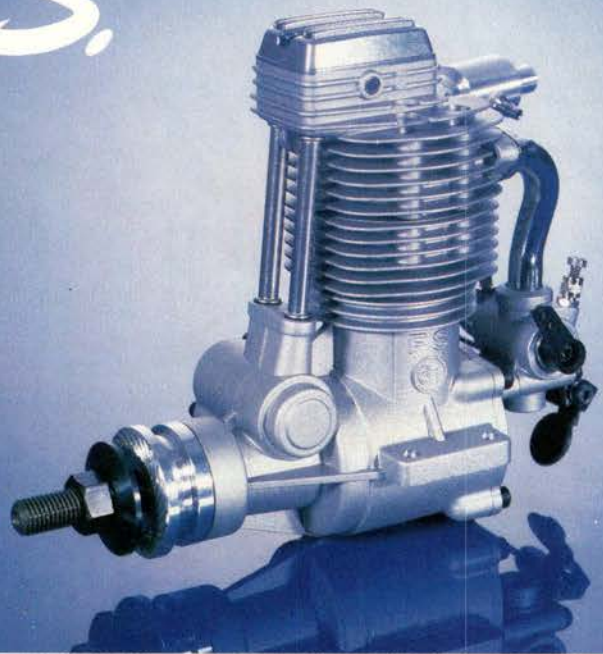
O.S. has been making four stroke engines since 1977. Their 60 was one of the first to appear on the market seven years ago. See Peter Chinn's review in Model Airplane News. They have also pioneered the twin market with the Gemini, which has been an outstanding success. Maynard Hill used the O.S. FS-60 to set many world records recently. His record-setting engine has over 600 hours without any major part replacement.

From a price standpoint O.S. may cost only a little more. The price difference between an O.S. and an engine of lesser quality is trivial. This difference is really nothing when you consider the satisfaction you will get from placing your aircraft on the flight line with an O.S. engine that you can really be proud of.

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On the cover

An all time favorite modeling subject, the F-4 Phantom is but one of the many historic aircraft on display aboard the Intrepid Sea-Air-Space Museum in New York City. Read about FM's visit to the distinguished carrier in this issue. Photo by: Bob Hunt.

June 1984

Vol. No. 6/523

Aircraft features

- 24 **Intrepid Sea-Air-Space Museum/Bob Hunt**
FM chronicles the "Fighting I's" last assignment
- 30 **F4U Corsair/Pavel Bosak**
A four channel R/C version of the "bent wing bird"
- 34 **R/C Battery/Charger Update/Bob Aberle**
New products from SR Batteries and Ace R/C complement each other nicely
- 37 **Simple Winding Stooze/Perry Peterson**
Back To... Square One: Ten minutes work can protect your rubber model
- 38 **F6F-3 Hellcat/Mike Midkiff**
Masterful recreation of a distinguished veteran for rubber scale
- 42 **Project Pattern/Dean Pappas and Bob Hunt**
Dispelling the mysteries of firewall installation in fiberglass fuselages
- 45 **Kraft System's KP4KB/Bob Aberle**
An FM Product Review: New sport four channel system with many features
- 48 **Jemco's Hellcat/Ron Farkas**
An FM Product Review: Has all the performance and realism you could want
- 52 **Motor Matters/Mike Billinton**
Engines spoken here
- 54 **Son-Die Whisper/Bob Cook**
An FM Product Review: An all wood kit that shouts performance
- 58 **Flyin' Things for Fledglings/Earl VanGorder**
More news from the gang
- 62 **R/C Sport Scale/Rich Uravitch**
Hassle free "all metal" finish
- 63 **R/C Giant Scale/Frank Costello**
Sources of scale documentation
- 64 **R/C Pattern/Dean Pappas**
Trimming for Knife Edge flight
- 65 **R/C Sport/Dick Sarpolus**
Try a "V" tail model
- 66 **R/C Soaring/Herk Stokely**
Mods to the Hobie Hawk for more performance
- 67 **F/F Sport/Larry Kruse**
More on CO₂ power and what to build
- 68 **C/L Combat/Rich Lopez**
Rich tells us about his new motor mount system
- 69 **C/L Stunt/Windy Urtnowski**
Drafting: helping another to help yourself

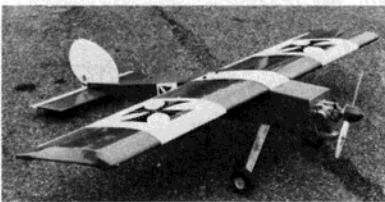
R/C model boating

- 72 **Octura's Florida/Vic Macaluso**
An FM Product Review: Vic relates some "surprising" performance
- 74 **R/C Boating and SR Batteries/Vic Macaluso**
An FM Product Review: An inside look at the new EP MAX PAC
- 76 **R/C Scale Boats/Eric Goldschrafe**
An update on the "Hank's Hobbies" crew and their tugs
- 77 **R/C Sport Boats/Vic Macaluso**
Making a custom boat stand

Departments

- | | |
|-----------------|---------------------|
| 4 Editorial | 80 Letter Rip |
| 6 Flying Report | 82 Timetable |
| 23 Airmail | 88 Classified |
| 57 3-View | 89 Dealer Directory |
| 70 Pit Report | 90 Ad Index |

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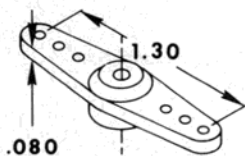
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editorial



After visiting the Intrepid Sea-Air-Space Museum, this month's special feature article, FLYING MODEL's Editor, Bob Hunt, in the cockpit simulator of an A4 Skyhawk on the hangar deck, says it sure beats video games.

Modeler's who live on the east coast and those who visit from time to time now have a unique place to go and be near some of the truly legendary pieces of flying and floating hardware. I'm talking about the Intrepid Sea-Air-Space Museum in New York city.

The FM crew, accompanied by RAILFAN's Jim Boyd (resident ace photographer), spent two very enjoyable days aboard this WW II carrier that is now permanently moored in the "Big Apple." The story of our visit can be found elsewhere in this issue. I would like to take a moment to say thanks to Larry Swinski, the museum's Director of Exhibits, and Bill Simmons, the Assistant Director of Exhibits for taking time to explain how this museum came into being and what its future goals are.

Larry told us of how area modeling clubs have been helping out by building the many solid models used in the various dioramas. He also asked us to spread the word to other modelers who may wish to donate their time and talents in the months and years ahead. Future plans include many model displays in the lower deck areas of the museum. Larry is also on the lookout for any rare or unusual full-scale aircraft. There is still plenty of space aboard for large exhibits, and uncovering an old war bird or even selected, interesting pieces of one is Larry's hope. If you know of any planes or parts of this type, get in touch with Larry; we'll all appreciate it.

In keeping with the theme set by the above piece, we've included two construction features of scale WW II Navy fighters and a review of a popular kit for one.

Pavel Bosak sent the story and plans for his R/C rendition of the F4U Corsair all the way from Czechoslovakia. Pavel's model is designed around the very popular .40 engine

class and utilizes four channel control.

Our friend and master rubber modeler, Mike Midkiff is on board with a fantastic F6F-3 Hellcat. Mike's model features removable landing gear for realistic static display and fine flight performance too.

Ron Farkas also built a Hellcat, only this one is for R/C Scale events. Ron enjoyed the Jemco kit and highly recommends it for the first time scale builder - only keep the speed up!

We hope you enjoy our brief tribute to the men and machines of the U.S. Navy.

Team Trials

Those of you who follow the C/L competition trail must be aware by now that the United States is hosting its first Controline World Championships this year. The site of this contest is Westover AFB in that fabulous town of Chicopee, Massachusetts where the 1983 Nats were held. We are certainly all excited about it, but there are some problems on the homefront.

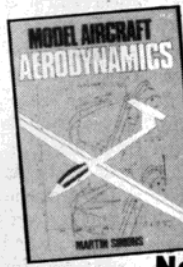
Our C/L team needs your support. True, the A.M.A. does supply a good bit of the funding needed, but it simply doesn't cover the many expenses incurred by the members of the team. I know this from my own experiences on two world teams. A good deal of the cost falls squarely on the individual competitors.

I've been asked by this year's Team Manager, David Elias, to join the team as Assistant Manager. One of my jobs is to help raise the needed support. If you can possibly help out, please do so now! And, thanks. Send donations to the Academy of Model Aeronautics, 1810 Samuel Morse Dr., Reston, VA 22090, and make a notation on them that they are to be used by the C/L Team Manager for the 1984 United States Team.

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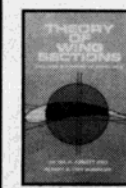


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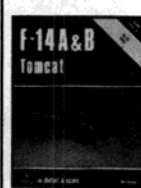
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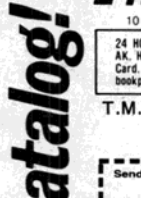
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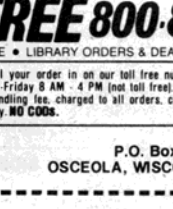
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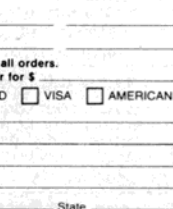
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While we're on the subject, the A.M.A. is offering a special Supporters Packet. This packet includes several WC's souvenirs: a cloth patch, decals, pins, program book and site pass. Additionally, by purchasing this packet, you will be able to park closer to the action and will be allowed into the "Supporters Zone" for spectating. This is an area with a vantage point closer to the circles than the non-supporter will have. The cost of this packet is \$10.00, which is half the cost of the items purchased separately. The money from the sale of this packet *does not* go toward helping out the team, so why not send for this offer when you mail in your team donation? Please include two dollars to cover the cost of handling and shipping.

Errata
 In the interest of accuracy, we must correct

a mistake or two. In the April issue, Frank Costello's Giant Scale column included a drawing of two spark plugs, one hot and one cold. Unfortunately the drawing labeled them incorrectly. Take a look back at them and simply switch the labels for a true picture.

In last month's issue (June) we presented John Ross' "Big Quickie" C/L racer. What we forgot was to credit Tom Schaefer for the text. Tom and John have been racing C/L ships together on the eastern circuit for many years with a great deal of success. It was a pleasure to work with them both on the aforementioned project. - BOB HUNT

Bob

flying report



Tournament of Champions
 One of the premier events of radio control will take place November 7-11 in Las Vegas, Nevada. It's the Eighth Annual Tournament of Champions (TOC). This year's purse, totaling \$125,000, makes it the richest one in aeromodelling history.
 Originally started in 1974, the Tournament at first followed traditional aerobatic patterns but has since evolved into a simulation of full scale aerobatics with maneuvers and miniature scale aircraft similar to their full size brothers. One aspect of the TOC has not

changed. Hanno Prettnner of Austria has won each annual affair, managing to master all the changing technology and techniques since the inception of the Las Vegas event.

According to Bill Bennett, the inspiration of the TOC and the co-owner of Circus Circus Hotels which sponsors it, selections will be limited to the top 20 R/C aerobatic pilots in the world. Ten participants will come from the U.S. and ten from other nations. Repeating last year's role as Contest Director will be Phil Kraft, a well known R/C pilot who founded Kraft Systems and has also won many national and international aerobatic R/C competitions. He will oversee the efforts of an international panel of judges who are experts in their own field of modelling or full size aviation.

All the excitement takes place at the R/C Model Airfield in North Las Vegas Regional Park, a specially built facility complete with runways, aprons, judge's pavillion, bleachers, running water and electric power. All spectators are invited free of charge with refreshments and souvenirs available throughout the contest. They probably will see another swing of the pendulum since the 1984

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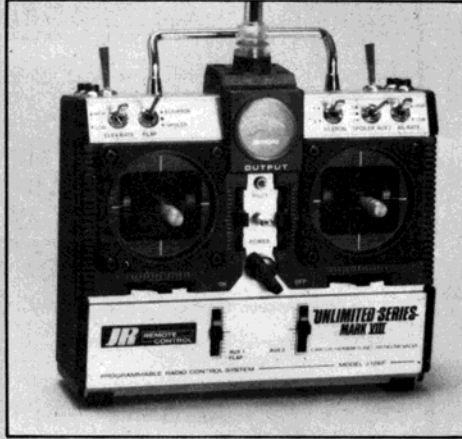
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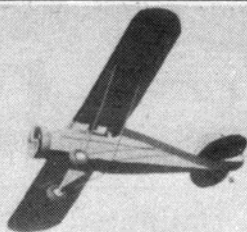
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rules have been changed to give biplanes an additional 10% factor in order to promote a greater variety of aircraft and inject a bit of biplane fever. Whatever the outcome they will surely see some of the best R/C flying in the world.

Hobbyoxy Scale Colors

In the latest effort to help the scale modeler with authentic camouflage color formulas for military aircraft, Hobbyoxy has turned its attention to the Japanese aircraft color schemes of World War II. The six colors presented here were used on both the naval and army aircraft from 1933 to the end of the war.

From 1933 through 1941, the standard scheme for naval aircraft was an overall **Light Gray N10**. From 1942 to the end of the war, **Black Green N1** was used on the upper surfaces, usually as a solid color, but sometimes applied in a blotch pattern over the **Light Gray**. **Light Gray** continued as the standard color for the undersurfaces.

Cockpit interiors, and the insides of doors and hatches, were primed in a **Translucent Blue**, which—when applied over the bare aluminum—produced a metallic effect. **Hobbyoxy Custom Metallizer** is used to duplicate the appearance. Both services used this primer, but in the naval aircraft cockpits it was often painted over with an opaque **Gray Green N4**.

Army aircraft were usually painted in one of four basic schemes; "Type O" was a single overall color, top and bottom, either gray or green; "Type S" was a two color scheme, with green on top and gray or natural metal undersurfaces; "Type B" was a blotch finish,

with green stippled over gray or metal on upper surfaces, and solid gray or natural metal on the bottom; "Type N" was overall natural metal.

The most prevalent green was **Dark Green A1**, and the gray most often seen was **Light Gray A9**. The six formulas follow.

Dark Green A1: six parts H81 Black, four parts H33 Stinson Green, two parts H66 Dark Red, and one part H49 Cub Yellow.

Light Gray A9: 28 parts H10 White, ten parts H70 Gray, six parts H55 Cream, and one part H47 Bright Yellow.

Light Gray N10: 16 parts H10 White, 13 parts H70 Gray, 8 parts H55 Cream, and one part H47 Bright Yellow.

Black Green N1: six parts H33 Stinson Green, two parts H81 Black, and one part H65 Bright Red.

Primer (translucent blue): five parts H24 Dark Blue, two parts H99 Custom Metallizer, and one part H33 Stinson Green. Instead of the normal HO5 Flat Hardener used with the other camouflage colors, use the **Gloss Hardener, HO6 or HO2**.

Gray Green N4: 20 parts H70 Gray, two parts H49 Cub Yellow, two parts H65 Bright Red, and one part H33 Stinson Green.

As with all the camouflage colors presented by Hobbyoxy, it is necessary to first mix the desired color formula and then mix that in a 1:1 ratio, with HO5 Flat Hardener before it can be applied. If you'd like a complete listing of this series of authentic camouflage formulas using Hobbyoxy paints, write your request to the Pettit Paint Co., PO Box 378, Rockaway, NJ 07866 and they'll send you an up-to-date list of the color formulas.

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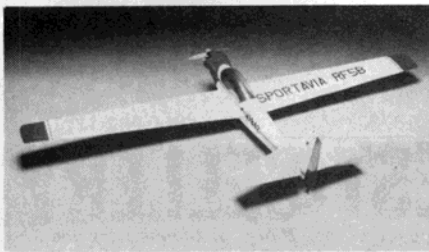


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TOWER HOBBIES, PO Box 778, Champaign, IL 61820, has introduced their all-balsa kit of the *Sportavia*, a motorized glider which makes a good beginner's airplane. Specifications: wing span - 62 1/2 inches; weight - 2 1/2 pounds; radio - two to four channels; and engine - .09 to .10. For more information about the *Sportavia*, contact Tower at their address above or call (Cont. US only) 800-637-6050.



TOWER HOBBIES, PO Box 778, Champaign, IL 61820, has released their balsa and plywood kit of Art Scholl's *Super Chipmunk*, a

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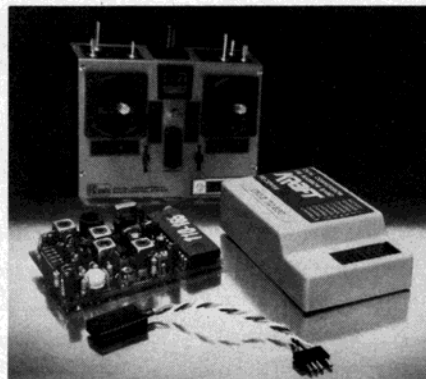
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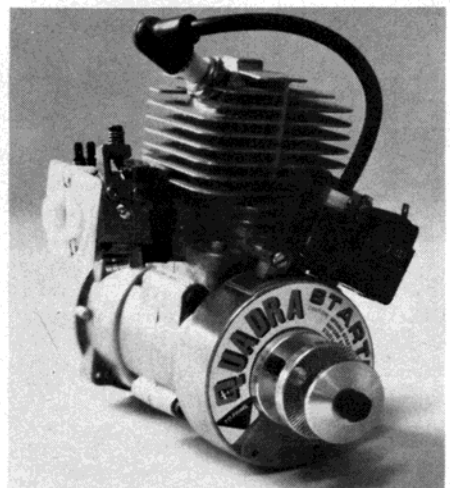
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ment, Kraft has made special plug adapters that can be used with either Kraft or Futaba servos or battery packs on the KPR8FD receiver. List price for the "G" series "1991" conversion, available from your local Kraft dealer or from Kraft direct, is \$149.95. For more information, contact Kraft at their address above, or call 619-724-7146.



QUADRA AERO ENGINES, PO Box 958, Uxbridge, Ontario, Canada LOC 1K0, have announced the introduction of their newest version of the popular Quadra engines for giant scale, the Q50S. This new engine is a refined version of the Q50 which debuted in 1983. Improved features include a newer schnuerle scavenging which helps develop 4 HP and to 10,000 RPM. The carburetor has



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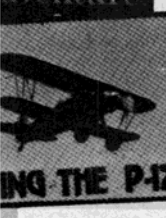
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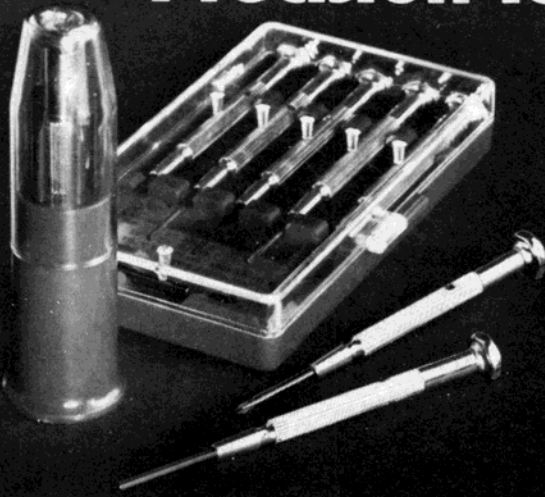
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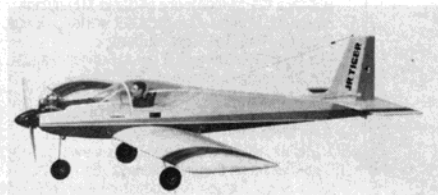
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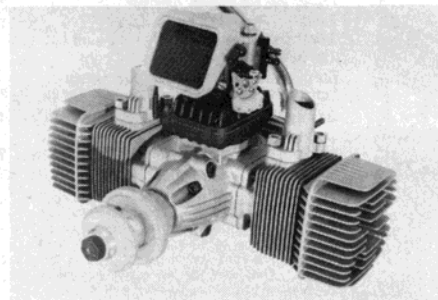
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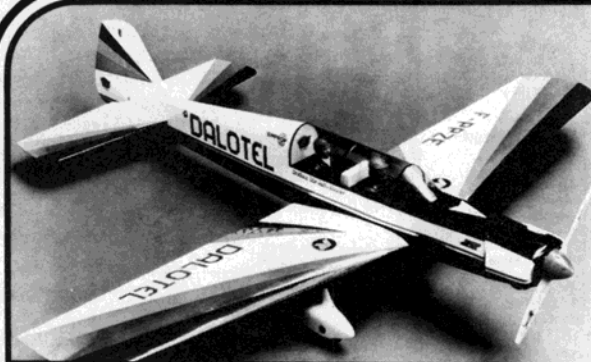
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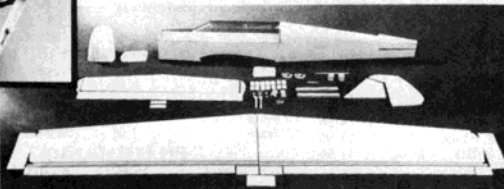
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Bentom Models Foam Kits
SKYBOY 18" Wingspan with Bimatic Unit **8⁹⁵**
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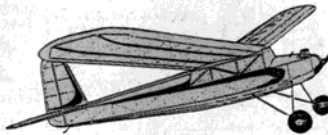
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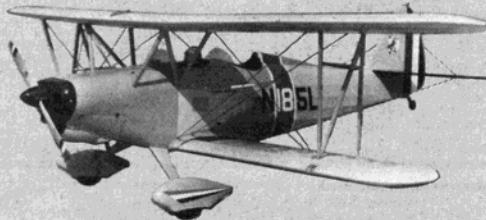
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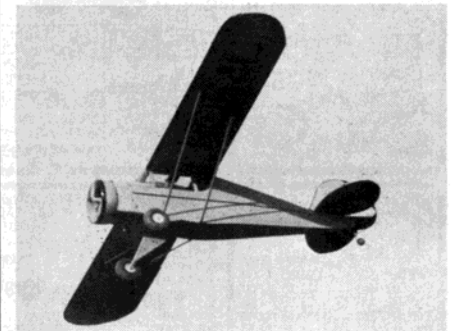
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D.G.A. DESIGNS, 135 East Main St., Phelps, NY 14532, has announced that they will make available new plans, in 2 inch scale, for their giant scale Davis D-1K and their Kinner Sporster K. These plans have been photographically reduced from their 1/4 scale size and come with building instructions. In the 2 inch scale, the Davis spans 60.3 inches while the Kinner spans 78 inches. The price on either 2 inch plan is \$15.00 postpaid and each is shipped rolled in sturdy cardboard tubes. Photo documentation packs for either plane are also available. Each pack has twelve 35mm color prints for only \$7.25. On all orders, NY State residents must add a 7% sales tax. For more information, contact D.G.A. Designs at their address above or call 315-548-3779.



IKON N'WST, Dept FM, PO Box 566, Auburn, WI 98071, has kitted an aircraft designed expressly for the new four cycle glow engines. Their new Porterfield Flyabout is a

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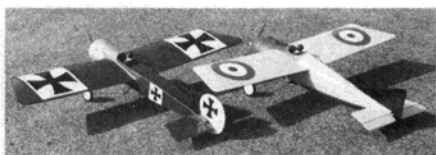


balsa, built-up kit with a scale of 2.5"=1'. Specifications: wing span - 80 inches; weight - 10 pounds; and power - Enya 4-cycle 90. The kit features formed cowl, complete hardware package, and pre-bent gear. For additional information, send for Ikon's catalog (\$1.00) to their address above.



SATELLITE CITY, PO Box 836, Simi, CA 93062, has introduced a new pump for their Hot Shot cyanoacrylate accelerator. The new Hypermist pump applies Hot Shot in a fine close circle spray and comes with it, in three ounce bottles, as Catalog #HS-3. Check your local hobby dealer for the new Hypermist Hot Shot.

JET HANGAR HOBBIES, 12554 Centralia Road, Lakewood, CA 90715, has announced the introduction of the Turbax III, a refined version of the Turbax line of ducted fans. The new unit has been designed to utilize the current generation of .60 to .80 size ducted fan glow engines which significantly increase the thrust available for scale jet aircraft. Specifications: shroud length - 7 inches; shroud diameter - 5 1/4 inches; fan diameter - 4 3/4 inches; thrust - up to 8 1/2 pounds; required engine - .60 to .80. Precision engineered thermoplastics and machined aluminum give this unit high strength and light weight. Both front and rear rotor engines can be mounted



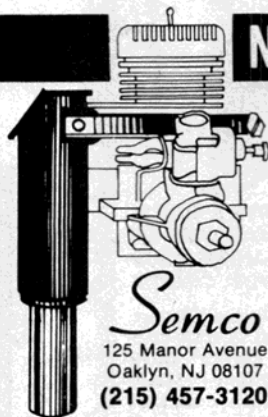
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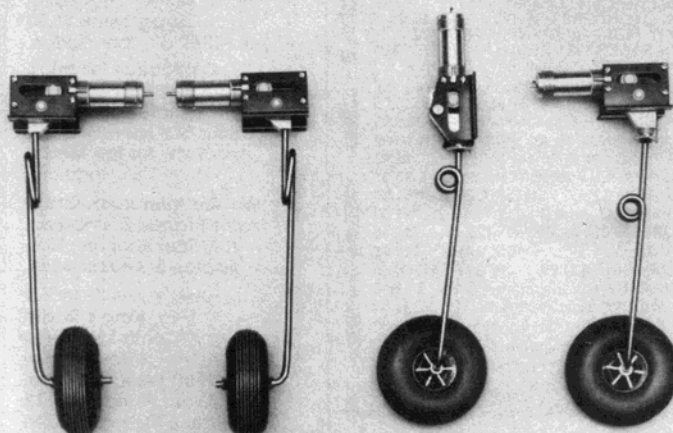


New Vertical Down Exhaust

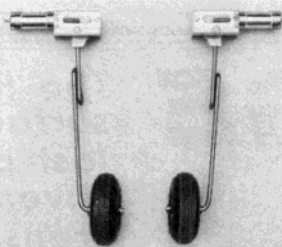
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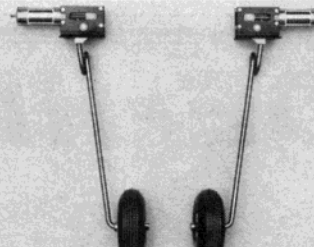
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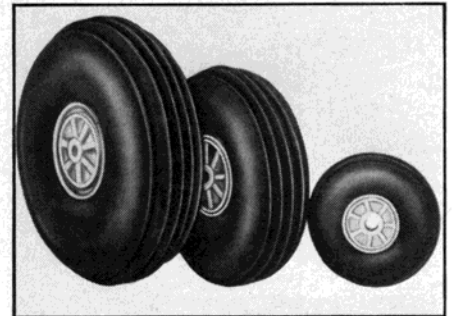
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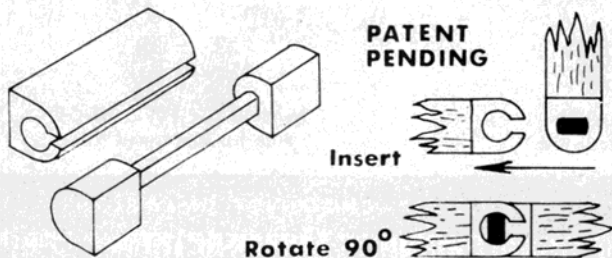


SULLIVAN PRODUCTS, PO Box 5166, Baltimore, MD 21224, has announced the addition of new, scale, balloon tailwheels and nosewheels in five sizes. Ranging from a 1/4 inch to 1 1/2 inch in diameter, these new wheels have metal hubs. List price starts at 55¢ each to 95¢ each for the largest. They're available at your local dealer. If you'd like more information, contact Sullivan Products at their address above.



AIRBORNE R/C DISTRIBUTORS, 7929 Parston Dr., Forestville, MD 20747, has introduced their Playtron Custom Power Panel for use with a 12 volt battery. This panel will supply power for your glow plug, a 12 volt electric starter, and a 6 volt fuel pump. Two alligator clips, six banana connectors, and mounting screws are included. List price is \$24.95.

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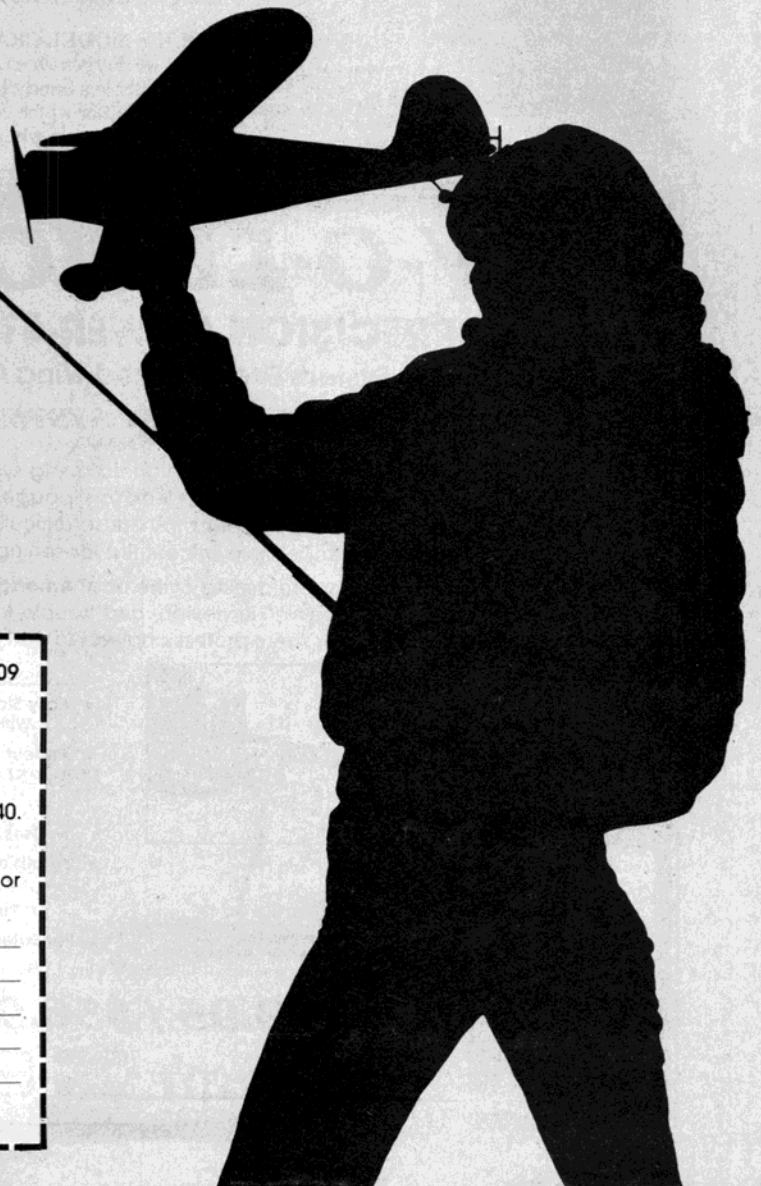
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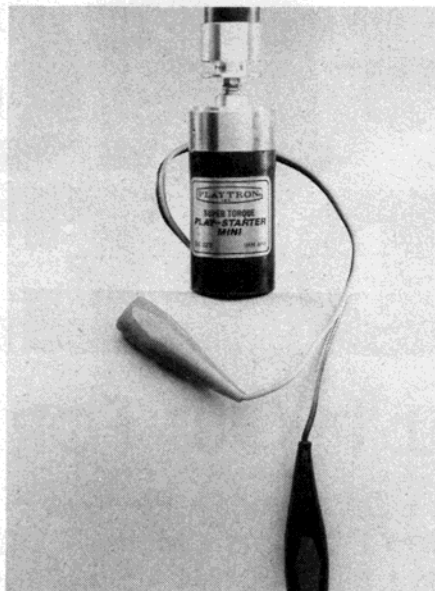
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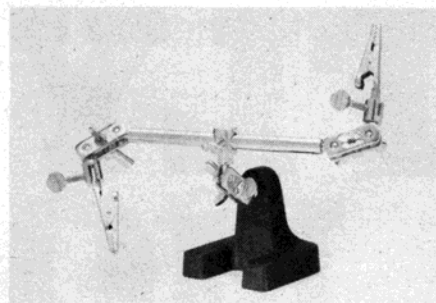
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AIRBORNE R/C DISTRIBUTORS, 7929 Parston Dr., Forestville, MD 20747, has introduced a light duty, electric starter, the Play Starter - Mini Type. It is intended for engines from .049 to .35 displacements and is pocket sized with a heavy duty ball bearing output shaft and light weight aluminum casing. Suggested retail price is \$39.95.

POLK'S MODEL-CRAFT HOBBIES, Dept. 0764, 346 Bergen Ave., Jersey City, NJ 07304, has available a handy, low cost "Third Hand" with magnifier which conveniently holds delicate work for you while you solder. Parts can



be easily swivelled to any angle desired. List price for the Third Hand is \$5.00. Contact Polk's at their address above to place your order.

An FM Mini-Review:

Tuned pipe adapter

HB's hot new schnuerle ported .21 ABC Grand Prix engine features a round exhaust



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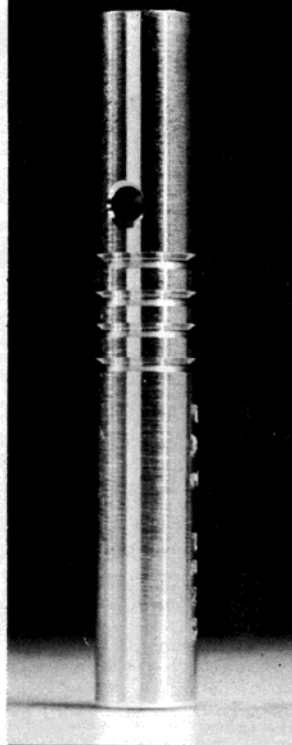
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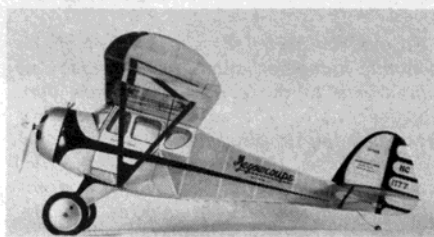
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outlet as part of its cylinder casting. The cylinder can be rotated to position the exhaust stack to the rear, left, or right side of the engine; flexibility for the most convenient installation set-up. To connect a tuned pipe to the engine, the appropriate sized silicon tubing can be slid over the engine's exhaust stack and held in place with a nylon cable clamp.

This would be best for a rear exhaust aircraft installation, where the silicon tubing could connect to a straight or curved aluminum tube and then to the actual tuned pipe. For a side exhaust installation, a right angle bend is required. When I ran my HB .21 several months ago, with no commercial adapter available, I made up an adapter from a length of 1/2 inch copper tubing and a 90 degree copper tubing elbow, common plumbing supply, brazed together. The 90 degree bend was the right size to connect to the engine with a short piece of silicon tubing and could be drilled and tapped to accept a pressure fitting for the fuel tank pressurization. This worked fine, but the copper parts were quite heavy.

HB has now come to the rescue with a special aluminum right angle exhaust adapter, and it is very light weight. The attachment to the engine is positive - the aluminum adapter has an internal O-ring seal, fits over the engine stack closely, and is slotted; a clamp screw permits it to be securely tightened in place. With the adapter on, additional length is needed for proper tuning of the pipe. I used a piece of 5/8 inch O.D. aluminum tubing and two short lengths of silicon tubing to complete the installation to the pipe.

My pipe length, measured from the center of the engine cylinder to the initial largest diameter of the pipe, is approximately 13 1/2

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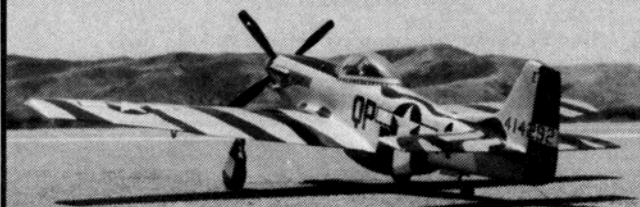
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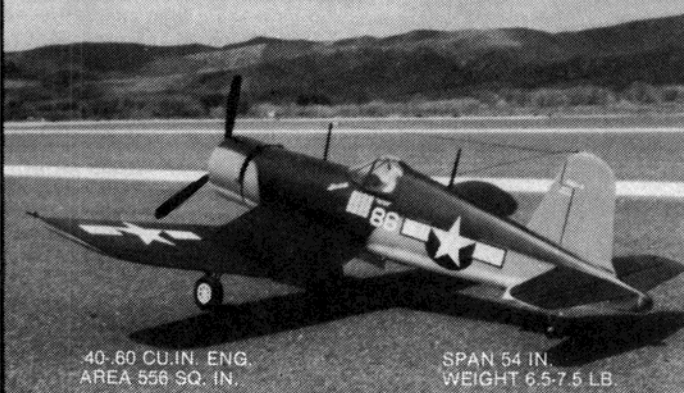
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Read FLYING MODELS monthly to keep abreast of the latest R/C Frequency information.

inches. This will vary depending on the propeller and fuel used, so must be individually tuned to suit.

The HB adapter did not have a convenient spot for a pressure tap fitting, so I installed one in the intermediate piece of aluminum tubing and it works fine.

The HB .21 is a powerful engine, and this new HB accessory provides even more flexibility in choosing an appropriate installation configuration. — DICK SARPOLUS

air mail

Yawn

You could say that Rip Van Winkle "woke up" when I recently bought a copy of FLYING MODELS at what I considered a high cost in comparison to the 1/4 inch or more books published monthly by Aero Digest and Western Flying at a "hard-to-come-by" 50 cents back in my day.

As I eagerly read the entire contents and wanted to return to model aircraft in my old age, the one thing that surprised me, and will surely slow me down were the costs of kits and the accessories to make them perfect to scale as intended.

These same kits in peanut scale (and peanut quantity of material) certainly have risen from \$1.50 less than ten years ago to the cur-

rent \$5.95. The same opposed twin engine kit I sold few of in my hobby shop of forty years ago at \$60.00 now sells for \$179.95. A five cylinder radial engine went for \$90.00 (and 20% discount to the retailer) and now commands \$995. Bargain prices!

Yes indeed! The cost of a postage stamp has risen from 3¢ to 20¢ as inflation erodes the economy, but that is a monopoly and not subject to competition and sales on an open market.

My final shudder is for the kids who will try to enter the market and find it more expensive and trying than playing the electronic games at the local arcade or whatever else takes less effort in money for them.

I find it very difficult to spend up to 50% over what the item is actually worth in material value regardless of how badly I want it.

L.A. HOFFMAN
Banning, CA

No one can argue the shock effect of the economic numbers bantered about today in comparison to those in vogue years ago. However, using the same comparison of years ago, the simple, no frills, four channel radio purchased 10 years ago for \$300 could, in no way, compare to the value of a six or seven channel radio with dual rates, servo reversing, and better components available today for \$150 to \$200. That's only one "for instance". More abound. By and large, the hobby market does do business not only responsibly but for the best price. Quality of product has risen dramatically. What was acceptable wood quality or part fabrication of years ago would quickly find a deserved bad reputation today.

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Ace R/C now offers an American made alternative to the plastic imports, the Olympic V. Time proven quality and dependability in a sensible, solid package with the tradition of the Silver Seven, results in a unit that is perfect for a first time R/C'er or sport flier.

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As for the kids, the problem may not lie in the cost as much as it does in motivation. Perhaps, the worth of hard won achievement has been quickly overshadowed by the more instant accessibility of today. It's like getting kids to like vegetables instead of candy. As for the economic factors, aeromodelling is by far much cheaper than computers, mini-bikes, boats, skis, and yes, even arcades. Yet, the kids who partake in any of these far outnumber those involved in aeromodelling.

Why? At this point, any reason would be pure conjecture. Perhaps the mystical and magical aura of flight in years gone by has become old hat to the highly graphic "magic" of today.

In any case, your lament is not new. Let's hope it never becomes absolutely true. —Ed.

Hold on a minute, Fud

Hrrmph! Gad, sirs, the person signing himself Fudpucker III and trying to give the impression that he is British is an impostor!

His choice of words seems to indicate that he is, at least, somewhat educated, but his closing parenthetical statement clearly reveals a misuse of the English language.

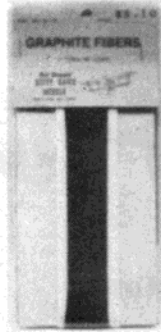
Please ask him what "... more future accuracy ..." is. Are some accuracies more future than others? And surely any accuracy concerning the DH5 is less future than several others?

Really, you must be more careful of what you print! You could mislead someone.

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What a dud, Fud! — Ed.

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FM Visits: The *INTREPID*



By Bob Hunt

Having served in two wars over a span of 33 years, The "Fighting I" finds new distinction as a unique floating museum.

One of the most dramatic light plane trips one can take is the tour of the New York City skyline via the VFR corridor south from the George Washington Bridge on the New Jersey side, to the Statue of Liberty and then across the Hudson River to the New York side and back north again. Surely some of the most awesome and spectacular man-made wonders are located on this route. I've taken this trip on numerous occasions with FM's C/L Stunt columnist (and full-scale pilot), Windy Urtnowski, and never cease to be thrilled by the sights.

It was during one of these tours, on a balmy night in 1982, that I first saw the *Intrepid*. From the right seat of Windy's two place 1946 *Ercoupe*, I was taking in the sights of downtown Manhattan, with the alternating streets of red and white (one-way streets cause the effect of alternating ribbons of lights) when suddenly Windy cut the power and began a rapid descent, circling out over the Hudson. As the nose of the *Ercoupe* swung towards the city again, there she was! This must be what it is really like to make a landing approach to a carrier. Windy got back on the power in plenty of time for us to avoid trespassing, and then told me that this ship had just been opened to the public as a new museum.

The carrier *U.S.S. Intrepid* is actually the fourth ship in the Navy inventory to bear that name; the first being a "prize" captured from Tripolitan pirates. Third in the "Essex" class of carriers, the *Intrepid* was designed to accommodate aircraft that had yet to be conceived, and two major facelifts during the course of her service (over 33 years) did indeed allow her to remain active well into the jet age.

The *Intrepid* has a long and distinguished combat record that includes an instrumental involvement at the Battle of Leyte Gulf, the largest sea battle of World War II. It was the search planes from the *Intrepid* that located the enemy's main force. Planes from the "Fighting I" then attacked throughout the day, severely damaging the Japanese force and ultimately turned them away. Shortly after this decisive battle, *Intrepid* was to take three hits from two successive kamikaze attacks which almost sent her to the bottom and caused the loss of many lives.

Much later in her career, the *Intrepid* was the recovery vessel for two of the space missions. The list of the *Intrepid's* service accomplishments could fill a volume and would make for very interesting reading. But that's not why we're here.

The *Intrepid's* last journey, to New York, actually began in Philadelphia in 1975-76

where she was taking part in the Bicentennial celebrations of the U.S. Navy and Marine Corps. During this period, a group of dedicated volunteer workers formulated the idea of turning the ship into a permanent museum. The Navy consented, with the stipulation that proper funding could be raised. New York real estate developer, Zachary Fisher,



PHOTO: COURTESY INTREPID SEA-AIR-SPACE MUSEUM



PHOTO: COURTESY INTREPID SEA-AIR-SPACE MUSEUM

became deeply interested in the project and established the Intrepid Museum Foundation which ultimately guaranteed the preservation of the ship.

On June 13, 1982, the *Intrepid* was towed to her final home at Pier 86, West 46th St., having been refitted into museum configuration. On August 4, 1982, the doors of the Intrepid Sea-Air-Space Museum were at last open to the public.

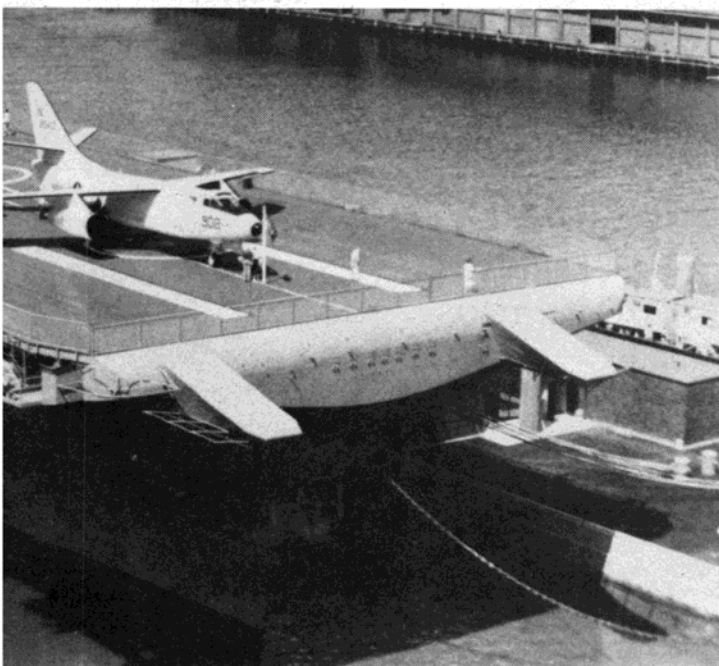
What all of this means to us as modelers is that there is yet another place where we can go and get close to some of the great pieces of flying hardware. Aboard the *Intrepid* are some truly rare and beautiful examples of aviation history.

Visitors to the museum board the ship on the hangar deck of the craft. This deck has been divided into three sections, each with a theme. The forward most section is devoted to the theme of the modern Navy. *United States Navy Hall* focuses on the modern day Navy tactical battle group and centers around the aircraft carrier. Carrier life is brought to the screen in the Carrier Operations Theatre where an originally produced Panavision film is shown continuously. The film, narrated by Cliff Robertson, depicts not only the action on deck, but also what it is like to live and walk on a floating city.

Several contemporary aircraft and their support equipment are on display here, the highlights being an A-6 *Intruder* and a full size mock-up of Northrop's XF-17, the forerunner of McDonnell's F-18 *Hornet*.

Moving aft into the middle hangar bay is *Intrepid Hall*. It is here that you will begin to understand the legend of the *Intrepid* through an eerie and highly moving presentation of the carrier's involvement in the Battle of Leyte Gulf. The darkened room is visited by black and white images of the conflict on a many faceted screen. The narrated presentation ends with views of the kamikaze attacks on the *Intrepid* and the sobering realization that you are standing in the exact spot where one plane penetrated through to the hangar deck and wrought much death and destruction.

On display during our first visit to *Intrepid Hall* were examples of WWII aircraft that



FLYING MODELS



PHOTO: COURTESY INTREPID SEA-AIR-SPACE MUSEUM

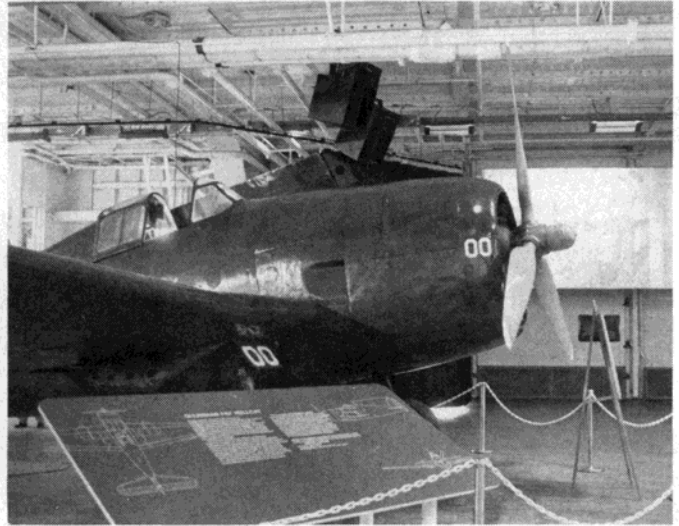
Easier days are ahead for the gallant *USS Intrepid*. Now permanently moored (left) in New York Harbor, she will serve as a floating Sea, Air, and Space museum. During her active life, she helped usher in the jet age in the 50's (top) after being baptized in the Pacific cauldron (above) of WW II.

Sea • Air • Space

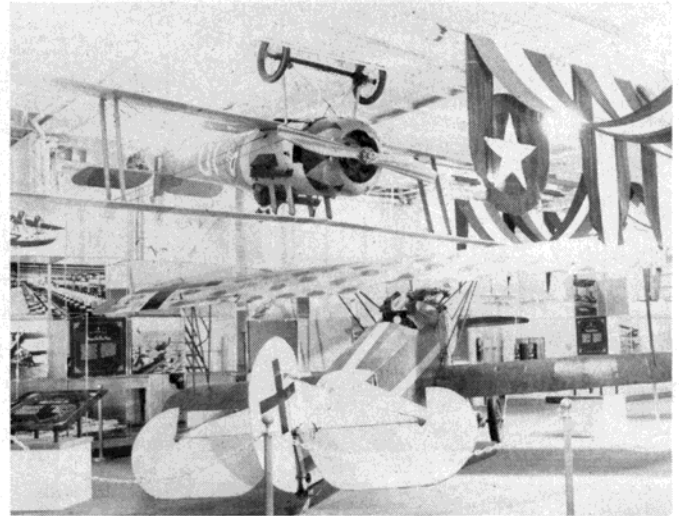
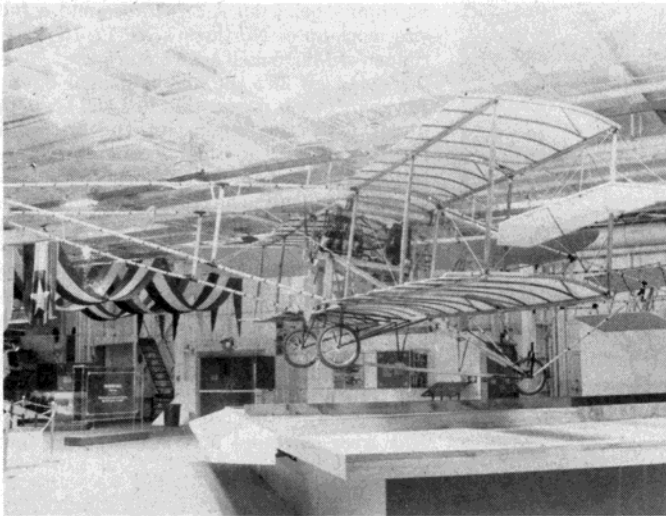


PHOTOGRAPHY: JIM BOYD

Your introduction to the *Intrepid* starts on the hangar deck with Navy Hall, a tribute to the modern Navy (above). You're greeted by a service stalwart, the A-6A Intruder. Eugene Ely's aircraft, in Pioneer Hall (below), depicts the humble origins of the modern naval carriers.



Moving aft from Navy Hall to Intrepid Hall (above), you're presented with a moving narration of the *Intrepid's* valiant World War II service. Aptly named Pioneer Hall (below), aft of Intrepid Hall, displays a Fokker D-VII and a Nieuport, WW I protagonists who brought aviation to prominence.

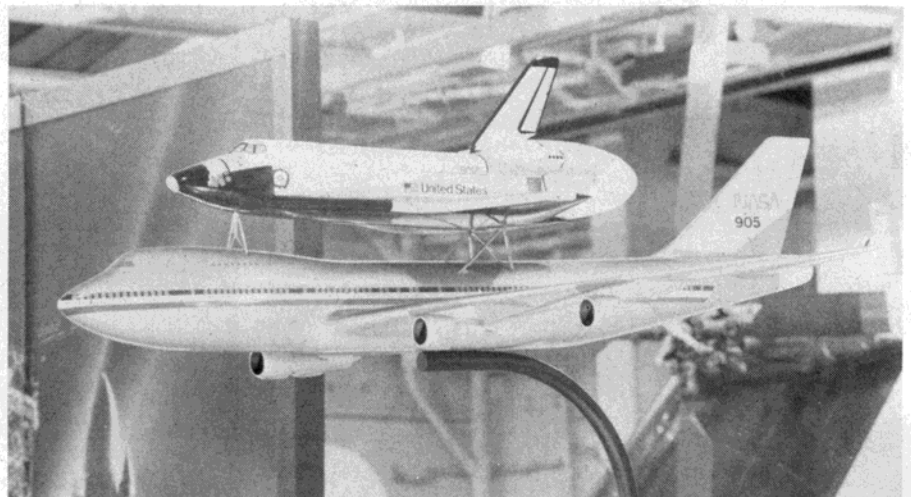


had actually operated from the decks above. An F6F-3 *Hellcat* and a TBF *Avenger*, both Grumman products, sat again in storage configuration in much the same manner as they had some 40 years ago. Several dioramas were on display to graphically recapture the various sea battles in which the ship participated.

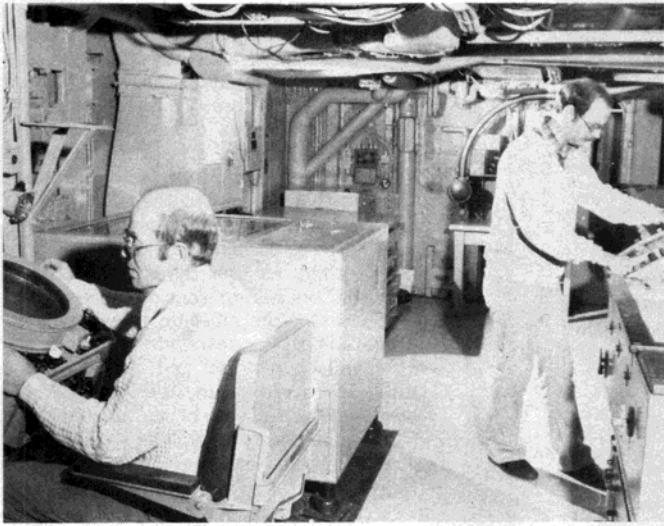
Again moving aft, we came to *Pioneers Hall* where the earliest days of naval aviation are brought to life with a full scale display of Eugene Ely's successful attempt at the first carrier takeoff. Also in this section are examples of two WWI fighters, a *Fokker D-VII* and a *Nieuport 28*.

The last section open on the hangar deck is *Technologies Hall*, where man's reach for the stars is documented with mock-ups and actual samples of space program hardware.

After taking in the displays on the hangar deck, perhaps a brief respite is in order before going "on deck," and the *Intrepid* is equipped with very clean food service and rest room facilities at the rear of *Technologies*



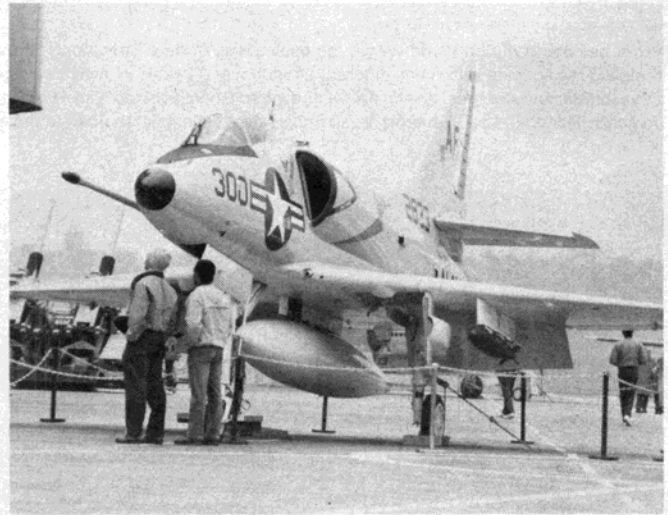
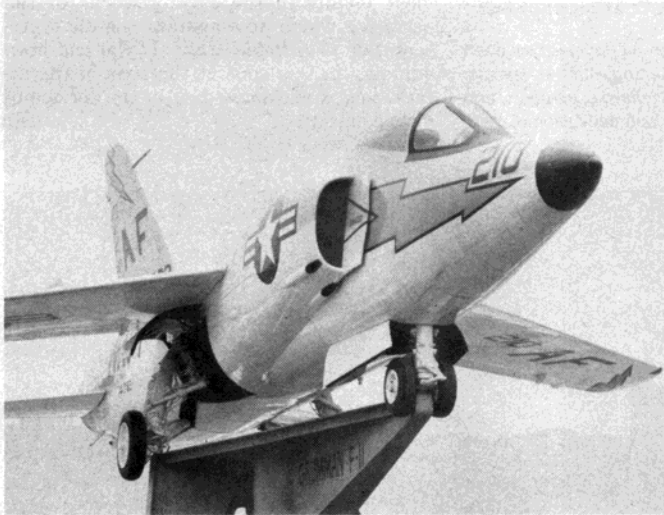
Technologies Hall commemorates the modern innovations which have propelled humanity into the dawning space age. The large static model of the space shuttle is only one reminder of today's technology.



The brain of the carrier is the island. FM's Associate Editor, Frank Fanelli (l), and Editor, Bob Hunt (r) (above) "man their stations" in the navigational radar room. Moving on deck, a Grumman F11-F *Tiger* "catapults" into the sky from the canted flight deck. It's one of many aircraft "up top".



Keeping a vigilant eye on "deck operations", FM's editors (above) take in some very impressive sights from the bridge on the carrier's island. The Douglas A-4A *Skyhawk* (below) occupies a prominent place on the carrier. This aircraft has seen decades of service and will continue to do so.



Parked at the front of the flight deck, the A3A Skywarrior impresses you with the size of the aircraft able to operate from the deck of a carrier. The Skywarrior served as a mid-air refueling tanker.

Hall. There is also a gift shop where you can purchase film and perhaps a memento of the visit.

The flight deck of the *Intrepid* is a scale modelers delight, with many examples of planes, most of which have operated from carriers. These planes are stationed in such a manner as to allow the public to walk up close and even under the wings of many. On display at this time are samples of the A-3A Skywarrior, P-2V Neptune, F-4B Phantom, F-11F Tiger, S-2 Tracker, S-2F Tracker, E-1B Tracer, two F-84F Thunderstreaks, two Huey helicopters, one the UH-1M and the other a UH-1B, a Sikorsky H-34, an F3J Demon, and an HU-16 Albatross. Future plans call for many additional planes to come aboard.

Much of the "island" is now open to the public. Here you can sit on the bridge and imagine what it would be like to command such a vessel, or work during a battle in the CIC (Combat Information Center).

FLYING MODELS' Associate Editor, Frank Fanelli, former FM Associated Editor - now

RAILFAN Editor, Jim Boyd (pressed into service on this occasion as photographer for FM), and I spent a totally engrossing day aboard the "Fighting I." It's the sort of place in which a modeler feels at home. In talking to the Director of Exhibits, Larry Sowinski, we learned that many New York and New Jersey model clubs had donated their time and efforts to build, en masse, the many solid dioramas that were displayed in the various dioramas on board. In fact, Larry asked us to pass on an invitation to modelers who may want to donate their talents to the ever growing and living experience that is the Intrepid Sea-Air-Space Museum. Larry was also quick to point out that the Hangar, Bridge, and Flight Decks represent only the first of four phases of the museum's development. During the next ten years, virtually all of the carrier will be restored and opened to the public. In future years, the *Intrepid* will house a complete library of sea, air, and space sciences and history as well as an expansive gallery of art and sculpture.

You can reach Larry in care of the Museum at: Intrepid Square, West 46th St. and 12th Ave., New York, NY 10036. Here's a chance to get involved with a real piece of history.

As we left the *Intrepid*, each of us reflected back on the drama and the meaning presented by the various displays. It's a moving testimony which perhaps may be summed up most vividly in the closing words of the narrative which accompanies the slide presentation in *Intrepid Hall*: "If you had been standing in this spot at the time of the attack, you would have died in the service of your country . . ."

CE

PHOTO COURTESY INTREPID SEA-AIR-SPACE MUSEUM

From her debut during World War II, the busy scene of deck operations (above) on the *Intrepid* has been replayed many times with many different aircraft over 33 years of active service. Starting with the *Hellcats*, *Devastators*, and *Avengers* shown above, the *Intrepid* finally retired with *Phantoms*, *Skyhawks*, *Intruders*, and *Tomcats*. Her next duty? To serve as an impressive testimonial (below) to the spirit and dedication of man.

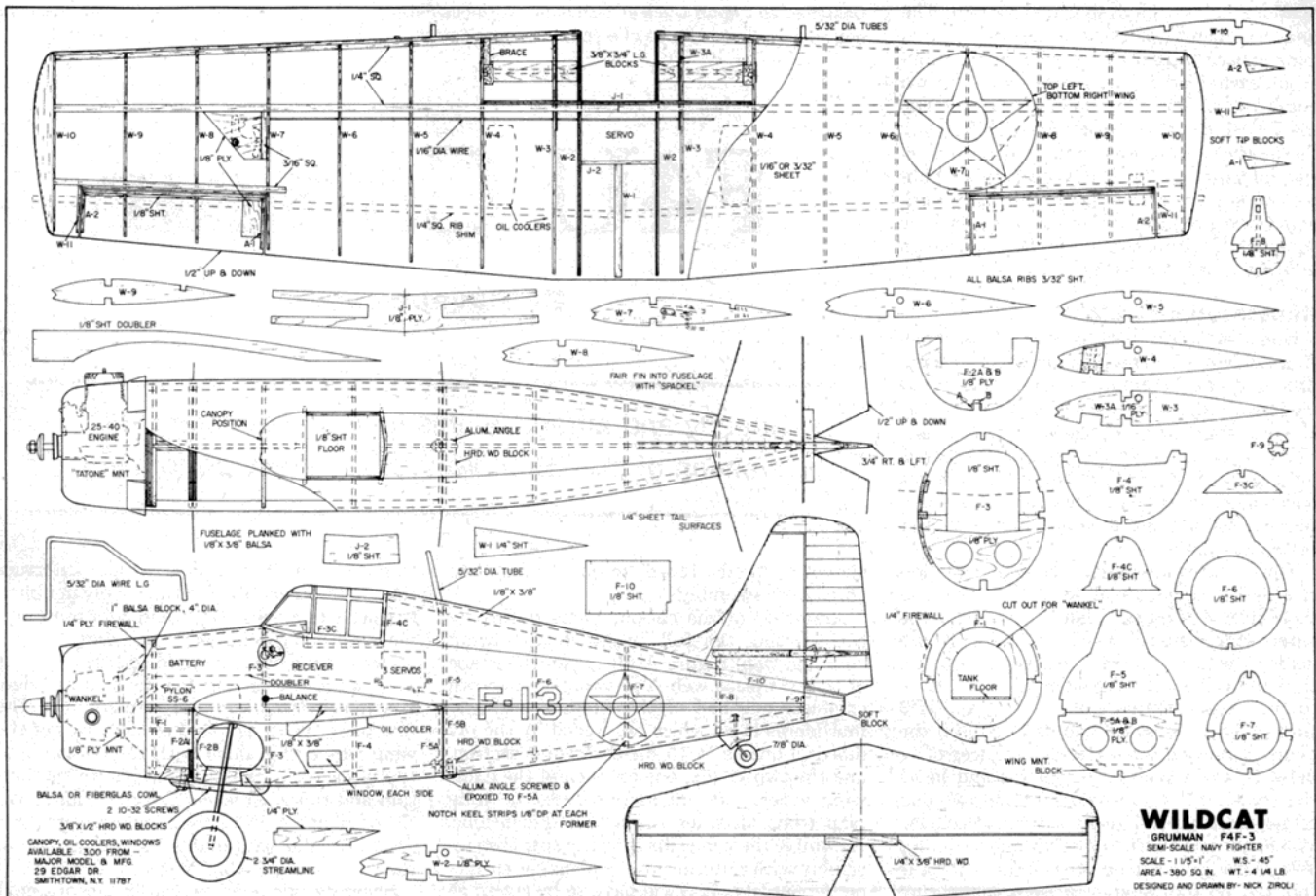
Carstens Flying Plans Favorites

CF-273 Wildcat

No story about carriers would be complete without mention of the Navy's first monoplane fighter, the rugged F4F-3 *Wildcat*. It held the front line in the Pacific until its more illustrious descendants, the *Hellcat* and *Corsair*, entered the scene and went on to win their share of glory.

Always partial to the *Wildcat*, designer Nick Zirolì finally created his sport scale rendition of the rugged plane when he found the perfect companion engine in the then newly introduced O.S. Wankel. The union of the two produced a highly maneuverable model at high speed without losing any stability at low speed.

Listed as Plan CF-273, the *Wildcat* is available from Carstens Flying Plans Service. This and many other plans of naval carrier aircraft which saw service on the *Intrepid* are available. For example, there's CF-143, the A5A *Vigilante*; or CF-183, the F8F *Bearcat*. One of the *Intrepid's* highlights, the Grumman S-2G *Tracker* is Plan CF-428. To order these or any other, contact Carstens Publications, PO Box 700, Newton, NJ 07860. For your convenience, Visa and Mastercard are accepted.



FULL SIZE PLAN AVAILABLE THROUGH CARSTENS FLYING PLANS
FLYING MODELS

ORDER PLAN CF-273

I wanted to build an attractive, space-saving, fast, and good-flying model in the sport scale category. I chose the F4U Corsair. Its thick fuselage and gull wing suited my first requirement pretty well. The choice of a hot .40 schnuerle engine would make it fast and its wing span, space saving. But only time would end up telling how well it would fly. Now, after building and flying it, I can report that it flies very nicely and its speed is so great that it could easily give some stiff competition at the Reno pylon races. At this point, I'm still using only the four primary channels for control without any extra functions, but in the future, I think I shall add a fifth servo for dropping a fuel tank or a bomb to get a few more points in scale competition.

A short Corsair history

The Corsair was, undoubtedly, one of the most successful Navy fighters to enter service before the era of the jet aircraft. Serving in both the Navy and the Marine Corps, this plane was superior to the Japanese aircraft it encountered in the Pacific theater of World War II. Corsairs shot down 2,140 planes against only 189 losses of their own. This extraordinarily high ratio made it better than any Japanese plane and many experts claim that it was better than the Army Air Corps vaunted P-51 Mustang. Production of the Corsair continued until December, 1952 and it was the last classic propeller fighter produced in America.

The prototype had its maiden flight in May, 1940 and it was quite apparent, even after only the first 30 minutes flying time, that its qualities would be extraordinary. But there was still a lot left to improve. The linkage controlling the aileron had some 96 modifications before the design was settled. The final armament was three 50 caliber machine guns in each wing with 400 rounds of ammunition each. Under each wing there were two bomb racks. The first operational unit got the F4U-1 model in September, 1942. After the 689th Corsair was built, a new version was introduced with the more familiar bubble canopy. From that point on, many variants were produced differing in engines or equipment, without any substantial change in its outward appearance.

Construction: wing

Don't let dreary visions of complex structure put you off. The plane is not that complex and can be built by any experienced modeler. Begin with the wings. First cut out all your wing parts. All the ribs are 1/8 balsa. The wing consists of a center section which is built as a unit and two outboard panels which are built onto it. Construction is much easier if you cut out all your wing parts first before assembly.

The ribs are all 1/8 balsa. The center section ribs, W-1,2, and 3, are all the same shape and their outline is on the plan. The ribs for the outer wing panels, W-4,5,6,7,8, and 9, are made by what I call "rasp interpolation". It's the sandwich method of shaping. You'll have to make a ply template of ribs W-4 and W-9 with a chord reference line as shown on the plans. Sandwich ten rectangular pieces of 1/8 balsa between the two templates and bevel the stack to the dimensions of the two end templates. That will give you two each of ribs W-5,6,7,8, and 9. Cut out two more ribs for W-4. After you cut out the notches for the top and bottom spar structure, make sure you also cut out or drill holes for routing the



PHOTOGRAPHY: PAVEL BOSAK

Designed as a sport scale version of the illustrious F4U Corsair, the author's ship flies on a .40 schnuerle engine, has the advantage of a space-saving wing span, and has proven itself highly maneuverable.

F4U Corsair

By Pavel Bosak

Speedy and attractive, this four channel sport R/C version of the "Bent Wing Bird" really performs!

aileron pushrods. It will be quite difficult to do it after assembly.

Assembly of the cut-out parts begins by constructing the full length bottom wing spar and web. Figure A gives you the shape of the two piece web. The two pieces shown complete one half of the wing. You'll need four pieces in all which are joined by the ply dihedral braces W-15 for the center section, and the two W-16s, one for each of the outer wing panels. Consult section A-A, the wing plan front view for the actual dimensions. Assemble the wing ribs over the spar/web assembly with reference to the plans for correct alignment. Rib W-3 will have to be cut to allow for the W-14 dihedral brace to carry

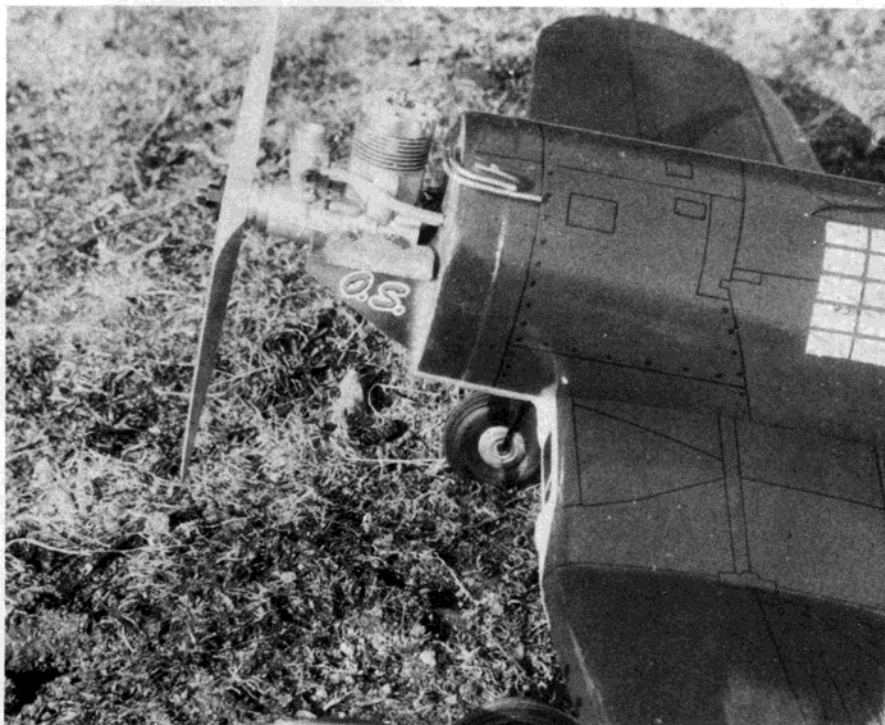
through from W-2 to W-4 without interruption. After assembly, add the 1/16 ply doublers to the noses of ribs W-1,2, and 3 for reinforcement of the landing gear block area.

Once that's done, you can add the top spar and you're then ready for the leading edge. It's done in two pieces, forward and rear. The rear piece, W-12, is glued to the noses of the wing ribs and is flush with the bottom and top of each rib "nose". This allows the bottom and top wing sheeting to be glued over the edge of the W-12 rear leading edge for a good firm glue joint and to butt to the rear of the front leading edge, W-13.

Sheeting, ailerons, and wing tip are next and will complete the wing structure. Start



with the bottom sheeting and put in the maple landing gear block. A quick note. The bottom sheeting ends at rib W-9. The rest of the bottom wing is the bottom wing tip cut to the shape shown on the wing's top view. Before adding the top sheeting, install the aileron pushrods. Add the wing's top sheeting, cutting it flush with the front of the rear lead-



The plans illustrate beam motor mounts with diagonal ply gussets for reinforcement as shown on the author's Corsair above. However, any of the commercially available glass filled mounts serve equally as well.

ing edge, W-12. The top sheeting goes all the way to the wing's tip. Now glue on the forward wing leading edge, W-13, butting it to W-12 and to the top and bottom sheeting. Cut out the aileron bay from the completed wing and add the $\frac{1}{4}$ inch sheet balsa, part W-10 to the rear of the wing. Build up the ailerons as shown and hinge to the wing.

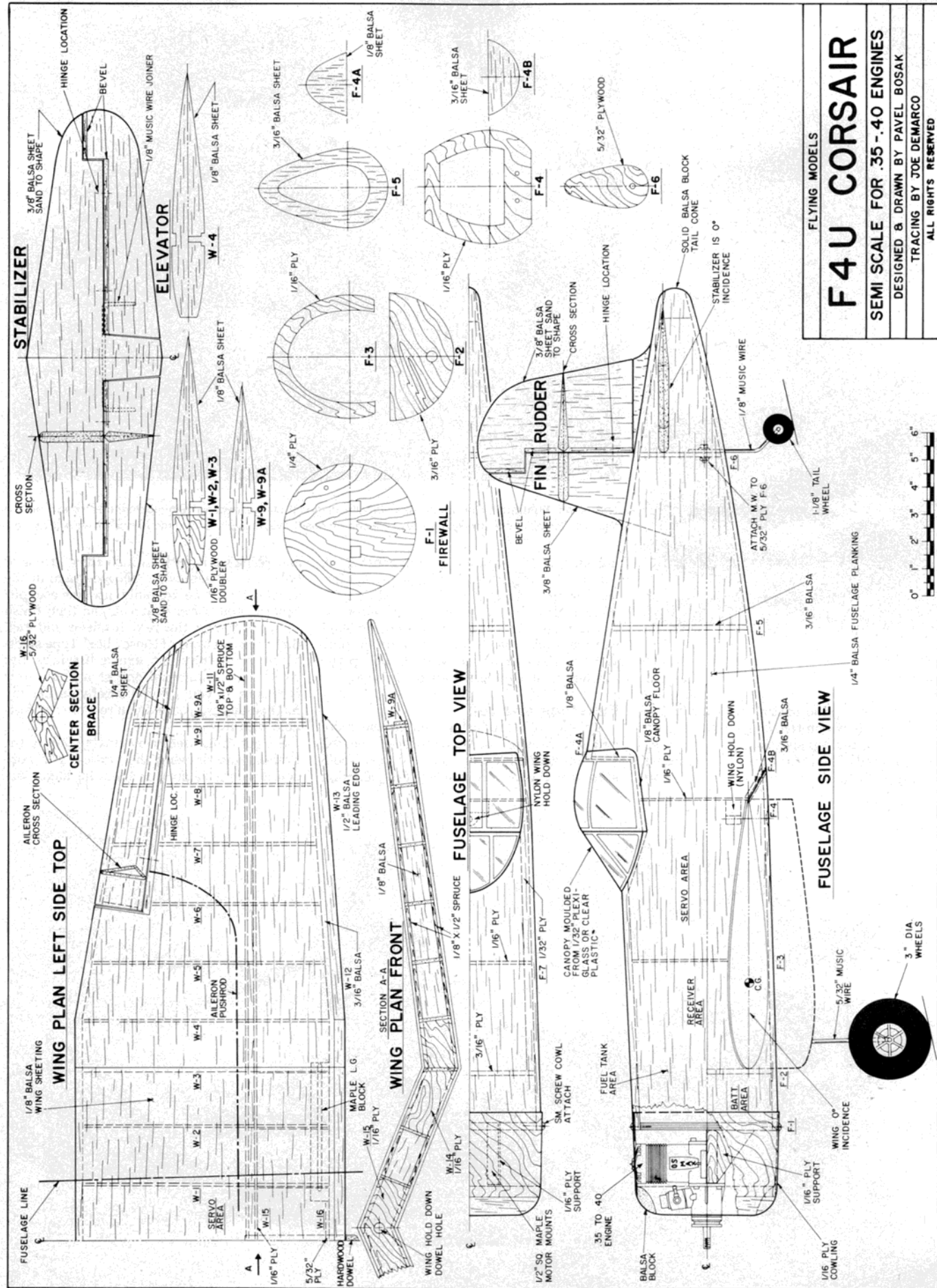
Fuselage and tail

By way of introducing you to the more complex fuselage construction, let me tell you that it's built in three basic stages. You'll start with the forward fuselage first, aligning

and planking it with $\frac{1}{4}$ inch thick strips of balsa cut $\frac{1}{2}$ inch wide. Second stage in the sequence will be to build up the cockpit/canopy area. After that you can then finish things off with the rear fuselage and tail. Since this isn't one of those "box" type structures you'll have to use a fuselage jig; whether a commercial one or a home-brew type is up to you. I'll very briefly outline my method but use yours if you're more comfortable with it.

So, get things ready by cutting out all the formers and drawing the vertical and horizontal reference lines on them for alignment





F4U CORSAIR

SEMI SCALE FOR .35-.40 ENGINES

DESIGNED & DRAWN BY PAVEL BOSAK

TRACING BY JOE DEMARCO

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FLYING MODELS



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purposes. When that's complete, make sure you plot and drill the holes necessary for the throttle cable, engine mount, and fuel lines in the firewall, F-1. Don't forget the tail wheel bracket, as well, for the rear former, F-6.

Now for the assembly, Cut a bunch of those $\frac{1}{4}$ by $\frac{1}{2}$ inch balsa planks to a length that's longer than the fuselage. Take three of them to use as longerons to hold the first four formers, F-1,2,3, and 4, in place. Use one strip as a bottom keel and place the respective formers on that and then add a strip to the right and the left side of the formers to hold them firmly in place. Start from the bottom and add more $\frac{1}{4}$ by $\frac{1}{2}$ inch planks until you get to the cockpit floor area. Be sure you constantly check alignment and correct any bends or twists.

Once you've gotten to the cockpit area, construct a floor from the top view shown on the plan. Add former F-4A and then create some type of plug for the shape of the canopy which I made by vacuum forming it with some acetate sheet over a balsa plug. If you prefer, you can just carve a balsa canopy, but for structural purposes, you'll still have to construct a cockpit.

The third sequence involves the tail. To start, take one of the planking strips and center it on the top of former F-4A and then glue it in place. Take formers F-5 and F-6 and position them between the top and bottom keels and glue in place. Continue the planking process. When the entire fuselage is finished, you'll have to fill in the cracks with your favorite filler and then sand it to its final shape.

Use the outlines shown on the plan to cut the $\frac{3}{8}$ sheet balsa fin, rudder, horizontal stab, and elevators. As indicated, use $\frac{1}{8}$ inch music wire as a joiner for the two elevator halves. You'll have to cut out the slots for these parts in the fuselage and do so carefully to insure the proper incidence angles. The only thing left to do is the engine cowl. Take some $\frac{1}{32}$ ply and form it into a tube the circumference of the firewall, F-1. Then cut a one inch thick, circular block of balsa, the same diameter as the ply tube and glue it to the tube. Cut out the hole for engine cooling and prop shaft and then sand the lips of the cowl round.

Finish

It's your choice. I used the venerable old method of dope and silkspan, but with the



The author poses with his Corsair; one of the more renowned World War II planes. For those considering construction, there are plenty of sources for scale reference to add a little more authenticity to the plane.

advent of the mylars such as MonoKote™, or the heat shrinkable woven fabrics such as Coverite™, the options are many. Resin and light glass are also feasible. Nothing, however, is going to hide a poorly prepared surface. So make sure all the dents and dings are filled and the entire surface sanded smooth and the dust wiped off the model. The color schemes for the Corsair are numerous and there's no lack of articles or books which document this popular aircraft.

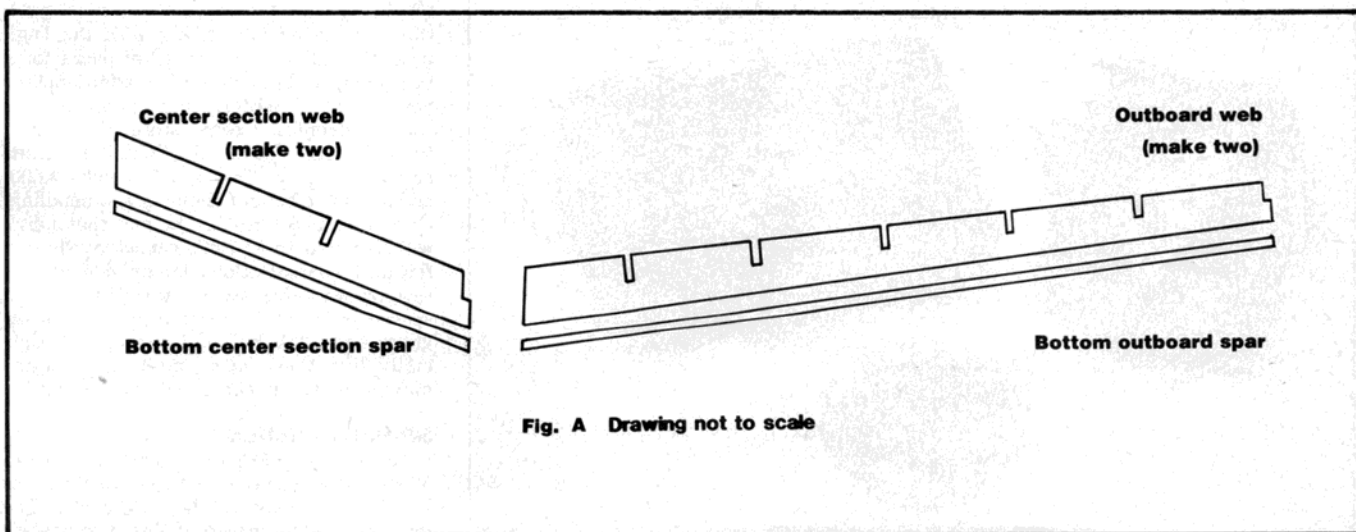
Into the wild blue

There are still a few things to consider before you commit your model to the air. In my case, an OS .40 FSR provided the power for the plane and was able to deliver the fast performance I had originally hoped for. If you prefer more docile performance, a smaller displacement engine such as a .25 or even a hot

.20 (as long as the weight is kept way down) will fly it well enough.

Check the throws of the rudder and the elevator. In the case of the rudder, make sure that when it is at full deflection it does not interfere with the movement of the elevator in the "up" position. As for the elevator, deflections of 7° "up" and 10° "down" will give you plenty of maneuverability. If there's more deflection than that, you'll experience snap rolls.

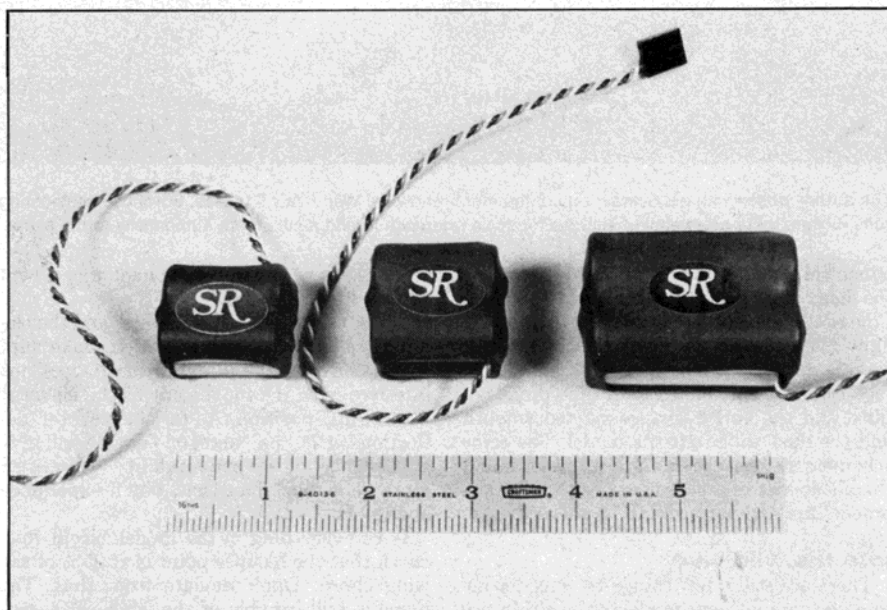
With everything in the model except fuel, check that the balance point is at 25% of the wing chord. Don't deviate from that. The plane is still capable of the whole F3A pattern while remaining very stable. During take-off, keep the rudder in neutral position and only correct direction as needed. After a 50 foot run, it's ready to test its wings. Mine was a joy to fly. I hope your's will be too. ☺



R/C Battery/Charger Update

By Bob Aberle

A brief look at some of the more useful, battery related products from SR Batteries and Ace R/C. Much to learn!



PHOTOGRAPHY: BOB ABERLE

SR Batteries has just introduced some new small size nickel-cadmium battery packs (above). Compare the size of the SR-150 (l) and SR-300 (r) with the popular SR-900 (r). The tiny SR-150 (below) yields 150 mAh and comes in both a flat pack and a square pack configuration. The quarter gives an idea of the size of each.



During the past couple of months I have had the opportunity to try several new products in the area of R/C batteries and battery chargers. For the benefit of our FM readers I decided to combine several of these "mini-reviews" and product announcements, along with a few suggestions and commentary, into a single column type format. Hopefully this approach will get the important new product information to you faster.

New SR batteries

Larry Sribnick of SR Batteries Inc., Box 287, Bellport, NY 11713 (tele: 516-286-0079) has just announced the addition of several small size nickel-cadmium battery packs to his ever expanding line. Up until now, the smallest cells Larry offered were 450 mAh. The new packs include both 150 and 300 mAh rated cells. For my evaluation, I received an SR-150 (four cell) pack which measures $1\frac{3}{16}$ inches long \times only $\frac{15}{16}$ inch square and weighs a little over 1.0 ounce with the connector and cable attached. In my initial testing of this pack using the ACE R/C Digipace (with a 300 mA constant load) I consistently obtained capacity readings of 175-180 mAh. I also received a sample of their new SR-300 (four cell) pack which measures $1\frac{1}{4}$ inches long \times $1\frac{1}{8}$ inches square, weighing 2.1 ounces with cable and connector. This pack indicated just about 300 mAh capacity during my testing with the Digipace. SR will sell both types of packs for a base price of \$19.95 plus \$3.00 additional for your choice of the following system connectors: Airtronics, Deans (state pin connections), Futaba, Futaba "J", Circus/JR, Kraft, and Kraft Sport. To the \$19.95 plus \$3.00, add another \$2.50 for shipping and handling. Of additional interest is the fact that Larry will also offer these same capacity cells in a flat pack configuration (side by side, all in a row) or any other style you might want on special order at no extra cost. Two meter glider and 1/2A R/C enthusiasts will especially like these new small, lightweight nickel-cadmium (rechargeable) battery packs.

SR-900 revisited

The January 1983 FLYING MODELS (pages 38-40) introduced the then new SR Batteries Inc., SR-900 capacity battery packs. The most interesting aspect of this type battery is the fact that it has a rated capacity of 900



ACE R/C has the Uni-Charger kit which sells for under \$6.00. Bob gives a suggestion in the text for setting this charger at the 90 mA current charging level for use with the SR-900 battery packs.

mAh, yet is physically the size and weight of a more typical 500 mAh pack. I first put one of these SR-900 packs into service in July, 1982. The capacity at the start was noted around 890-910 mAh, using the ACE Digipace (300 mA constant current load). At this writing, December 1983 (close to 1½ years later), that same pack is still indicating a capacity of 775 mAh (or almost 87% of the original capacity). That figure is still way above that normally obtained from a 500 mAh nickel-cadmium battery pack. My SR-900 pack has been installed in a model containing a Kraft rate gyro which draws an extra 100 mA steady current, in addition to the usual R/C system load. Helicopter and glider duration enthusiasts are also finding this SR-900 an excellent choice because of the high capacity to low weight ratio. At \$23.95 plus \$3.00 for the connector/cable plus \$2.50 shipping and handling, it is still well worth the extra cost.

Charging the SR-900's

Although I am presently indicating 775 mAh capacity on my SR-900 battery pack (154 minutes discharge time on a Digipace with an exact 302 mA load) there were times in recent months that I experienced capacity readings far less than that (130 minutes or 650 mAh). After some experimenting, I decided that I was actually charging the SR-900 pack incorrectly. By all battery standards a 900 mAh capacity cell should be charged at least at the C/10 rate for 14-16 hours. That would mean $900/10 = 90$ mA current for that period of time. Since most modelers, myself included, have the usual 50 mA output chargers, the suggested technique was to simply extend the charging time to something like a 24 hour period to get the extra current into the battery. Apparently, this does not always "sit well" with the battery chemistry. Several months ago to prove my point, I purchased a little ACE R/C Uni-Charger kit (ACE catalog No. 34K35) for under \$6.00. Normally this single output,

wall-plug charger, can be built for 10, 20, 30 and 50 mA outputs at 4.8 volts or 50mA at 9.6 volts for charging a transmitter pack. A group of resistors are provided from which you can select the charge current of your choice. What I did was take the 56 ohm (green, blue, black) resistor and connect it across or in parallel with the 33 ohm (orange, orange, black) resistor which are both supplied with the kit. By doing this, the resulting resistance value works out close to 21 ohms. Using that value resistance in the Uni-Charger circuit gives you a charge current output of 90 mA, perfect for the SR-900

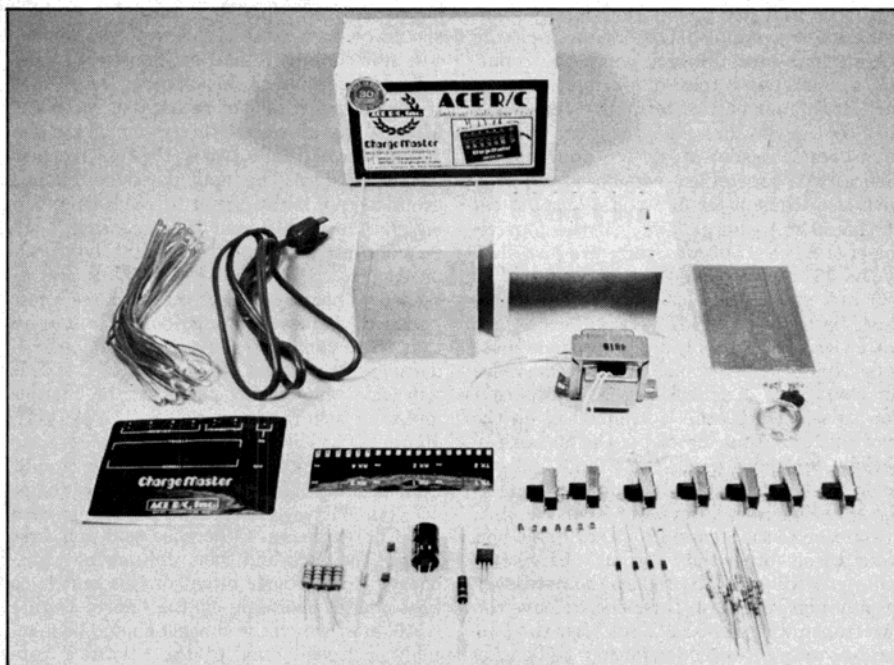
pack. After several months of normal use cycling using the 90 mA charge level for the 14-16 hour period, my SR-900 pack was back up from 650 mAh to the currently indicated 775 mAh capacity level. The battery experts tell me this was predictable and that no pack should ever be recharged initially for less than the C/10 rate. As a further example: never attempt to recharge a 1200 mAh battery at 50 mA for something like a 48 hour period. The lower charge current for a longer period of time is the no-no!

Special ACE R/C Digipace

I learned recently that ACE R/C will be producing a new version of their popular Digipace battery tester and charger. This new model will be exclusively marketed through SR Batteries Inc. The principle difference will be the inclusion of 50 mA and 120 mA charge rates on the receiver output (instead of the usual 50 and 20 mA rates). The 50 mA charge position will have the standard 300 mA discharge load. On the 120 mA charge level a new higher discharge load of 500 mA will be employed. That should greatly benefit the quarter scale and helicopter flyers who normally use high current drain equipment. There is also a third variation of the Digipace in the planning stages which would have receiver charge current levels of 50 and 90 mA expressly for the owners of the SR-900 battery packs.

ACE R/C Chargemaster

ACE R/C Inc. (116 W. 19th Street, Higginsville, MO 64037) is in the process of introducing four new products in the areas of battery charging and testing. The first of these new items is their Chargemaster which is available in kit form (catalog No. 34K55) for \$36.95 and an assembled version (catalog No. 34K55C) listing for \$46.95. This new charger is housed in a very durable, all aluminum case, measuring 5 inches long \times 3½ inches wide \times 3 inches high. It is AC powered (115 volt household) with a main power switch and power LED (red) indicator light.



These are all the parts of the new ACE R/C Chargemaster kit. The unit, when assembled, gives you a total of six charging outputs, all available simultaneously (two for the transmitter; four for the receiver).



Each output on the ACE Chargemaster has a switch to select "normal" or "trickle" charge levels as well as a red LED for charging indication.

There are six (6) outputs available on this charger. Each output has a separate LED (red) indicator and a switch that lets you select either "normal" charge level (C/10) or a special "trickle" level (C/50 or the capacity of the battery divided by 50). Both charger versions (kit or assembled) come without charge output connectors. So you will have to purchase separately a total of six connectors to mate with your particular R/C system. ACE R/C, by the way, has many of these proprietary connectors in stock for your convenience. The assembled version is supplied with two transmitter (9.6 volts) outputs set at the 50 mA charge level. Of the four receiver (4.8 volts) outputs, three are furnished at the 50 mA rate and one output is set at 120 mA specifically for charging the 1200 mAh batteries. The kit version is supplied with a set of resistors that will produce these same charge levels. You are also given a resistor chart with instructions that will permit you to select a 90 mA current level on the transmitter output instead of the 50 mA (especially for those using the SR-900 cells in their transmitter). You can also select receiver charge current levels of 25 and 90 mA, in addition to the 50 and 120 mA. Should you select these "other than normal" charge currents you will have to procure the necessary resistors on your own. I decided to leave the two transmitter at 50 mA, but I set the four receiver outputs (intended for four cell packs) at 25, 50, 90 and 120 mA respectively, for flexibility in future use. Many of the special resistor values were not readily available at my local Radio Shack stores, so it required

ordering directly from ACE R/C. Building the kit version was no problem. It is somewhat time consuming because of all the output connections. I would say that total construction time was in the order of four to six hours. A first time (beginner) kit builder should be successful at this type of project.

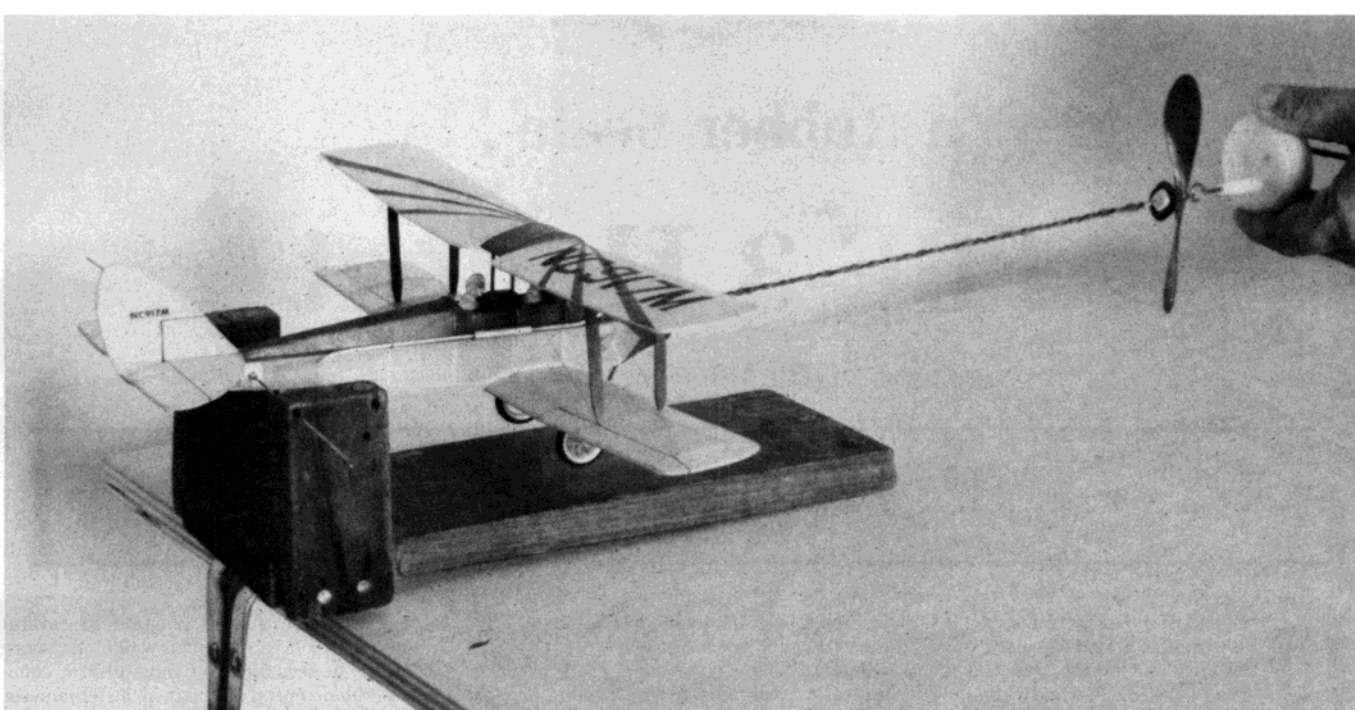
A few comments and cautions are necessary with respect to this charger. Because of the transformer output rating you shouldn't attempt charging more than two packs at the 120 mA level (that's two of the four receiver output circuits). The input power cord is not grounded nor is the circuit fused. Remember, six charging cables exit from the case, each terminating in a male connector (with exposed pins). Unless all the outputs are attached to battery packs you will have a few "unused" cables hanging loose. Be careful that these connectors (outputs) are not accidentally shorted out. Also be advised that if you leave the battery packs on the charger and then turn the input power (115VAC) off, *all the packs will begin to discharge.* It is the unfortunate nature of this particular circuit. So if you normally use a 16 hour timer to cut off your battery chargers, don't use it with the Chargemaster. Otherwise you will first charge the pack and then, unknowingly, discharge it. The basic intent of this unit is to first charge overnight at the "normal" rate (C-10) after which the charger should be manually switched over to the "trickle" rate (C/50) where it supposedly can remain indefinitely. I have no real experience concerning the prolonged effects of trickle charging. ACE does state that battery packs should

still be cycled on a device such as their Digi-pace, on a regular basis. I definitely go along with that recommendation. The only other problem I see is a careless modeler leaving the switch in the "trickle" position, charging the pack overnight and then running out to the flying field the next morning. You can figure out the rest of that scenario for yourself. Be careful! The use of this charger is not complicated, it just requires a little care and basic common sense. I expect to keep several extra battery packs on my Chargemaster in the "trickle" mode to see if any long term trends develop. That will be reported on at a later date.

Future projects and comments

Later on in the year, as they become available, I will also be looking at the ACE R/C DMVC (Dual Metered Vari-Charger) and their Voltmaster (a special new ESV device for battery testing purposes).

Our recent reader survey didn't indicate any particular interest on the part of our readers for these "electronic type" product reviews. The most important function of our staff is to respond to what *you* specifically want to see in print. If we interpreted that survey incorrectly, how about dropping us a special line. Do you favor product reviews, such as this one just presented? Was it too detailed? or technical? Or would you like to see more details? We are quite flexible and hope to be responsive to your needs, but to do that we must hear from you. What do you say?



PHOTOGRAPHY: PERRY PETERSON

Crunch no more, good buddy. The simple, but very effective winding stooge detailed in the text is great for both indoor and outdoor use.

It was a quiet autumn evening with the sun just beginning to turn red in the western sky. The large open meadow was surrounded by a few trees turned crimson and yellow by October's paint brush. Two men, oblivious to the beauty around them, were silently intent on winding a small rubber powered model airplane. One was holding the model, carefully clasping the motor peg with thumb and forefinger of one hand and gently cradling the cowl with the other hand. As he reverently anchored the model, he thought of the many long painstaking hours the builder must have spent with the delicate framework and immaculate covering. The other man was also silent as he carefully and deliberately turned the crank of his winder moving his lips as he counted the turns to himself while slowly moving toward the model as he wound.

Suddenly a loud snap broke the evening silence! In an instant the rubber snapped and, startled by the noise, the thumb and forefinger that had so carefully held the motor peg, punched through both sides of the fuselage crunching tissue and balsa.

Sound familiar? If you are a rubber sport or scale modeler and can honestly say you have never been involved in a scene portrayed in the above scenario, you must indeed be luckier or wiser than most of us!

There is a very simple solution. Take ten minutes and build a winding stooge. You may want a more sophisticated version later on, but the stooge pictured is quick to build and suitable for many sizes of models.

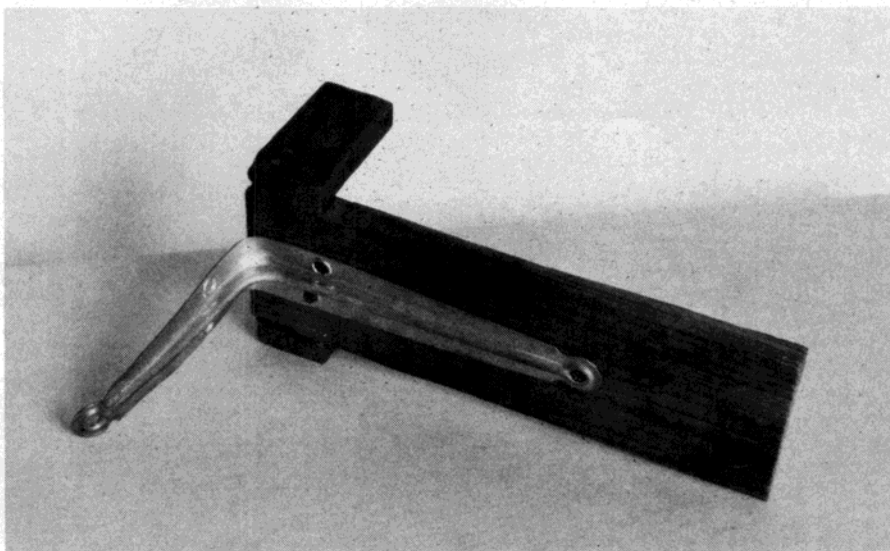
The stooge pictured is made from a 1 × 4 piece of redwood (most any wood will do) with 3½ inch ears cut from 1 × 2 redwood. Fasten a shelf bracket to the underside and drill ¼ inch holes in the top corners of each ear. That's all there is to it — you are ready for the flying field already!

To use, press the protruding shelf bracket leg in the ground with your heel and anchor your plane with a piece of music wire pushed through the ears of the stooge and the aluminum tube motor peg of your plane (it's easy to replace dowel motor pegs with aluminum tubing). For indoor use, simply fasten to a table with a C-clamp.

Back to . . . Square One a simple . . . Winding Stooge

By Perry Peterson

Take ten minutes and a few pieces of wood to make yourself a handy "third hand".



Three pieces of wood (redwood, in this case) and a shelf bracket are all you need to get started. That and probably ten minutes of your time give you a very versatile accessory for rubber powered airplanes.

a Rubber Scale . . .

F6F-3 Hellcat

By Mike Midkiff

The unsung hero of the Pacific theatre, Grumman's durable fighter amassed impressive service records in short order.

Designed specifically to combat the fast, nimble Japanese *Zero* after the outbreak of the war, the unsung *Hellcat* methodically and systematically eliminated almost all Japanese fighter opposition during the final two years of the war. Strangely enough, she never got the accolades literally heaped upon her more glamorous teammate, the F4U *Corsair*.

In a humble attempt to set the record straight, let's compare: Kill ratio: *Corsair* 12-1; *Hellcat* 19-1! Carrier landings: the *Corsair* required almost the entire war to solve carrier landing problems. The *Hellcat* could literally "stall and fall" in a controlled attitude until the deck came up to hit the gear. Speed: the *Corsair* was marginally faster at low altitudes, but at 10,000 feet they were even and at 30,000 angels, the *Hellcat* pulled away.

As further proof of the F6F's basic soundness and efficiency, there were only two variants produced through the war: the F6F-3

and the F6F-5. Both models totaled 12,274 aircraft produced by war's end, which amounted to over eleven aircraft per day! Truly this was an amazing production feat and a tribute to the basic simplicity and functionality in the *Hellcat*'s design. Perhaps the greatest tribute paid to the *Hellcat* was by Navy ace Gene Valencia of VF-9 who once remarked: "I love this airplane so much that if it could cook, I'd marry it."

The model represents an F6F-3, which was flown by VF-1 aboard the *Yorktown* sometime in 1944. At $\frac{3}{4}$ " : 1' scale, she is rather large as far as rubber power scale models go. Originally, my model had knock-off wings and adjustable ailerons, but I left them out of the design because little was gained to offset the added weight. I did however retain the plug-in landing gear, as this gives one the option of flying with or without the gear. Due to the size of the model, near scale airfoil thickness is a must for the wing, stab and rudder, or she just doesn't look right. Consequently,

some attention should be paid to careful wood selection to keep the weight no more than six ounces all up. I have used a semi-scale 3-bladed prop of about 11 inch diameter with satisfactory results, but a 2-bladed 12 inch diameter prop would be at least as satisfactory.

Construction notes

A model of this size and bulk requires extreme care in the selection of balsa wood to give adequate strength, yet at the same time minimum weight. With this in mind, the fuselage should be constructed as lightly as possible using hard balsa only for the $\frac{3}{32}$ basic box framework. All other areas—formers and sheet fill-in—must be made from light balsa. The wings should employ only medium to medium light balsa for leading and trailing edge stock and all ribs. Only the spar material should be medium to hard. All balsa blocks should be hollowed out and, in addition, be of the lightest balsa possible. Cut out



PHOTOGRAPHY: MOPSY MIDKIFF

Some heroes remain unsung. The stodgy but sturdy *Hellcat* chalked up a much more impressive record than her more glamorous colleague, the F4U *Corsair*.

lightening holes were possible in the larger formers and wing ribs. Jap tissue should be the only covering material considered since it has the lowest absorbency rate of any covering material. Do not use colored dope unless it is sprayed on with an airbrush. Weight is the single most important factor affecting the model's overall performance.

Fuselage construction

Typically, this style of fuselage is built with formers assembled to a vertical keel. Unfortunately, a large fuselage constructed in this manner borders on excessive weight. My solution is to use the basic box type structure and add light former sections to this box to provide the appropriate fuselage contour. This system not only saves weight, but also allows for better alignment control.

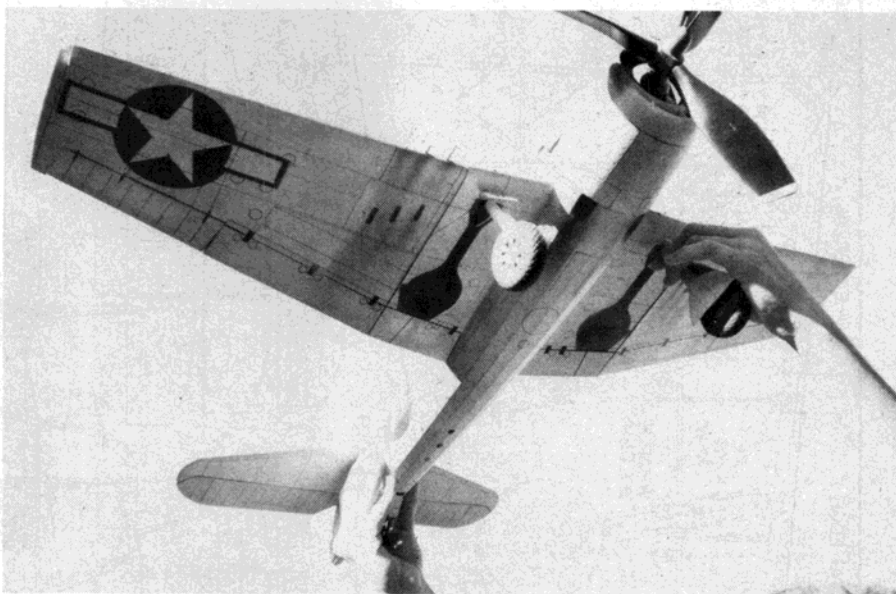
Start by building two identical fuselage side frames. Use hard, stringy $\frac{3}{32}$ square longerons with medium weight uprights. Note that the engine cowl area is built separately from the fuselage and added later. After the fuselage frames are dry, remove, separate and add the required $\frac{3}{32}$ square cross pieces except at station "K" where the former is glued in place. Cut out all of the top, bottom and side former sections from light $\frac{1}{16}$ sheet. Do not notch out yet for the $\frac{1}{16} \times \frac{1}{8}$ stringers, but mark where each one goes. Cut out the notches for the two stringers on the horizontal center line; glue and assemble these two in place, making sure that the side formers are true before the glue sets up. Cut out the $\frac{3}{32}$ sheet wing mounting plates and glue in place where the side formers are notched out. Take care that these are lined up properly; these define the wing location. Glue in place the wing compression brace at station "G". Check alignment and notch out for all of the other $\frac{1}{16} \times \frac{1}{8}$ stringers, and glue in place. Add light $\frac{1}{16}$ sheeting between the stringers at stations C-D and D-E. Add the light $\frac{1}{8}$ sheeting between the formers along the top of the rear fuselage, and the light $\frac{1}{16}$ sheeting above and below the stab opening.

Build the engine cowl portion of the fuselage by cutting out two formers from medium light $\frac{3}{32}$ sheet and notching out for four $\frac{1}{8} \times \frac{1}{4}$ short stringers. Glue these four stringers in place and wrap and glue light $\frac{3}{32}$ sheet around the framework. Glue on the front of this cylinder another $\frac{3}{32}$ former, orient this one so the grain is at 90 degrees. Carve out the $\frac{1}{2}$ inch thick front engine cowl block; the inside contour is finished before it is glued in place.

Cut out the removable nose plug opening and finish shaping the engine cowl assembly using the side and top views on the plan for reference. Don't glue this to the front of the fuselage yet. Finish out the fuselage framework by gluing the rear motor mount in place. Don't forget the $\frac{1}{32}$ ply doubler here. Make, hollow out, and glue in place the block at the rear of the fuselage. Add some sheet fill-in in the area of the tail wheel and glue in place the two $\frac{1}{32}$ I.D. mounting tubes. Finally, scallop between stringers and cut out lightening holes to reduce weight as much as possible.

Wing construction

The wings are constructed in the time-honored manner by pinning down the leading and trailing edges and the bottom spars. Glue and assemble all of the ribs in place (note the break in #1 rib) except the outside #3. This is assembled later after the wing is separated at the dihedral joint. Remove the



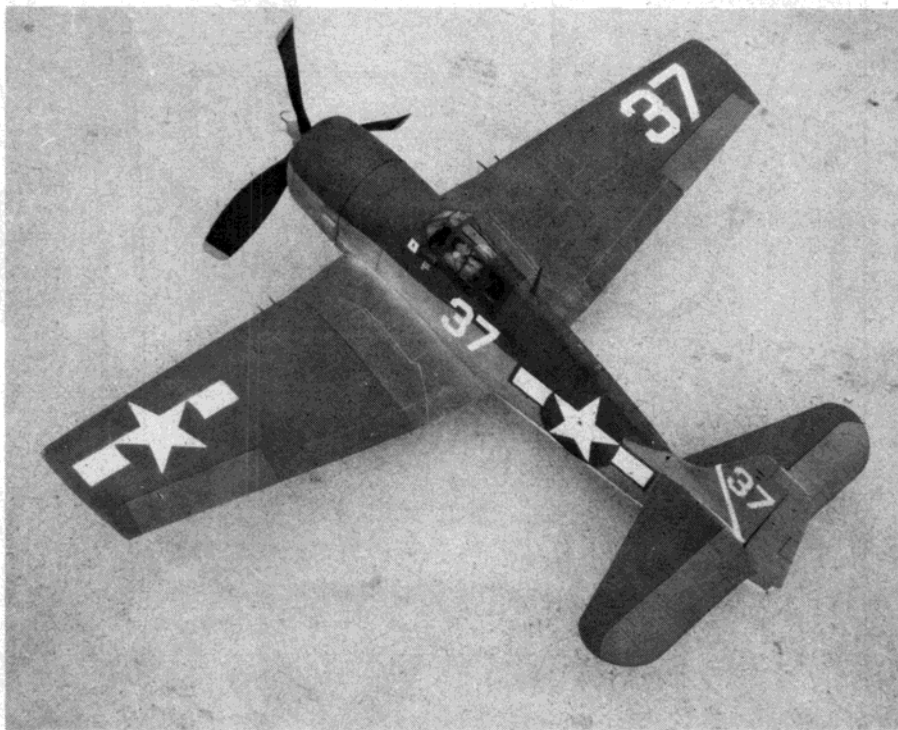
The landing gear plugs in on the Hellcat so that a little weight and some extra drag are reduced when flying. Watch your wood selection since the maximum weight should be no more than six ounces.

wing from the building surface and carefully cut the leading edge, trailing edge, and the two bottom spars at the dihedral line just outside the assembled #3 rib. Re-pin the outer wing panel back on the building surface and add the remaining #3 rib with the proper dihedral slant in this rib. After this is dry, remove and add all of the top spars and the $\frac{1}{64}$ ply webbing between ribs #1, #2, and #3. Now glue in place the ply-balsa-ply landing gear and the tube mounting assembly. Look carefully at the cross section on the drawing to clarify how this is done. Drill and glue in place the brass tubing which provides the sockets for the main gear. Carefully locate and glue the $\frac{3}{32}$ diameter hardwood dowel in

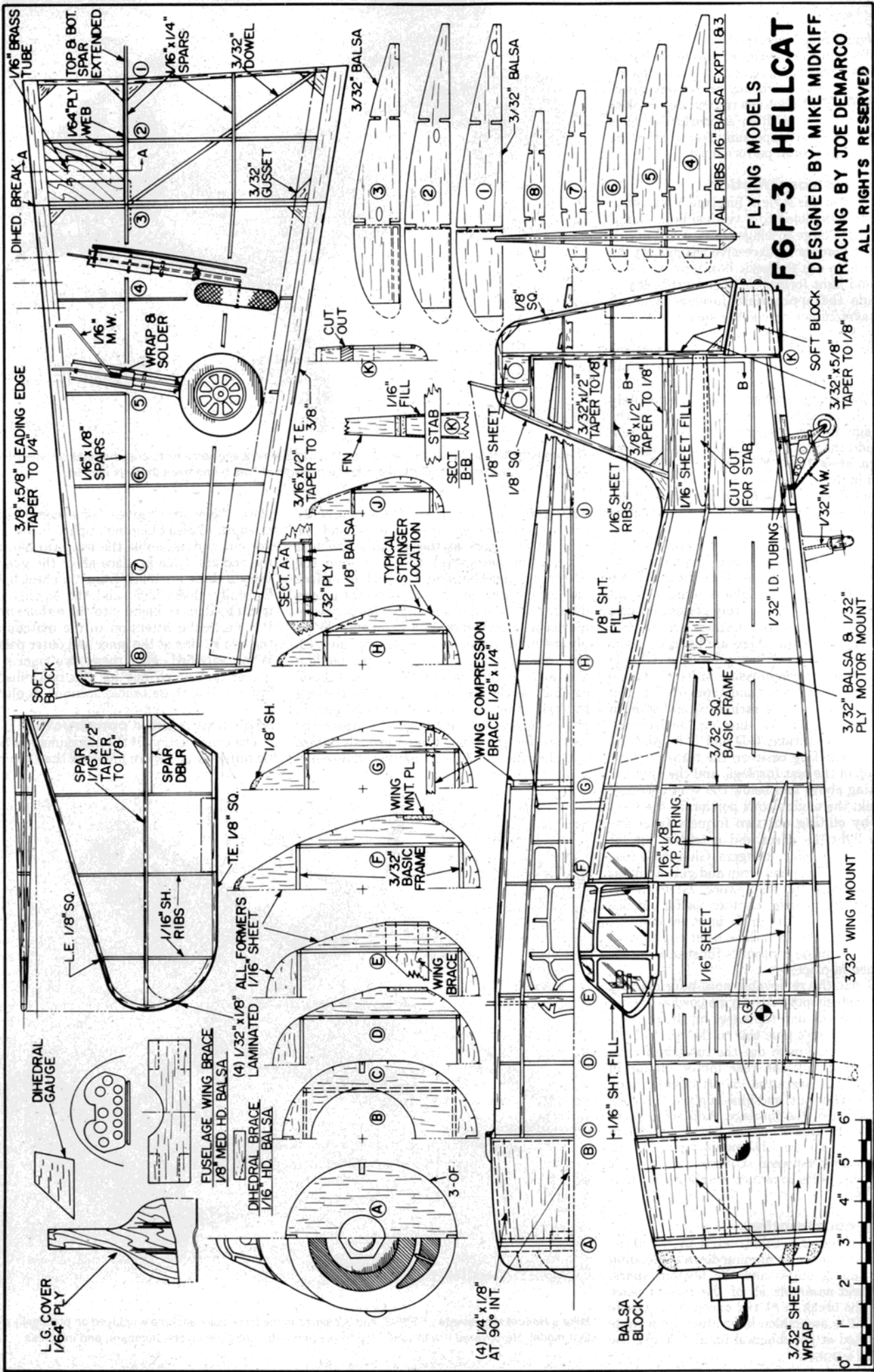
place. This dowel gives some compression strength to resist landing impact shock. Hollow out and assemble the wing tip block to the end rib. Glue in place all of the gussets shown; these are made from $\frac{3}{32}$ sheet balsa. Carefully shape and sand the leading and trailing edges to blend into the airfoil shape. Pay particular attention to the matchup of the two #3 ribs at the inner and outer panels. When satisfied, glue these two panels together and notch out for the two dihedral braces. Glue these braces securely in place.

Stab and rudder construction

The construction of the empennage is a little different and more involved than the con-



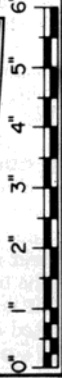
Mike's Hellcat represents an F6F-3, and is painted in the three color scheme employed on practically all of that model. He covered it with white Jap tissue and airbrushed the colors, numbers, and insigniae.

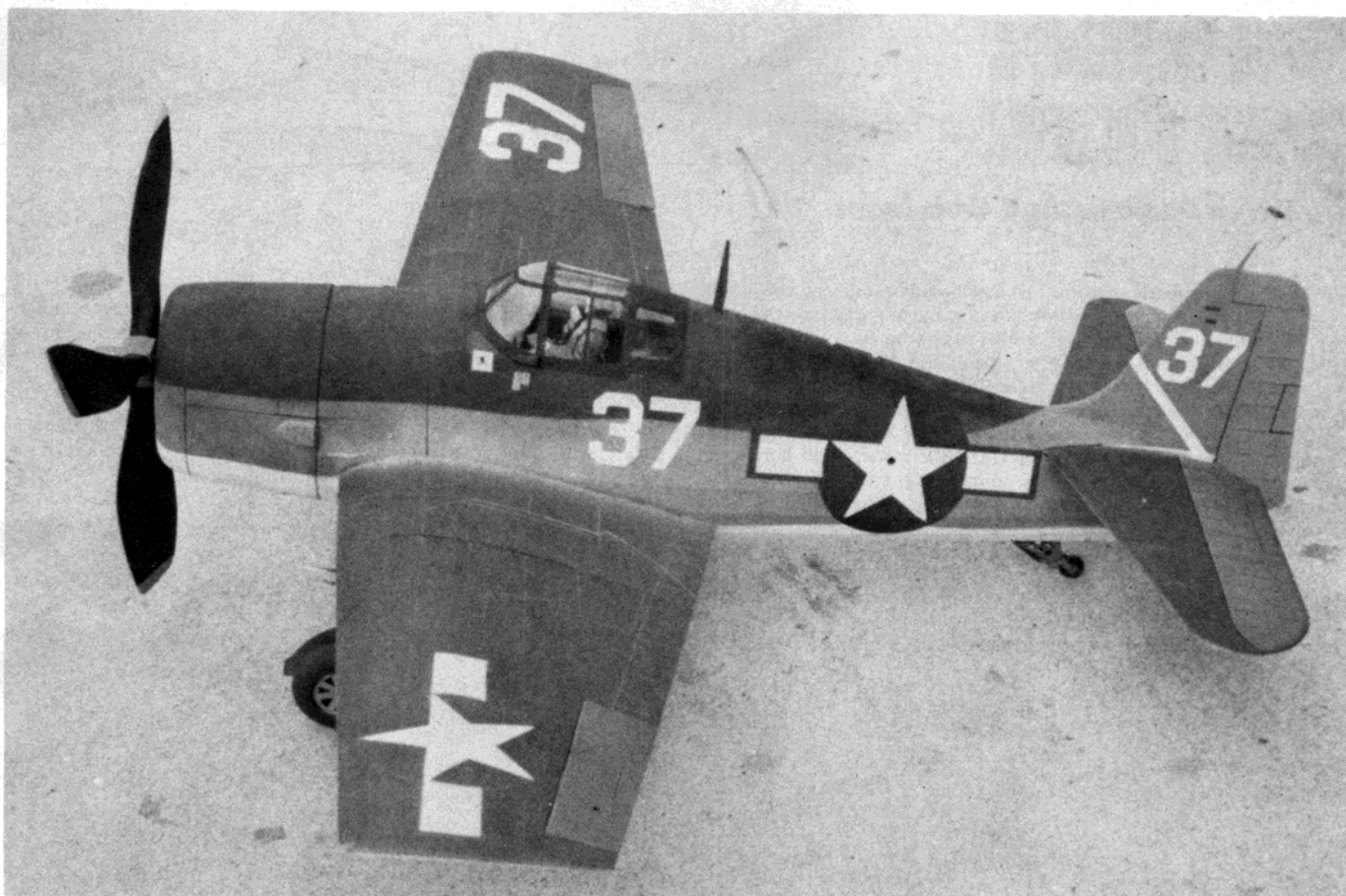


FLYING MODELS
F6F-3 HELLCAT
 DESIGNED BY MIKE MIDKIFF
 TRACING BY JOE DEMARCO
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FULL SIZE PLANS AVAILABLE THROUGH CARSTENS FLYING PLANS





If you have nerves of steel (or won't fly the model) you can apply a good bit of finish detail to really make the model "come alive".

ventional flat structures seen on smaller models. A model this size just wouldn't look right without scale thickness tail feathers. Start by cutting out the tapered spars for the stab, fin, and rudder. The rudder is built separately from the fin to facilitate offsetting, if necessary, for proper flight trim. Pin the spars to the building board with the appropriate thickness shims to support the small end of each spar. Cut out, glue, and assemble all of the leading and trailing edge parts using the same thickness shims as used under the spars. Cut out, fit, and glue in place the laminated tips and the various other $\frac{1}{8}$ sheet parts. Don't forget the shims for these also. Lastly, cut out, and glue in place all of the sheet ribs and gussets. After these surfaces are dry, remove, and sand carefully to a symmetrical airfoil shape.

Covering, assembly and finishing

All of the individual structures are doped and covered before assembly, except the fin, which is assembled and glued in place on the fuselage before covering so that the covering blends from the rear fuselage turtle deck into the fin. I use the method of doping the framework three times, sanding lightly between coats and applying the tissue by brushing thinner through the tissue. This allows wet tissue to be applied to negotiate some of the compound curves resulting in fewer pieces of tissue used to cover the fuselage.

If you are doing an F6F-5, the color scheme can be accomplished with dark blue tissue only. However, the F6F-3 is a little more complicated in that almost all were done in the three-color scheme characteristic of that time

period. I suppose one could duplicate this using white, light blue, and dark blue tissue, but it would be quite a chore. I chose to cover entirely in white Jap tissue and airbrush the various colors, numbers, and insigniae in place.

After all the covering, doping, and color application is complete, assemble and glue the stab in its appropriate slot, and don't forget to add the small section of fuselage to fill the open slot behind the stab. Glue the rudder in place with a small amount of left turn. Plug in and glue the wings to the fuselage. Be extremely careful here to have equal incidence and dihedral. Now reach through the front of the fuselage and glue securely the wing/fuselage brace to the spar stubs and the adjacent former. If the engine cowl had been glued to the fuselage, you could not have reached in to assemble the brace. Finally, glue the engine cowl to the front of the fuse.

Finish detailing the cockpit area to your satisfaction and attach the canopy. Make and assemble the various lights, antenna, pitot tube, gun barrels, and other external details which give the model that personality.

I use a black "Sharpie" marker to scribe panel lines on the white and light blue areas and grey Floquil paint in a ruling pen applied to the dark blue areas.

If you have the guts, apply the exhaust streaks, weathering highlights, and gun powder streaking where appropriate and watch your model really come alive.

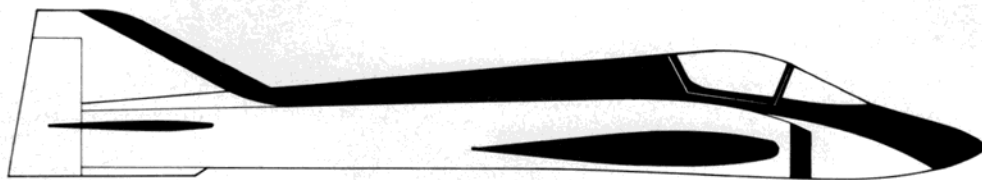
After applying all the finish detailing that the nerves will allow, I spray the entire model with a light coat of clear to "lock" everything together and reduce smudging.

Flying

Locate the C. G. as shown on the print and install a rubber motor of six to eight strands of $\frac{3}{16}$ or equivalent size. Both wing tips should have about a quarter inch of wash-out with a little more on the right wing. Also, the decalage should be approximately two degrees between the wing and the stab. Start trimming flights with moderate right and down thrust. By using thrust adjustments only, try to achieve a shallow wide left hand climbing turn. Don't be concerned about the glide trim yet; concentrate only on a good steady climb-out and cruise by utilizing thrust adjustments only. After you have a consistent, steady climb-out using near full power, work on the glide trim. A glide circle to either the right or left is okay as long as neither tighten up to become a spiral dive. Achieve glide turn with the rudder by movements of no more than one sixteenth of an inch at a time. As you move the rudder, offset the side thrust of the nose block in the opposite direction the same amount: if you put in $\frac{1}{32}$ left rudder, add $\frac{1}{32}$ right thrust and vice-versa. After all appears okay, install a fresh, lubed motor and go to near max winds, observe the total flight, and make minute corrections to the thrust setting or rudder to groove the total flight pattern. Under full power without the landing gear, your Hellcat should easily top a minute without thermal assist if properly trimmed.

Your Hellcat, replete in its dark color trim, circling about fifty feet away in that characteristic, pugnacious "tail low" Hellcat attitude makes you feel sorry for that Zero that just missed on her first pass.

PROJECT PATTERN



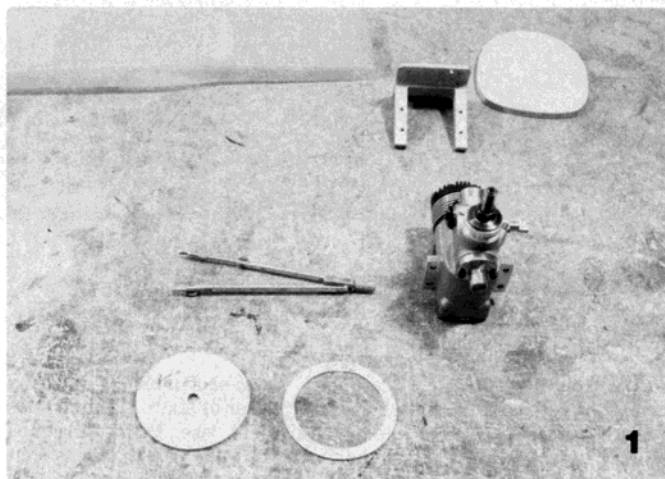
By Dean Pappas and Bob Hunt

Since our fearless editor has already published the aim of Project Pattern, I will waste no time in getting to the meat and potatoes. The first task is to appropriately prepare, and install the firewall. This critical, and simple, task is much easier since manufacturers started molding accurate thrustline references into the front face of the fuselage. Virtually all manufacturers of fiberglass fuselages now carve their master plugs with the front face perpendicular to the thrust-line in both vertical and horizontal planes. This allows the use of the engine that is to be installed in the airplane to be used as its own alignment jig. What could be more precise!

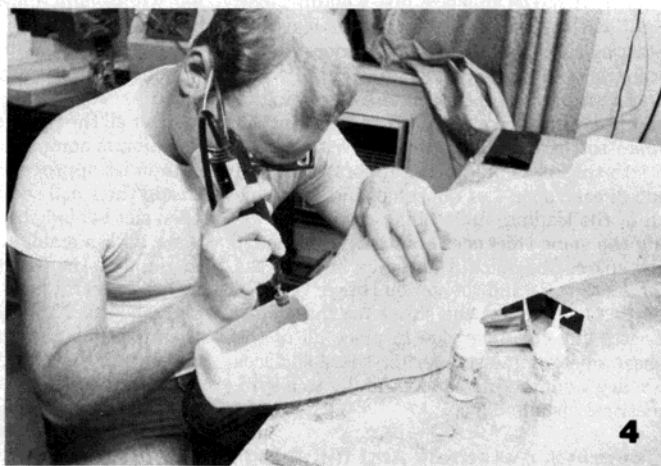
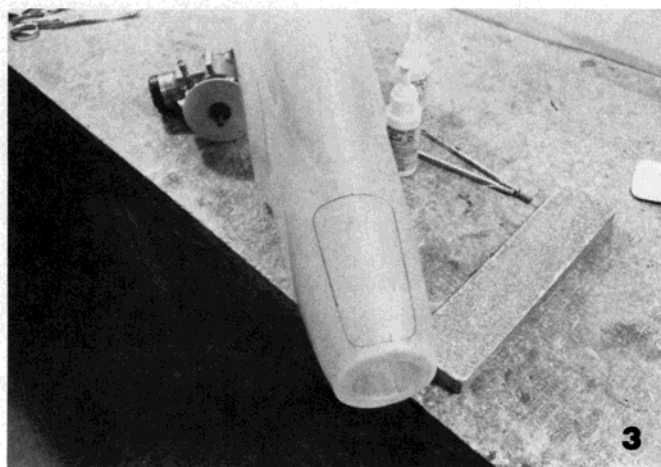
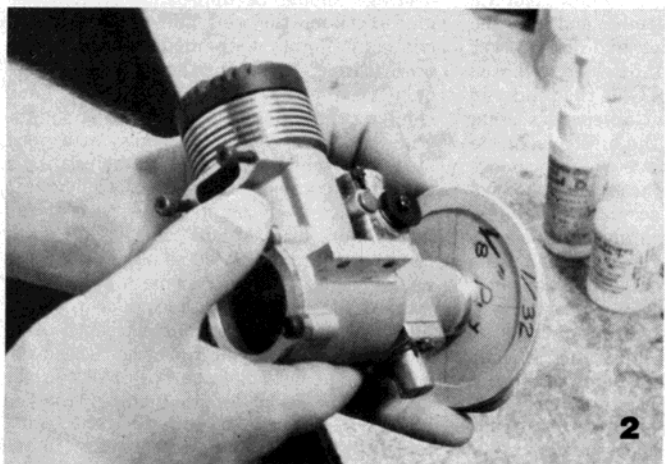
You will have to build some "special tooling" of your own for this job, but this is relatively simple. Start by looking at picture #1. In this picture you will see a 1/8 inch plywood disc the same diameter as the spinner that will be used. The hole in the center should be accurately centered, and a tight fit on the engine crankshaft. The back-

Composites kits) is unusually complete in this respect: Dave Scully and company provide instructions that could be used as a benchmark. Once you have decided where and how large the engine cutout should be, just tape the template down, and mark the fuselage with a grease pencil or crayon.

In case you do not have a ready made template, or would like a different shape here is a simple method for laying out your own template, while guaranteeing that it is symmetrical. Fold a piece of paper in half, and using the fold as a centerline, draw half of the perfect shape. It should take half the effort. . . (Oh brother!-Ed.) Pictures #3 and #4 show the grease pencil outline, and the cutting operation.



PHOTOGRAPHY: BOB HUNT AND DEAN PAPPAS



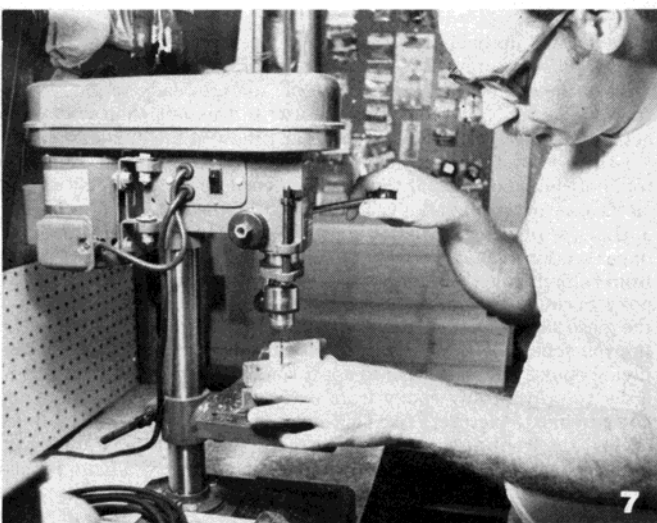
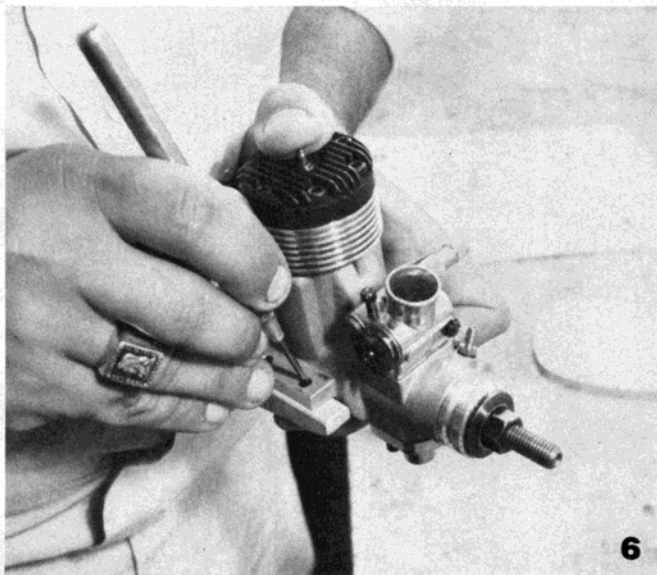
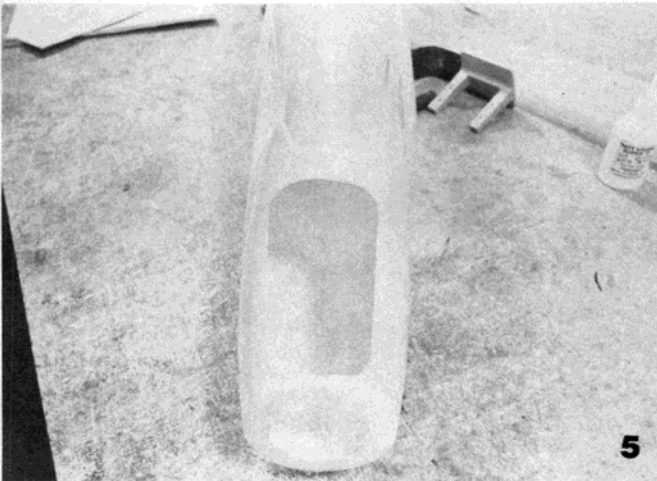
Picture #4 is particularly important since it shows the use of a dust mask while cutting the fiberglass. Fiberglass dust is harmful to your health on both a long and short term basis, and exposure is cumulative! Picture #5 shows the result of finishing the cut-out with a Dremel sanding drum.

The next step is one that requires care whether done by hand, or with fancy machine tools: drilling the engine mount. Using the distance specified by the instructions for total length from the firewall to the front face of the fuselage, locate the engine on the mount for the same total length, plus about 1/16 inch. If you have a friend with a milling machine or drill press, by all means, get him to do this for you. If not, get a helper after locating the holes on the mount with a scribe as shown in picture #6. Clamping the mount in a vise, hold the drill vertical, while your helper eyeballs the operation along a line perpendicular to your line of sight. This works surprisingly well. Pic-

plate of the spinner may conveniently be substituted, and if you plan to use a spinner that has a recessed backplate, such as the Goldberg item, it becomes necessary in order to get the fuselage/spinner spacing correct. The thin ring is cut from either 1/16 or 1/32 inch plywood, and determines the gap that will remain between the spinner and fuselage (not including the finish). Glue these pieces together as shown in picture #2. They will later be mounted to the engine with the thin ring rearward.

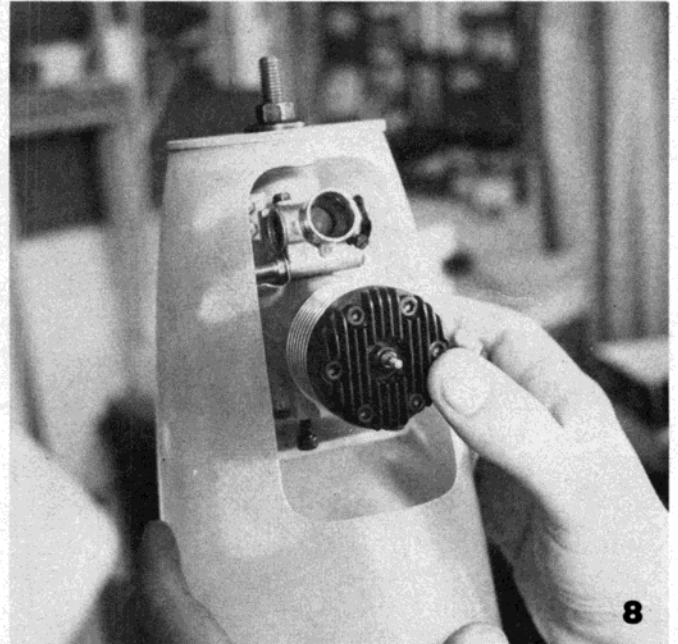
The next step is the engine cut-out. Most kits will include a template for this cut-out in the instructions. The EU-1A (and all Aero-

Construction of the EU-1A begins with firewall installation.
A few tricks to be learned here to insure an accurate ship.



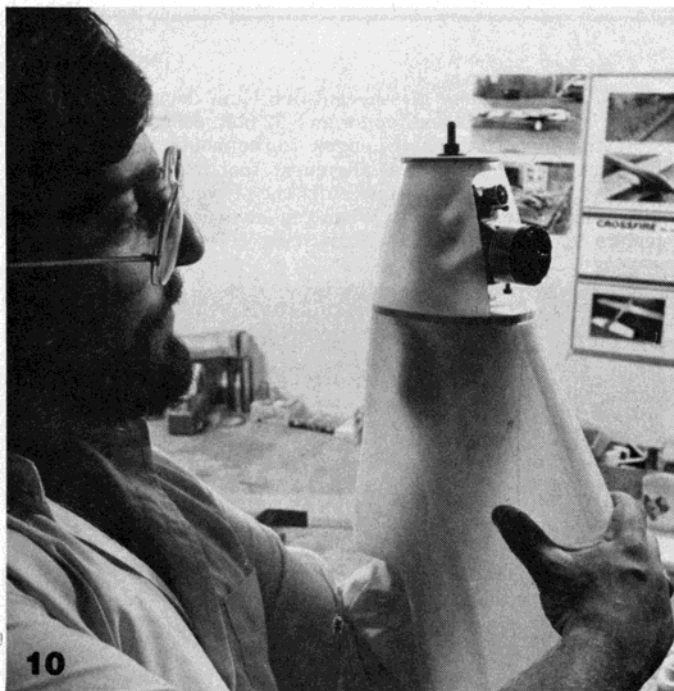
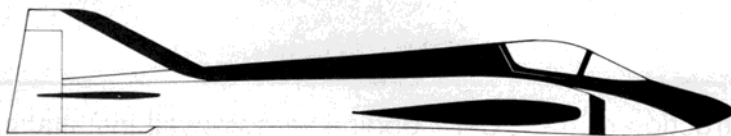
ture #7 shows a safety glasses-clad Bob Hunt doing this in a drill press. I prefer to drill and tap for an 8-32 bolt, using a #29 drill bit.

Having done this, bolt the engine to the mount, slip it into the fuselage, install the special alignment tool that you made and tighten up the prop nut. "Hot Stuff" the plywood disc to the fuselage, taking care to center it. When you are done, it should look like picture #8. Place a dot of Hot Stuff Super "T" on the firewall where

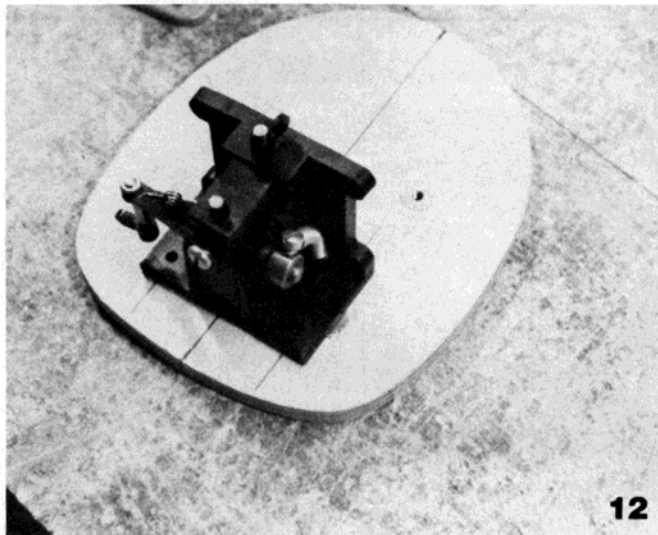


it will contact the back of the motor mount (picture #9) and carefully push it into the fuselage as in picture #10. Carefully unbolt the engine from the mount and remove the firewall/engine mount unit. If done carefully, you can drill the holes in the firewall right through the aluminum mount. Presto! Instant alignment. Install the blind nuts for the motor mount in the back of the firewall, and prepare to . . .

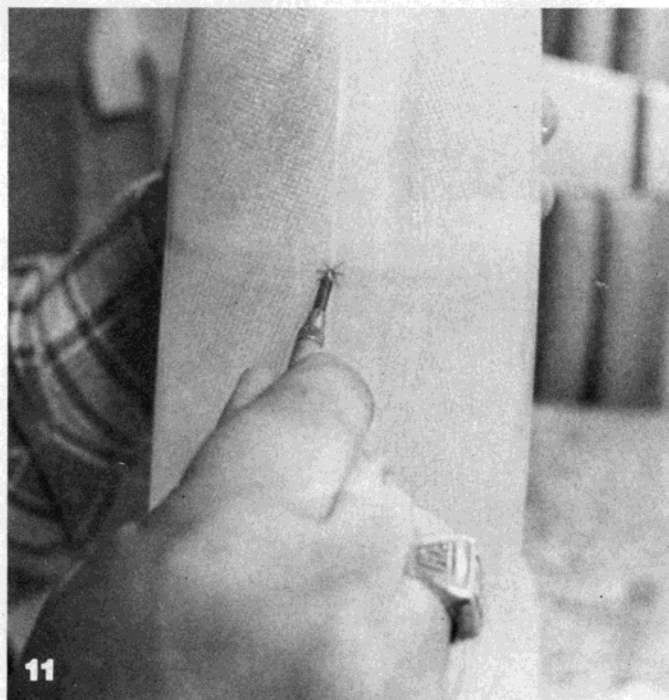
PROJECT PATTERN



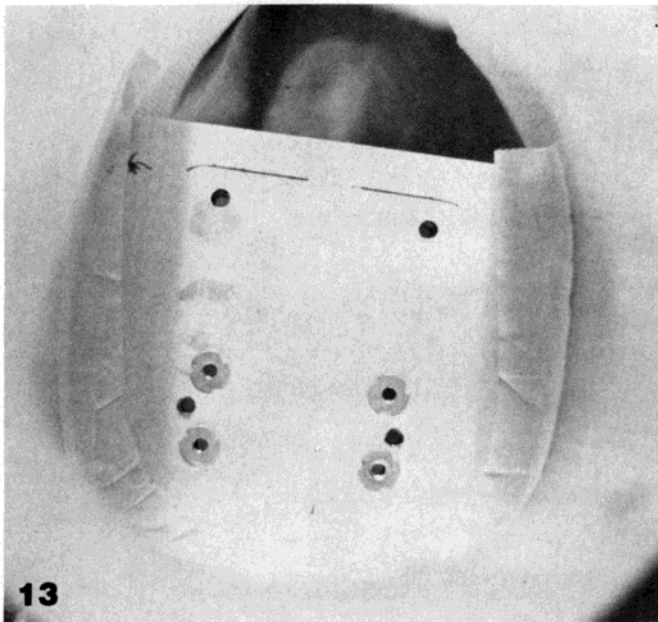
10



12



11



13

Align the nosewheel retract mounting holes. With the engine mount bolted tightly to the firewall, re-install the firewall in the fuselage, and replace the engine mounting bolts. Using a small punch, or drill, mark the fuselage centerline by punching through the seam in the fiberglass into the firewall on both top and bottom picture #11. Remove the firewall once again, connect the two punch marks, and you will have a perfect vertical line about which to center the nosewheel mounting holes. Picture #12 shows this layout for the B&D retract used. Install 4-40 blind nuts in the front side of the firewall, and re-install the whole mess once again. It may be necessary to use 1/4 inch long bolts for the upper two retract mounting points, since

they will end up behind the motor mount.

Tack glue the firewall at three or four points with Super "T", and remove the engine and alignment tool. You are ready to glue in the firewall. Actually, it takes longer to write this out than it does to actually do the job, and after the first time you'll feel like a pro.

I cut a two inch wide strip of four ounce fiberglass cloth for the top, bottom, and sides of the firewall—each about four inches long. In the case of the *EU-1A* (even I lost sight of the fact that the *EU-1A* is the star of this show) Bob and I decided to eliminate the small upper section of the firewall in the interest of better cooling. Working from behind, glue the fiberglass strips into the corners using Hobby-poxy Formula II. You are going to get messy. When done correctly, the glass should be tucked tightly into the corner, and the edge of the firewall should be wetted with epoxy all the way around. Before applying epoxy, you may wish to apply masking tape from the front in order to prevent any epoxy from dripping through into the engine compartment, picture #13. This also produces a nice epoxy fillet around the front of the firewall. Leave the whole thing standing on its nose overnight (preferably over some newspapers) and go re-read last month's *FLYING MODELS*. Next month, we will discuss the tuned pipe tunnel installation.

The current Kraft Systems monthly advertisements are calling your attention to a new KP4KB four channel imported R/C system. Kraft decided a few years ago to expand their overall line of equipment by importing several systems manufactured by the KO Company Ltd. of Japan. The initial radios offered were meant to compete with the so called, economy class R/C units, which contain a minimum of extra features, but with very attractive selling prices. One of those original import models, the KP5K (*K-Line*), was reviewed in the April 1983 issue of *FLYING MODELS*. That particular system provided dual rate control on the aileron and elevator channel functions as the only extra feature.

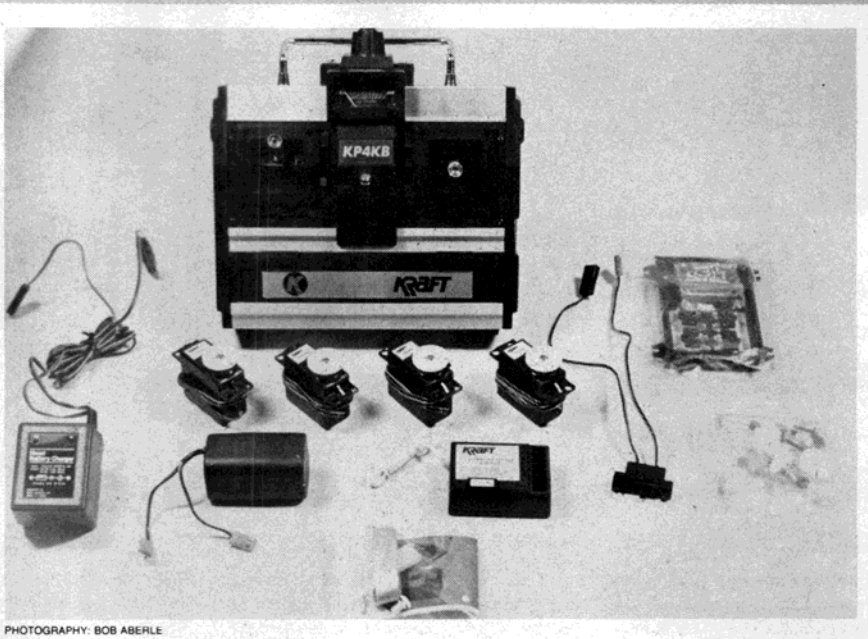
The new Kraft KP4KB system will now offer a further degree of sophistication to the *K-Line* series by including some noteworthy additional features. Specifically, this initial four channel entry will include both servo reversing and servo travel (span) adjustments on all channels. The KP4KB, however, will not have dual rate control. The list price will be \$229.95, which means that the actual selling price is going to be extremely attractive. In several months time, a deluxe seven channel version of this same series will be offered. I will give you an overview of some of the special features of that system later on in this text.

Just a word for a moment concerning the actual testing of this radio. With the advent of the new R/C frequencies I have been trying to perform field tests on each system submitted for evaluation. The emphasis being on adjacent channel performance or basically *selectivity*. The test procedure I devised to check down to 20 or 10 kHz spacing requires that the evaluation unit be on either new Channel 50 or 52. Unfortunately in this case, Kraft could only supply me on short notice with a unit on Channel 56 (72.910 MHz). For this magazine review, therefore, I was only able to verify adjacent channel performance to within 40 kHz (by using the next adjacent channel on 72.870 MHz). Hopefully, later in the year a follow up evaluation will be possible down to the 20 and 10 kHz adjacent channel test criteria.

KP4KB system

The \$229.95 system list price will provide you with a complete four channel system including: transmitter, receiver, full nickel-cadmium rechargeable battery packs, four servos, a dual output battery charger, switch harness, aileron extension cable, servo trays and mounting hardware, new set of frequency flags, and an instruction manual. This particular system operates on AM. It is my understanding that both the four and seven channel versions will be available on FM by the fall of 1984. The KP4KB is supplied only in the dual stick transmitter configuration. By switching a control stick spring and ratchet device you can easily convert the transmitter from Mode II to Mode I in a matter of minutes. Although this radio is electrically compatible with other Kraft systems, it does employ a new type of connector. This connector is not only different from the standard Kraft (domestic) Multicon variety, but different from the previous *K-Line* as well. Connector adapters will be made available as follows: P/N 200-302K (original *K-Line* to new KB type receiver connector) and P/N 200-303K (new KB type back to the original *K-Line* receiver connector). Unfortunately, this will be an inconvenience for some

FLYING MODELS



PHOTOGRAPHY: BOB ABERLE

The complete new Kraft KP4KB R/C system. This four channel import lists for \$229.95 and includes a full set of nickel-cadmium battery packs and an aileron extension cable (not shown in this photo).

An FM Product Review: Kraft System's KP4KB

By Bob Aberle

Servo reversing and servo travel adjustments
on all four channels highlight this system.

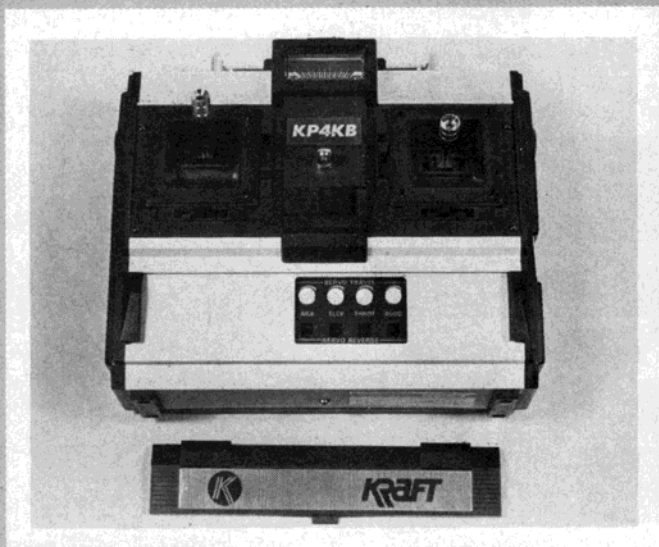
modelers looking for a degree of commonality in the overall Kraft imported line. The new connector style now permits a smaller receptacle block on the receiver, with resulting savings in volume and weight (especially when going to seven servo inputs).

KP4KB transmitter

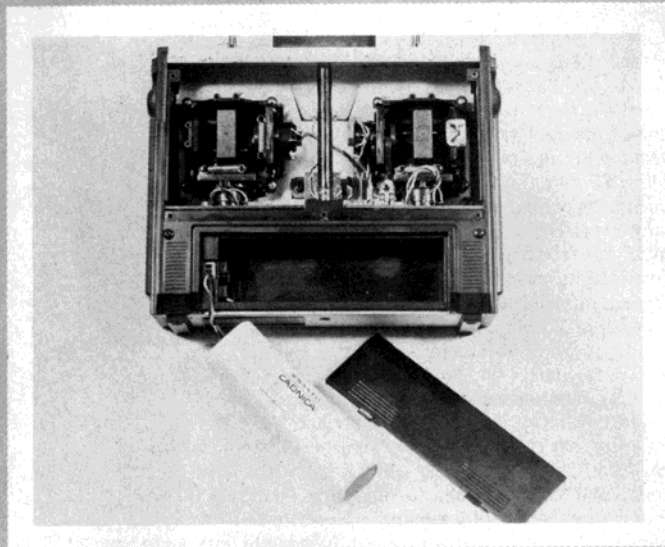
This is an all new transmitter featuring a case made primarily from extruded aluminum (the original *K-Line* cases were made totally from molded plastic). The case measures 7¹/₄ inches wide × 7 inches high (overall) × 2 inches thick (plus the control stick projections). Weight is a little under two pounds. A carrying handle is included on the top of the case. In the center of the case, directly below the model number logo, is a single neck strap support loop. The neck strap itself must be purchased separately (P/N 200-219). Control stick lengths are adjustable. Simply loosen a small hex set screw located in the tip of the stick, rotate the stick to the desired length, then re-tighten the screw (a special hex wrench is supplied). Stick length can be varied from ³/₈ to 1¹/₄ inches (range of

³/₈ inch). Front panel meter reads as an expanded scale voltmeter (ESV). Main power switch is a slide type (side to side motion). Antenna is an eight section whip which extends fully to 39 inches and can be collapsed down to within 2³/₄ inches of the case top. You can also completely remove the antenna if you like. Power output was measured at a very high 700-750 milliwatts. At that output, the total transmitter battery drain was only 100 mA which is surprisingly low when you consider the output just noted. On this four channel transmitter, four separate trim levers are provided, each with a ratchet device. All trims are mechanical, no separate pots are employed. Typical trim travel on the aileron, elevator, or rudder channel functions amounted to +/- 12 degrees (24 degrees total travel). On the throttle channel the total trim travel was more like 35 degrees and the trim operated at both ends of the control (high and low throttle extremes).

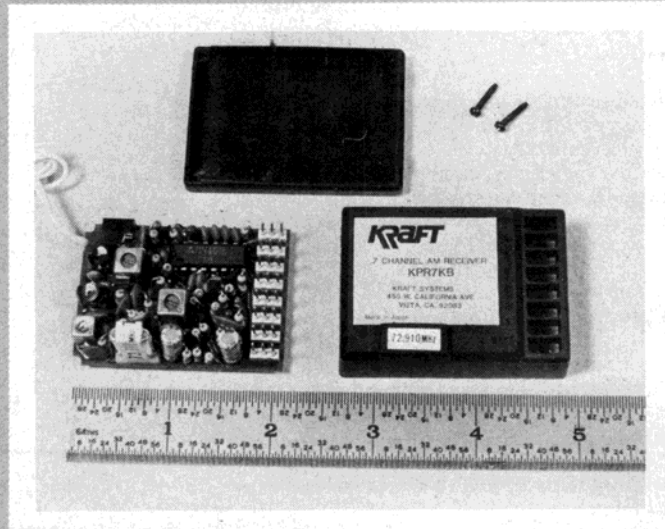
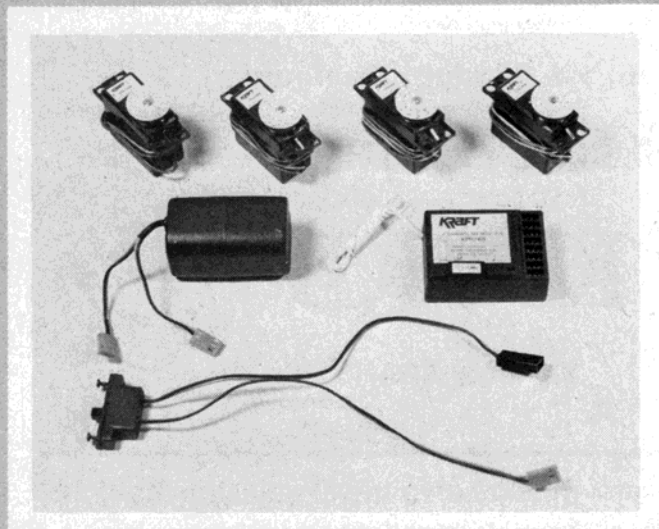
At the lower rear of the transmitter case is a battery box compartment. Pop open the cover and you will find a pack consisting of eight Sanyo 500 mAh capacity, AA size cells



This close-up, showing the front special control panel cover removed, reveals the servo reversing (above) switches and servo travel adjustment pots for all four channels. The entire flight pack (below) weighs 12 ounces. Notice also the new type "KB" connector used with this system.



With the rear cover of the transmitter removed (above), you can see the control stick assemblies and the P/C boards as well as the battery pack. A 455 kHz sharp filter helps improve selectivity in the new KPR-7B receiver (below), a seven channel receiver sold with the four channel system.



connected in series for 9.6 volts (nominal). This pack has its own easily accessible connector making replacement or substitution a simple job for the modeler. On the side of the transmitter is a charging jack. Full battery voltage is available at this jack for battery test purpose.

Inside the transmitter you will find a typically neat layout. The encoder circuit employs the popular Signetics NE-5044 IC chip. Encoder and RF functions are placed on separate printed circuit boards. For this reason you could easily change over to an FM system later on by simply changing RF boards (which makes it essentially a replaceable module). Control stick assemblies are of new design. Kraft calls them their *Micro Touch*™ sticks. They are constructed totally from plastic. The feel is about right for the average modeler. Spring tension can only be adjusted by substituting the centering springs.

In the front lower portion of the transmitter is a removable access hatch cover. Under this cover are a series of eight special control functions. Four switches provide servo reversing for each of the four channel functions (aileron, elevator, rudder, and throttle). An

additional four pot controls provide servo travel adjustment of each channel. This is more like a span control. Normal servo travel is typically 50 degrees either side of the neutral position. By rotating the servo travel control you can reduce the control down to approximately 15 degrees, either side of neutral. Remember, both sides of the servo travel are affected. This is clearly not an individual end point adjustment (that can give you more or less control on one side than the other). Those are the two extra control features offered on this four channel transmitter. Dual rate control (similar to the KP5K system) is not available on this model.

KPR7KB receiver

You can tell from the model number that this is actually a full seven channel capability receiver. Both the four and seven channel systems employ identical receivers for commonality. It measures 2 1/4 inches long x 1 5/8 inches wide x 1 3/16 inch thick and weighs 1.5 ounces. Case material is a durable black-colored, filled plastic. The receiver crystal is accessible from the outside of the case. As already pointed out, a new "single gang" con-

ductor block is being employed which is located at one end of the case. All seven servo connectors and the battery input plug into this block. Receiver circuitry appears to have changed somewhat from the original *K-Line* receiver (KPR-5K). A Murata 455 kHz sharp IF filter has been added. The single IC chip is still the 4015 eight bit shift register to handle the decoding function. This receiver is voltage regulated over the range of 3.5 to 7.0 volts. Sensitivity is claimed to be in the order of 2.5 microvolts and the idle current was measured at 14 mA. I might add that this is a single conversion receiver utilizing a conventional 455 kHz IF (intermediate frequency). As such it is not a "1991" type receiver. For that type of capability you would need a receiver with something like dual conversion circuitry, such as the very popular Kraft KPR-8FD. Nevertheless this KPR-7KB receiver can still offer many years of excellent service.

KPS-26KB servos

These servos are essentially identical to the existing Kraft *K-Line* KPS-25 units. The primary difference being in the use of the

new "KB" type connectors. Size is still the same at 1½ inches high × 1½ inches long × ¾ inch width (less output arm and mounting flanges) and the weight is 1.5 ounces each. Output hub is now a spline shaft permitting easy neutral position adjustments. The nine inch length flat cable is quite generous. Kraft rates this servo similar to the KPS-25, at 28 inch-ounces of output torque. Idle current averages 4mA per servo. Transit time is very fast at 0.35 seconds for full 90 degree rotation. Electric motor is a standard 16mm diameter variety with a resistance of eight ohms. The output shaft does not have a ball bearing support, but does have an "O" ring seal which along with a case gasket makes this servo almost totally waterproof.

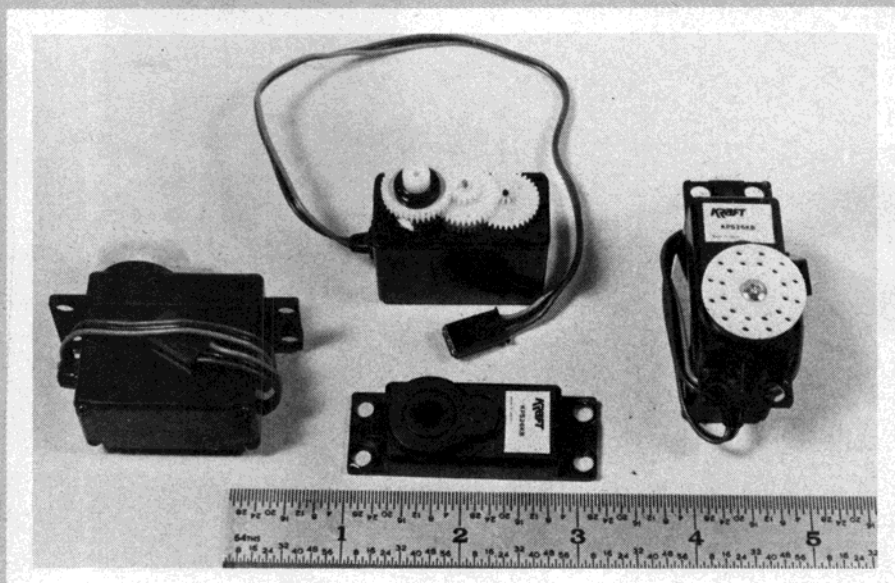
Additional equipment

The airborne battery pack and switch harness is identical to the type supplied with the KP5K system. This pack consists of four Sanyo 500 mAh capacity AA size cells, measures 1¼ inches square × 2¼ inches long, and weighs 4.2 ounces. Again two connectors exit from the pack case. One is for direct charging of the batteries and the other goes to the switch harness. In some cases it will be necessary to add an aileron extension cable to obtain access to the battery pack for charging purposes. This would be especially true if the pack were "buried" somewhere deep inside the fuselage. Final airborne weight added up to 12.0 ounces with the four servos. Airborne current drain at idle, with four servos, was 32 mA. Pulsing one servo in continuous motion, the drain was noted at 350 mA. With two servos in continuous motion the drain was as high as 550 mA (a little on the high side but normal by today's standards of high output, fast servos!). Servo accuracy has about ½ degree when returning from full excursion back to neutral. That certainly isn't bad for an inexpensive system such as this.

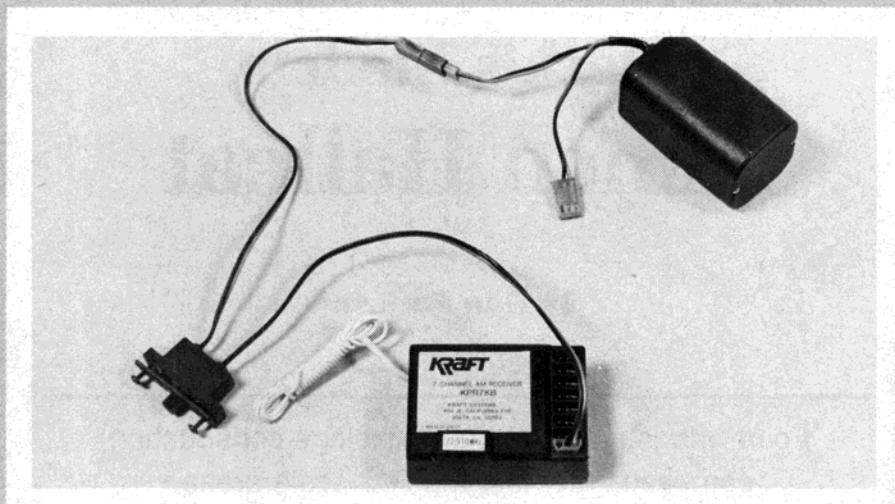
New seven channel system

The new seven channel version will be designated as the KP7KB system and will list for \$304.95 with four servos. Besides the three extra channel functions (two proportional and one retract), this system will have dual rate control on two channels (aileron and elevator), servo reversing and servo travel adjust on all seven channels, two types of control couplers and a mixer circuit. The coupler modes will combine aileron/rudder and elevator/flaps. Kraft will mix aileron and elevator commands to handle "V" tail aircraft or possibly elevon control for a delta wing configuration. The 6th and 7th channel functions can be operated by either a proportional lever control (with ratchet) or by a switch for discrete control positioning. That feature alone should prove quite interesting for such things as spoiler deployment. The key point here is that this new seven channel system will be available at a very low selling price. It is definitely going to be very competitive in comparison to many of the imported systems now on the market. Hopefully, I will get a chance to review the special control features of the new seven channel version later in the year and also follow up on the adjacent channel testing as mentioned earlier. If you want to see this please write and let me know.

For the time being you should definitely give this new Kraft imported system your further attention. Their address, for information is: Kraft Systems Inc. 450 W. California Ave., Vista, California 92083.



Output for the KPS-26KB servo which comes with the system (above) is 28 inch-ounces with a transit time of 0.35 seconds for the full 90° rotation. Battery pack and switch harness wiring (below) are unconventional. The charging plug exits the battery instead of the switch, the more common practice.



The frequency flags supplied with the KP4KB system are made from colored gloss type paper stock. Construction and mounting technique is similar to the flag sets sold by ACE R/C Inc.



PHOTOGRAPHY: RON FARKAS

An FM Product Review:

Mark's Models Jemco Hellcat

By Ron Farkas

Foam wings and "Jemloc" fuselage construction
can ease entry into the R/C scale arena.

After many years of sport flying I decided to take a crack at a stand-off scale model with mechanical options and a fair amount of detailing. When looking around for a kit to pick, I had several things in mind for my first serious effort. First it had to be interesting to me, not necessarily different from all the rest but one which would hold my interest long enough for a sustained effort to finish the job. In fact, I wanted something common enough so that documentation would be easy to find. Secondly, I wanted an airframe that would be easy to build. Since I expected to spend a substantial amount of time fitting options and applying the finish, I wanted to get the initial building over with as quickly as possible. Thirdly, I wanted an airplane that I could trust in the air so that all of my work would not be lost in an untimely crash. Oh yes, one more thing, it had to be a WW II fighter.

Now these are not particularly difficult requirements to satisfy with the abundance of good scale kits on the market today. In the course of looking at magazine ads and manufacturer's catalogs I happened upon the Jemco F6F *Hellcat* and I just stopped look-

ing any further. I was captivated by the round Grumman airplane, especially since I was a Grumman employee at the time. Not only was documentation easy to find, but the Nassau County Cradle of Aviation Museum had one on display. With a simple wood fuselage and sheeted foam wings I expected the building to go pretty fast. And, finally, I had seen plenty of Jemco kits fly well at my club field. The *Hellcat* is a .60 sized airplane. Its span is 56 inches and area is 610 square inches. It is advertised to have exact scale outlines. So I picked one up and started building.

Some time between the start and finish of this project, the Jemco company changed hands. You will find that the entire line of Jemco kits are now marketed by Mark's Models, 1578 Osage St., San Marcos, California 92069. As I understand it, Mark's Models did most, if not all, the kit manufacturing for the designer Jim Meister so you can count on today's kit to be just the same as the original version. Jim went on to produce a couple more designs under the brand name Master Scale Series. However, for the airplane discussed here you should ask for the Mark's Models Jemco *Hellcat*.

The kit

The wood quality in my kit ranged from good to very good and it appeared that the various densities were well chosen for their specific applications. For example, the sheet tail pieces were nice and light while the fuselage sides were of a medium grade. Except for the tail parts and wing sheeting, all the balsa wood parts were on die-cut sheets. Many of the fuselage internals were of lite-ply and these pieces easily popped out of their die-cut sheets.

The wings are foam cores with balsa sheeting. Each panel is comprised of two cores; a center section and an outboard panel which meet at the dihedral break. The outboard panels have wash-out cut into the core itself. The trailing edges were of firm density tapered balsa stock. The tip pieces were of soft balsa. Hardwood blocks were provided for fixed landing gear mounting if the builder chose to do so.

A large, ABS, vacuum formed cowl was provided. It has some radial engine detailing molded in. The cowl flaps were molded in the open position. The canopy was formed from fairly heavy plastic. The basic hardware provided with the kit is for a four function model, but if you want more mechanical options then you must get some additional pieces.

The plan sheet showed the fuselage in full size with all its internal structure identified. Both the wing and horizontal tail were shown in reduced size. Retract and flap options were not shown on the main plan. Instead, a separate full size optional wing plan was available with these details shown exactly as they should be installed. Special instructions were on this wing plan sheet. General building instructions were contained in a 13 page assembly manual. I was favorably impressed with the kit contents.

The work

The fuselage construction is called Jemloc because all the formers lock into a horizontal crutch and the main fuselage sides are keyed into tabs on the crutch. This one piece die-cut, lite-ply crutch follows the entire beltline of the model. First, all of the formers were glued in their respective positions at 90 degrees to the crutch. At this point in time the structure looked like a dinosaur's backbone. The crutch had a dozen or so tabs around its perimeter. When the sides were applied to the framework the tabs fit into notches and the whole structure was locked into alignment. The sides were about four inches deep, leaving the top and bottom of the fuselage still open. Stringers were then glued into the exposed notches and the remaining die-cut balsa fuselage sheets glued in place. It was necessary to soak the sheet and tape it in place one day, then trim it, and glue it permanently on the following day. Considerable cutting and fitting was required during this process but it seemed easier to me than strip planking.

I should mention that before the nose section was sheeted, the beam engine mounts and lite-ply fuel tank compartment were added to the internal fuselage structure. I was surprised at how well all these die-cut parts fit together with only minor trimming. It was like building a three dimensional jig saw puzzle. Considerable engineering effort must have gone into this Jemloc construction technique.

Each wing panel is comprised of two foam cores that are glued together with dihedral

and then sheeted. That's right, you have to sheet over the dihedral break. However, prior to sheeting the cores, the flex cable aileron pushrod must be embedded in the foam. This pushrod follows a path from the top surface of the wing at the center section to the lower surface at the aileron location. I used a heated screwdriver blade to make the channel and then epoxied the outer sleeve in place. Later, after the cores were covered, I went back and relieved the sheet where the pushrod exits the lower skin.

If retracts are being used, they also must be installed before the cores are sheeted. Rhom Air 90 degree rotating retracts are shown on the optional wing plan. Patterns for the mounting blocks are also provided. My set of Rhom Air gear has their new design with its captured ball and socket joints on the rotating mechanism. These links are manufactured expressly for this application and are an improvement over the old style which tended to pop off under stress. I ordered my gear with the heavy duty $\frac{3}{16}$ inch wire struts to take the extra weight of this airplane and the abuse of grass fields.

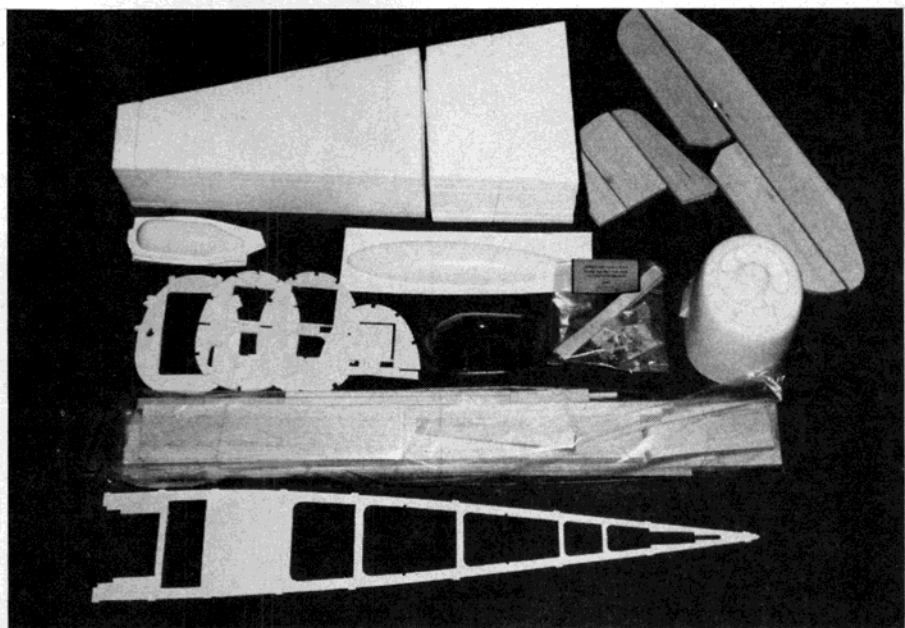
After pushrod and retract installation, the wings can finally be sheeted. The individual sheets were glued into skins, trimmed to approximate size, and a slice made at the leading edge where the dihedral break occurs. At this time I did some trial fitting and made lots of alignment marks on the skins and cores. The sheeting was applied with contact cement, carefully working from the trailing edge toward the leading edge. One technique that helped me was to place a piece of waxed paper between the skin and core, and then slowly pull it out as I pressed the two surfaces together. Sheeting the cores was tricky but with a lot of care I had no problems. In case you are wondering why the panels can't be sheeted first and then glued together with dihedral, I suppose that the answer would be that it's impossible to install the aileron pushrod.

Next, the two wing halves were epoxied together and the leading and trailing edge stock glued on. Then the ailerons were cut away and hinged. Since I intended to install working, segmented flaps I turned my attention to the optional wing plan sheet and transferred the dimensions to my wing. A lot of cutting, fitting and fiddling was required to make them work properly without any binding. On the plus side, the instructions and sketches on the wing plan were very accurate.

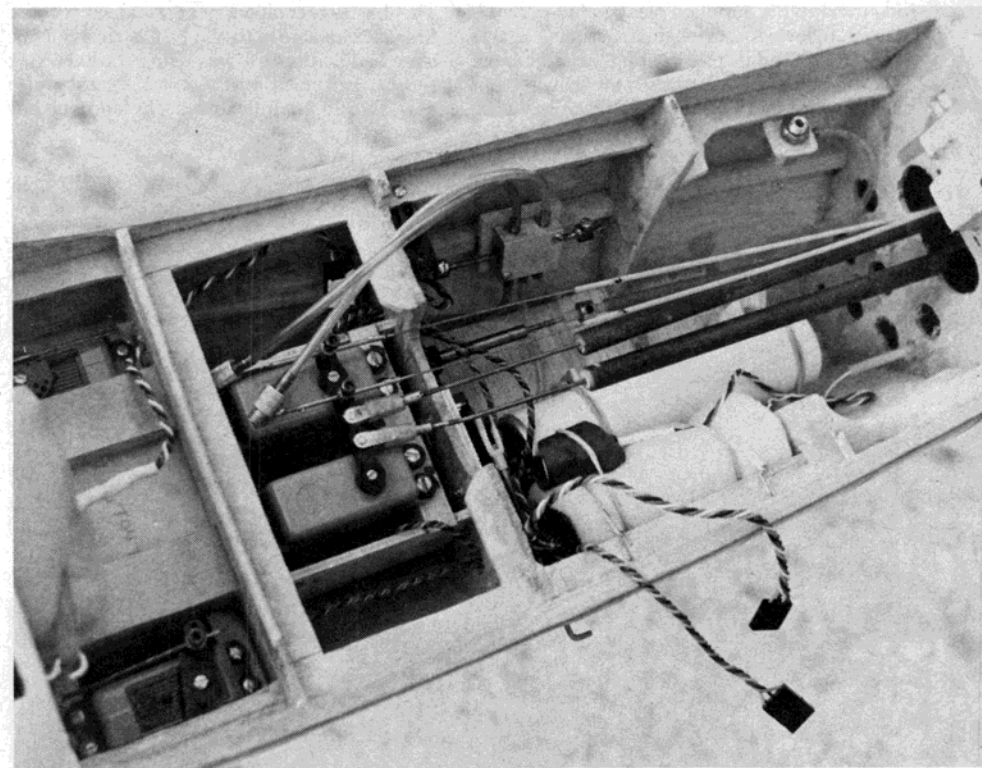
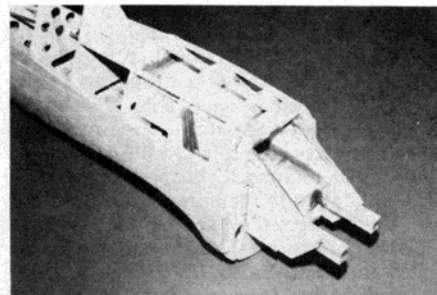
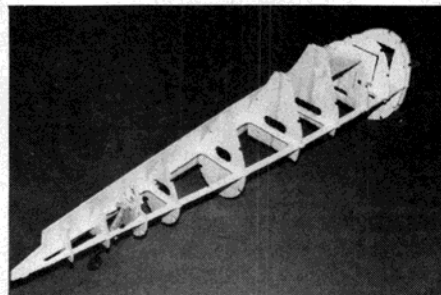
The only wing modification that I made was to install a one piece, full depth $\frac{1}{8}$ inch ply center section spar that tied into the landing gear blocks. Following that, I fitted the wing to the fuselage and installed the underbelly fairing. Again, this was a cut and try process as it was for the fuselage sheeting. I was pleased with the result of my effort on the flaps and retracts but it turned out to be more work than I had first expected.

The tail section was pre-cut from $\frac{3}{8}$ inch sheet balsa. The plans showed $\frac{1}{4}$ inch balsa surfaces but I presume that the thicker material was substituted so that a nice airfoil shape could be sanded in. Anyway, since this airplane will require lots of nose ballast to get the center of gravity correct, you better plan on doing a lot of sanding at the tail to keep it light. Besides, the airfoiled section gives a much better scale appearance.

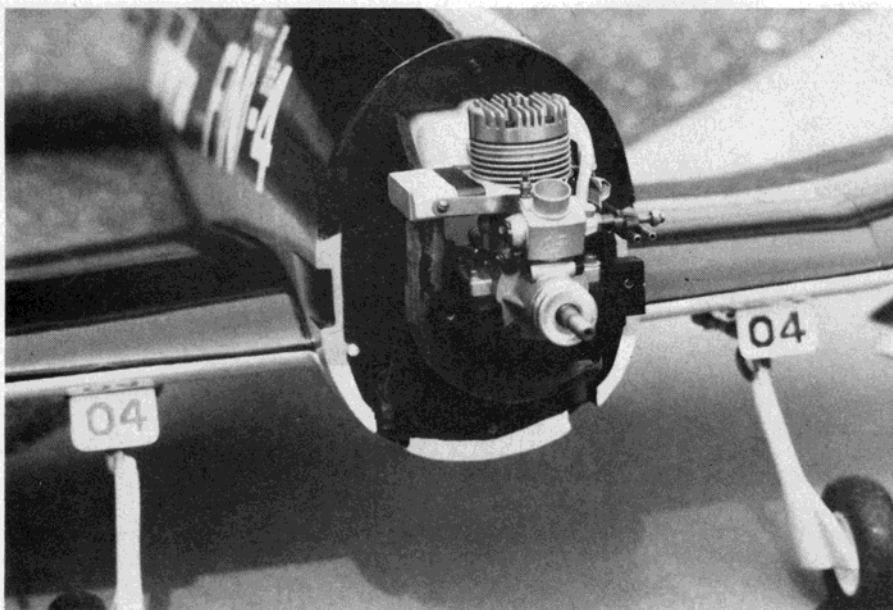
I decided to try the recommended scale-like engine exhaust system. This required soldering some brass tubes that get mounted



Overall impression of the kit contents is very good (above). It's well-packed, wood quality very good, and die-cutting excellent. The initial fuselage structure (below left) shows "Jemloc" construction; formers are erected on a crutch. An internal lite-ply box, used as the fuel compartment, (below right) beefs up the nose section. The dark colors are micro-balloons fillets. Beam engine mounts are well supported.



There's plenty of room in the wing saddle area of the fuselage for easy, neat installation of radio gear and retract valve and tank. The receiver, well protected with foam, is strapped to the fuselage side in the aft compartment.



An OS Max .61 FSR ABC flew the model beautifully. Notice the Semco manifold used in the exhaust system. It, and some neoprene tubing, route the exhaust to a scale location and eliminate the need for a bulky muffler.

in the nose section between the firewall and the next former. Thus, they exit just ahead of the wing's leading edge. I modified this arrangement a bit by removing some extra wood from the firewall and making my exhaust outlet pipes removable. The engine was fitted with a Semco dual pipe downward manifold. Neoprene tubing (with some internal springs to prevent collapse) connects the manifold pipes to the brass outlet tubes.

Since I expected to have a nose-over every so often I replaced the ABS cowl with a duplicate from Fiberglass Master. Their ads indicate that they have cowls for a multitude of current kits. The Fiberglass Master cowl is identical to the supplied plastic one so installation followed the kit instructions. Inside the cowl I built the cooling air ducts as shown on the plan. I must say that getting the cowl on and holding it in place is left to

the imagination of the builder. I used DuBro quarter turn latches.

That about covers the airframe. I put in a pilot bust and did not go for a full cockpit detail. I did recess the cockpit floor a little to give it the illusion of depth. Without the full cockpit, there was plenty of room for radio installation and retract plumbing.

I am using a Kraft seven channel radio system. The four flight controls are operated by KPS-14 servos with EMS Bantam Midgets for throttle and retract valve. I put the servos as far forward as possible, even relieving an area on either side of the fuel tank compartment for the throttle and retract servos. The battery compartment is ahead of the firewall but access to the box is through the wing saddle. Since I was using a total of six servos, I decided on the extra security of a new SR 900 mAh flat pack. So far, mine has

checked out at a capacity a little over 900 mAh.

The finish

From the bare wood right up to the last coat the entire finish was applied using Hobbyoxy products. Large voids in the surfaces were filled with polyester resin and microballoons. Nicks and dents were filled with Hobbyoxy filler. After all surfaces were sanded smooth, I covered the entire airframe with $\frac{3}{4}$ ounce glass cloth. To save weight and aggravation I applied the cloth with Hobbyoxy clear instead of resin. This was very easy to use and held the material well but, of course, did not fill the weave. However, I did fill it with two successive coats of White Undercoater with sanding in between. Looking back, I think that a third coat would have been even better. (Prior to all this priming I had painted the cockpit and installed the canopy.) When the airplane was all sanded smooth and dusted off, I pencilled in the panel lines that I planned to duplicate. These were simulated with $\frac{1}{16}$ inch Chartpak drafting tape. A few hatches were simulated by cutting out the shape from ordinary Contact paper and adhering them in the proper locations.

The full size *Hellcat* had fabric covered control surfaces. To simulate these, I applied strips of $\frac{1}{8}$ Chartpak tape for the rib effect and then ironed on Top Flight Fabricote. All such covered areas received one coat of Hobbyoxy White Undercoater.

Just around the time that I needed to start mixing colors Hobbyoxy came out with formulas for Navy WW II Sea Blue and Medium Blue. The only catch was that I was modeling a restored *Hellcat* from pictures that I had taken myself at the museum and the "authentic" colors did not match the photos. So I started with the given formulas and added a drop of this and a drop of that until the two blues matched my photo documentation. Basically I needed more green. By the way the museum *Hellcat* was polished to a pretty good shine so I used gloss catalyst. I sprayed on two coats each of white, medium blue, and sea blue, while observing the scale separation lines. Individual colors were applied about two days apart. Jemco provides decals for several variations but as it turned out I had to paint on all of the markings because none of the decals matched my particular airplane. Each trim color was applied separately using Contact paper stencils. All the small lettering was applied using Prestype dry transfers. A final coat of Hobbyoxy clear was sprayed on to seal the lettering.

The engine

For this airplane I chose an O.S. Max .61FSR ABC engine. This is my second .61FSR, the other having given me very good service in an aerobatic biplane. My preference for the ABC piston/liner combo this time was because such engines are more tolerant of heat in tightly cowled applications. I put about a half dozen 5-minute bench runs on the engine to loosen it up and get familiar with it. Then I installed it in the *Hellcat* and hooked up the exhaust system as mentioned before. Rather than making a needle valve extension I drilled the end and soldered on a short 4-40 socket head capscrew. This can be adjusted by a ball point hex driver via a hole in the side of the cowl. A couple of test runs in the airplane confirmed both a good top end and a reliable idle. This engine is a brute and provides plenty of power for this model. My



The graphics shown above were a combination of techniques. Large squadron marking was masked and sprayed; the small lettering was from dry transfer sheets; and, the Japanese flags from the kit decals.



Total flying weight of the Jemco *Hellcat* came to 10 pounds yet take-offs presented no problem, even on a hot muggy day like the one when the plane was first flown. A touch of "up" elevator gets it up and going.

homemade exhaust system works fine but provides no muffling effect.

The flying

It flies great! I am really impressed. Considering that this is my first heavily loaded scale airplane, I was not quite sure just what to expect. The final weight was exactly 10 pounds (including 20 ounces of lead ballast in the nose) and therefore the wing loading was a whopping 38 ounces per square foot.

The test flights were made from a paved

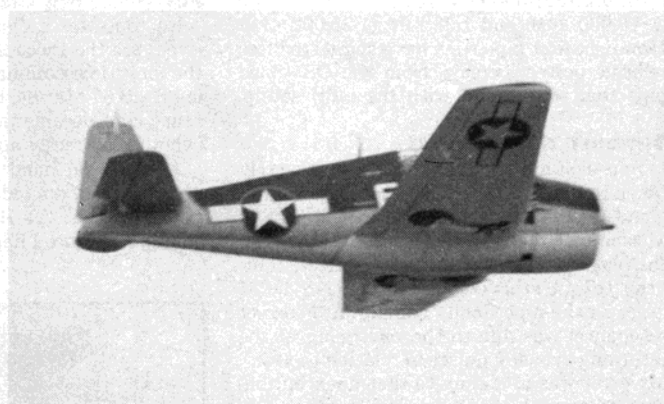
strip. The day was hot, muggy, and overcast. A slight breeze was coming straight down the runway. I was trembling but my photographer, Rich Uravitch, was calm. The O.S. .61FSR was running beautifully. The crowd was watching. I was committed.

On Rich's recommendation I left the flaps up on the first flight. The *Hellcat* accelerated briskly and needed a lot of right rudder to keep it in line. It didn't take too long to start feeling light enough to break ground, and just a touch of up elevator got it off. For

a while, I just made wide circuits around the field at about 400 feet of altitude. It was going fast and it felt very solid in its reaction to my control. I retracted the gear and the only change was that it looked a whole lot better. That is, no trim changes were required. As I got more confident I flew lower and tighter. I was getting pretty comfortable by the end of the flight. My first landing was nothing to brag about. I came in a little too hot and the right main gear rotated so the ship tipped up on its nose. The cause was a threaded rod that had pulled out of a ball link. Quick field repair.

The second flight was even better. I did some loops, rolls, and a split-S. I noticed that it would snap if I gave it too much elevator in a loop. That's to be expected though in a heavily loaded scale model like this. You can't flog it like a sport airplane, you know. I made lots of low fly-bys for the cameraman. I could cruise at half throttle with good control response. This time the landing was a piece of cake. I practically dragged it in, even without flaps. I set it down gently and taxied back to the pit area.

Since then I have flown the *Hellcat* from my club's grass field and I am happy to report that it did not nose over on either the take-off or landing. Unfortunately my retractable tailwheel pulled off its former and will require some minor surgery to repair. The flight characteristics have exceeded my expectations. This model can easily handle a high wing loading. I am looking forward to some local contests in the near future. Building and flying the Mark's Models/Jemco *Hellcat* with these mechanical options has been a very rewarding experience for me. ☺



Flight performance exceeded the author's expectations and the retractable landing gear only added to the satisfaction. Loops, rolls, and other maneuvers

look good but resist the temptation to "horse" it around. With its high wing loading, it will snap if you add elevator too abruptly.



Motor Matters

By Mike Billinton

Q uite a few things to mention this month, so without any more ceremony, on to business.

OPS 60 RCA

First off, this R/C pattern motor has now been through its paces on the dynamometer. (Readers may recall an earlier Motor Matters "educated" forecast of 2.7 BHP in view of its racing layout.) A full report will be with the editor shortly, but in brief it produced 1.8 BHP @ 16,000 RPM with open exhaust; 2.15 BHP @ 14,000 RPM with a standard length pipe; and 2.35 BHP @ 17,000 RPM with a two inch shorter pipe. All tests done on methanol (no-nitro) fuel. So, the guess proved optimistic. But the motor (with its slide valve carburetor) was very smooth and controllable, and is clearly a high-quality machine.

OS61VR

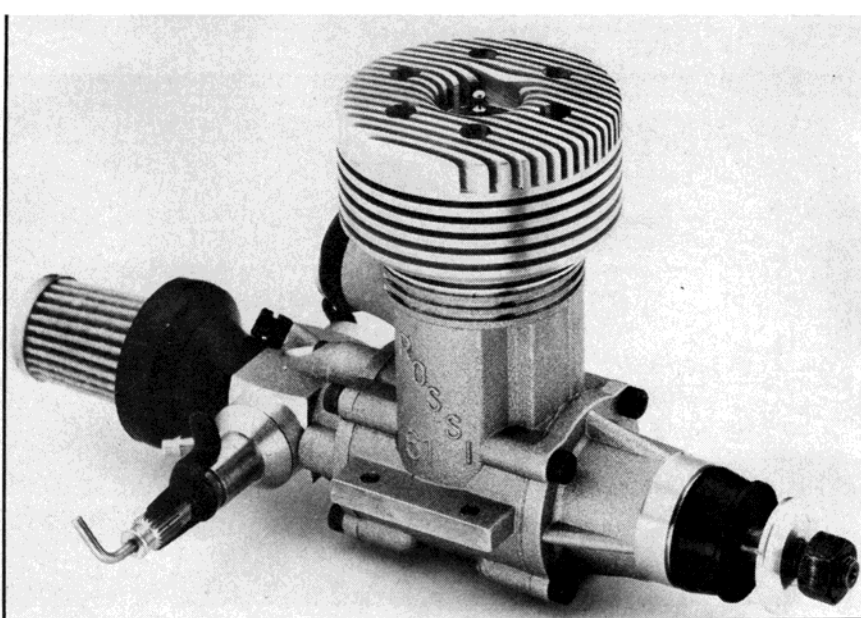
Some initial tests on this directly competitive pattern motor (its the model which won USA 1983 Nationals have so far shown that in open exhaust configuration, it has the capacity to go on producing considerable power right up to 21,000 RPM. It achieves 2.05 BHP @ 18,000 RPM and 1.98 BHP @ 21,000 RPM. However, first pipe runs have suggested less relative power increase from the OS tuned pipe than was found with the OPS set-up.

Sunburn department

Your columnist, here, has been severely taken to task by Derek Jepson of Crewe, England, over comments made in the OPS90 Marine test report (F.M. April 1984). Under the heading TEST 3, I stated (in effect) that: "the torque-starved area at lowish RPM (prior to the pipe finally coming into correct resonance) was due to the mistiming of the returning acoustic pulses in relation to RPM." My error was in adding to that unexceptionable statement these words: "Additionally the mistimed returning "positive" wave is vainly attempting to push back any surplus mixture (which has been extracted through the exhaust port) against a *now closed exhaust port*..."

That part is wrong - the exhaust port cannot close that early if the motor is at that low RPM point; on the contrary, it's closing much too late because of moving too slow. My error was in the choice of phrase, and I clearly had in mind the severe torque decline which equally occurs at *too high* an RPM level - the other side of the peak. My apologies to readers for that potentially misleading comment.

Another comment which caused Derek even more problems was: "the running conditions normally encountered in the 90 multi-racing class require infrequent use of part or low throttle openings." (It was part of my reasoning that the carburetor design itself partially recognized this.) This issue still rumbles in England, so correspondence is likely to continue; suffice it to say there is a



PHOTOGRAPHY MIKE BILLINTON

The Rossi .61 crankcase finds another adaptation as a base for a ducted fan engine. The new Rossi .65 ABC is scheduled for testing on the dyno together with the Boss 602 fan unit in the near future.

difference of opinion within the sport, and, naturally, much depends on course size and conditions. It does seem though, that as an "outsider" to power boating, I have trodden on some sensitive toes here, and more care seems advisable in the future! Admittedly, another of his points has considerable merit: "report the test results and leave the readers to form their own conclusions." That way I could sleep at nights, and your editor could then get a full test report onto one page!

Forthcoming tests

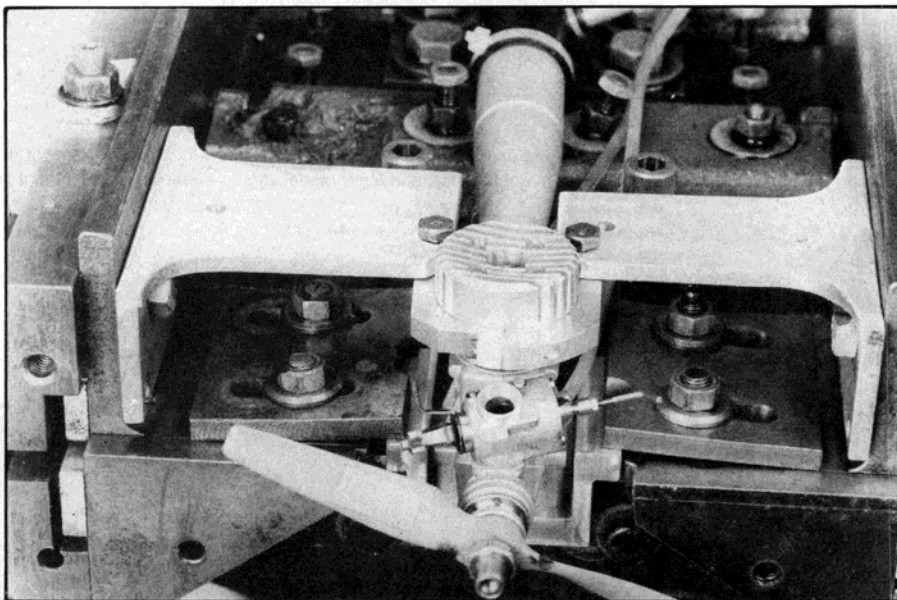
En route for a dyno test, but not yet arrived, are the Picco 90 Marine (5.6 BHP) and the long time coming but nonetheless exciting K&B 67 Marine. Both these will no doubt cause considerable jangling of my eardrums (whether correctly apprehended or not).

Actually on hand is another state-of-the-art piece, the ducted fan Rossi 65 ABC, together with USA's Boss 602 Fan unit. Been some years since I handled a large Rossi; now

I remember the quality! The claimed 3.7 BHP @ 25,500 RPM is a likely consequence of its drum valve's greater reliability at very high RPM's. This point has tended to restrain the potential of any disc valve 60 engines with 22,000 RPM representing a plateau beyond which things have, in the past, "gone wrong".

One of the photos shows a Rossi air-filter unit, a particularly vital item when a motor is used as a "Pusher". In this layout, the tuned pipe becomes a problem and there are moves afoot to convert over to the more sensibly shorted minipipe silencer style. The visual impact of the Rossi is strong: detail work like the carburetor controls, in-flight needle etc., being most solid and, to all appearances, fool-proof. This motor is again based on the Rossi 61 crankcase.

A test is scheduled for the end of March, and, together with those other two Marine units, it seems likely that they will produce a severe test of the dyno itself.



That gruesome looking rig around the head of the Super Tigre 21 engine residing in the dynamometer was an attempt to restrain cylinder head oscillations noticed in previous car engine tests. Text has details.

Super-Tigre S21

The odd-looking photo shows the dynamometer and the temporary experimental rig to restrain cylinder-head oscillations which, with some previous 3.5cc car engines, have occasionally become very severe at certain RPM levels.

The supports were designed to place a very rigid restriction on any movements relative to the dynamometer other than the small upward thermal expansion.

This rig was meant to form part of the full power tests on the S21 unit . . . net result actually was a big to do about nothing, because the base mounted engine had such a vibration-free solidity at all RPM's while in the normal 'unrestrained' mode, that tightening of the final two restraint bolts adjacent to cylinder head was a little like "gilding the lily." No change whatever to engine sound, RPM's or torque. Maybe meaning it was the wrong choice of engine to which to apply this technique. Of course the hope is that information gained this way might point towards similar solidity of mounting in a typical car being of advantage. - Further tests and time will tell.

Tartan Twin—again

Down to earth, in a more practical, even humorous vein, is this follow-up to Dennis Pemberton's starting problem referred to in the February 'Motor Matters'. Communication from World Engines has now revealed that Harry Roe has come to a highly individual arrangement with his Tartan Twins . . . might be best to quote direct . . . "Use the hottest glow plugs available. To flip start the engine without oscillation or kickback, Harry recommends starting the engine on only the left cylinder (as you face the engine). The prop will oscillate back and forth. Then connect the battery lead to the right plug and the engine should kick over in the right direction every time and run smoothly. Needle valve settings and glow-plug selection are critical to this procedure."

There you are Dennis, now you and I know what was lacking earlier. Maybe Tartan should put this in their instruction leaflet. Harry's advice certainly indicates the value of a considerable familiarity with a particular new engine style such as the Tartan Twin represents. During the test runs leading to FM's June 1983 Engine report, there never was a need for such an individual approach because the starter used was quite adequate (car starter on 12 volts), and so the engine did not show signs of any specific problem which might have followed hand-starting or a less than adequate starter situation. Remembering back, the Tartan Twin proved a very ready starter, but was a little cantankerous during the running-in period while the piston rings were bedding down to the hard chromed bore surface; so compression seal was less than perfect during the first 20 minutes or so. Meanwhile Harry, thanks for the right touch.

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The *Whisper* sailplane is an exciting new kit offered by the Son-Die Model Company, 4007 Peppermill Road, Attica, MI 48412. It is available directly from the manufacturer for \$75 plus \$3.50 to cover shipping. This high-performance, standard-class sailplane is primarily a competition ship; however, it is ideally suited for sport flying as well. The airplane features a full-flying T-tail and a polyhedral wing which incorporates a modified Eppler 205 airfoil. A three-channel radio is required to operate the rudder, elevator, and spoiler functions.

Upon opening the box, I must say that I was impressed by the fine quality of the kit. This is an all-wood kit consisting of the best quality balsa, spruce, and plywood I've seen. All parts were neatly stacked and bundled. The ribs, formers, and fuselage sides were all beautifully machine cut.

This attention to detail is always the mark

of a really topnotch product. All necessary hardware is provided except for control cables. The nicely drawn plans are on one blue-line print measuring 36 × 52 inches. I found the instruction booklet to be complete and clearly written, containing nine pages of step-by-step directions as well as two pages of helpful diagrams.

Before beginning the construction sequence, I would like to point out that this is not a kit for the first-time builder. The "Whisper" is more complex than the boxy trainer-type gliders, and one should acquire basic building skills in order to do justice to this kit. Anyone with at least minimal building experience should find the kit a joy to build and will end up with a handsome sailplane to be proud of.

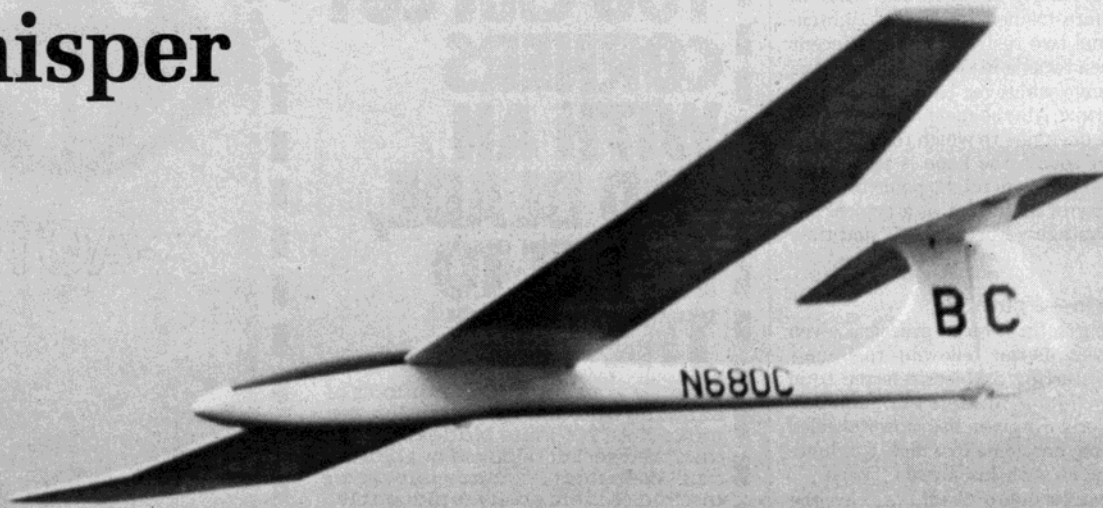
Construction

The construction of the fuselage is straight forward, but you will get plenty of use out of

your carving knife and sandpaper as there is a lot of shaping work to do. The fuse sides are self-squaring through the use of both horizontal and vertical formers. Large-sized triangular stock runs down all four corners of the fuse allowing it to be carved and sanded to a smooth, rounded cross-section. A large balsa block is carved to form the canopy which fits nicely over the wing to provide a smooth air flow. This fuse is a very strong structure which, I think, is important, especially when it is supporting a T-tail. Be sure to carve away as much wood as possible in the tail boom area now, or you will have to pay the penalty of extra lead in the nose later.

The full-flying stabilators are the most complicated mechanism in this glider, but if the instructions are followed carefully, there will be no difficulties. Both stabilators are framed out at the same time and all interconnecting hardware is installed with all parts pinned to the building board, assuring per-

Son-Die Model Co.'s Whisper

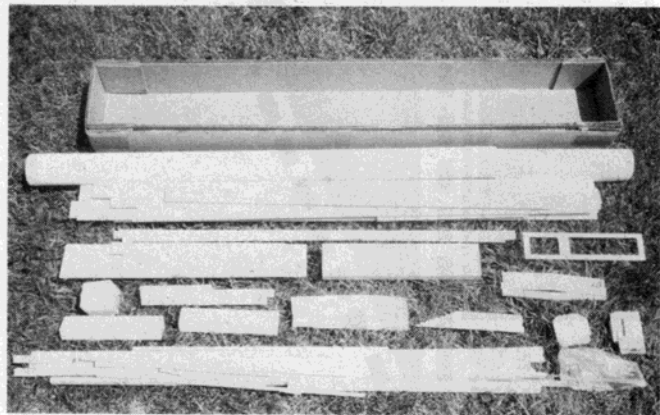


High performance standard class sailplane serves the competitor or the sportsman equally well.

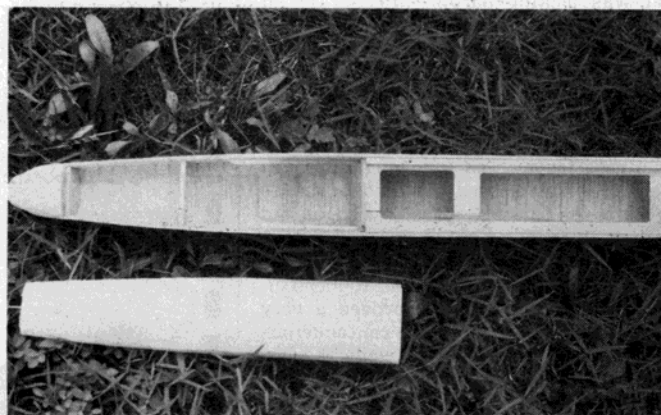
By Bob Cook

An FM Product Review:

PHOTOGRAPHY: BOB COOK



The *Whisper* kit contents give you plenty of wood of excellent selection and quality. All the wood is machine cut and sanded.



The fuselage is well-braced and very sturdy, relying on both horizontal and vertical internal formers. More than adequately supports the "T" tail.

fect alignment and smooth operation. After construction, the stabs must be shaped and fine-sanded into an airfoil section.

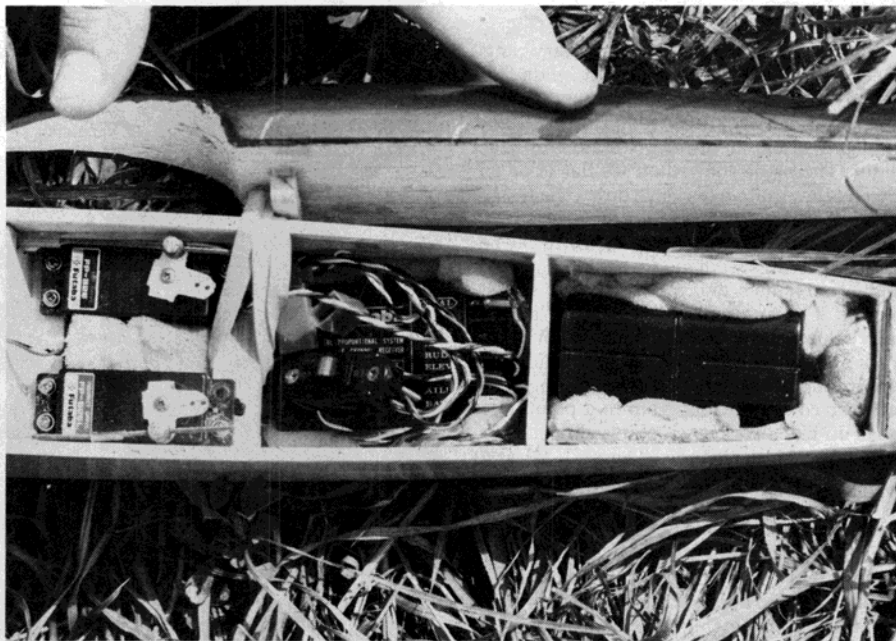
The fin is somewhat unconventional in that it contains the mechanism necessary to operate the stabilators. The fin is first framed out and then sheeted on one side only. The control cable housing is then routed through the ribs. Be sure to use a 48 inch cable since the 36 inch cable specified in the plans won't be long enough. After the special fitting supplied is attached to the cable end and the cable slipped into the housing, the other side of the fin is sheeted up, enclosing all the workings inside. The rudder is of normal framed construction and is sanded to a taper from front to back.

The wing is built differently from most gliders in that the spar is fully built separately and the ribs are cut into two pieces and attached to the front and back of the spar. The spar is built of spruce and plywood bonded into a box-beam with balsa fillers inside. This structure results in the strongest (and heaviest) spars I've seen. The wing tips are removable and are joined to the center section by big plywood blades fitted into pockets in the spar. The wing is sheeted top and bottom from the leading edge back to just behind the spar. Rib cap strips complete the wing structure. Strength was a major design consideration of the wing, and it can easily withstand zoom launches from a 12-volt winch without any danger of folding up. The spoiler system installs easily in the wing center section and does not require adjustment every time the wing is put on as all linkages are permanently connected.

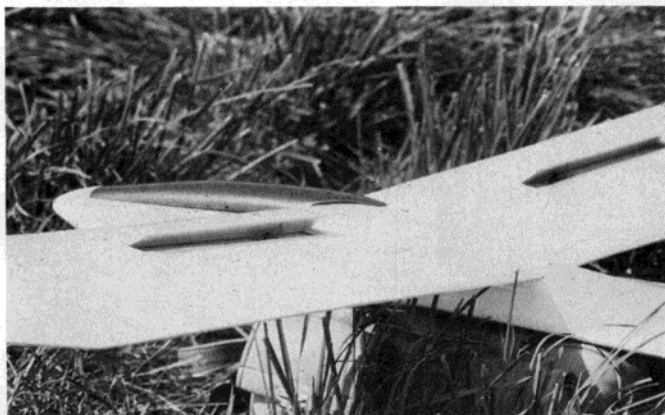
Finish

I covered the entire model with Mono-Kote™ since it is lightweight, easy to apply, and good looking. I chose a color scheme that is basically all white except for metallic charcoal gray on the canopy and black N-numbers on the fuse sides. This is a glider with classic good looks and I felt that a multiple color design would clutter up its pleasing lines; besides, full-sized gliders are normally all white, and this color gives the model a realistic appearance.

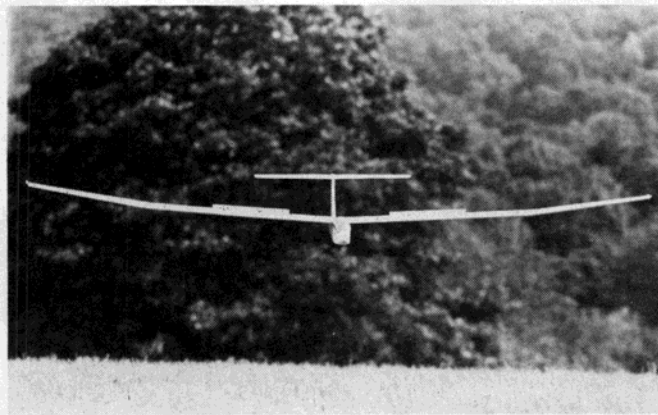
Before flying, it is important to set the center of gravity of the airplane exactly as specified in the instructions. The plane is very sensitive to C.G. placement and will fly best as recommended. Also, be sure to correct any warpage in the wing and balance the wing from side-to-side.



The radio compartment is relatively "spacious" for a sailplane (above) and allows for easy installation as well as positioning for sake of balance. You can really put this plane through its paces. It's nice to dive down and make a low pass on the deck (below) and then do a high speed pull-up.



The spoiler system in the *Whisper* installs easily in the center section of the wing and doesn't require adjustment each time the wing is off.



With spoilers deployed, the *Whisper* sinks in for landing. They accurately control the angle of descent while the elevator remains effective.

Flying

After giving the radio the customary range check, the *Whisper* was ready for glide testing to set the trims. I gave it a hearty toss and it climbed out nicely, requiring just a bit of down stick in order to maintain level flight. The plane showed off its flat glide angle and flew quite a distance down the field. I re-set the elevator trim and tried one more launch to verify the adjustment. Once the basic trim settings were made, I went right to a high-start launch and made the fine adjustments at altitude. I used a new "super" heavy-duty high-start and sent the *Whisper* up on its first real flight. Upon launching, the plane pulled over to the right, requiring some left trim correction, but from that point on, it went up like a rocket, climbing almost vertically to a high altitude. The 15 - 20 MPH winds helped the launch a bit. After releasing from the line, I established a smooth glide in order to get the feel of the plane. I executed a few turns and discovered that the rudder response was very sluggish. I brought the plane down and adjusted the rudder throw to the maximum setting and sent the plane back up to try some more turns. I noted a big improvement, but the plane still needed a lot of rudder input to initiate a turn. Once the outside wingtip comes up, however, nice smooth round turns are possible. The turning response is also more enhanced the faster the plane is flown.

Now that I have this complaint out of the way, let me relate the many positive aspects of the *Whisper*. The glider will circle tightly without excessive banking which gives good results in working thermals. The elevator response felt "just right" with a short arm on the servo. The spoilers were effective in accurately controlling the angle of descent, and only a bit of up stick was needed to keep the nose from dropping. With a little practice, spot landings should be a snap.

I did flight tests on both calm and windy days and was surprised to find that the *Whisper* can handle both conditions quite well. Flying in winds in excess of 15 MPH and with gusty conditions, I found the plane able to penetrate with no problem. I was able to




After a few "tosses" for basic trim, the *Whisper* took its turn on a "super" heavy duty high start (above). It climbs like a rocket and flies well even on the days when the others have to stay "in the hangar".

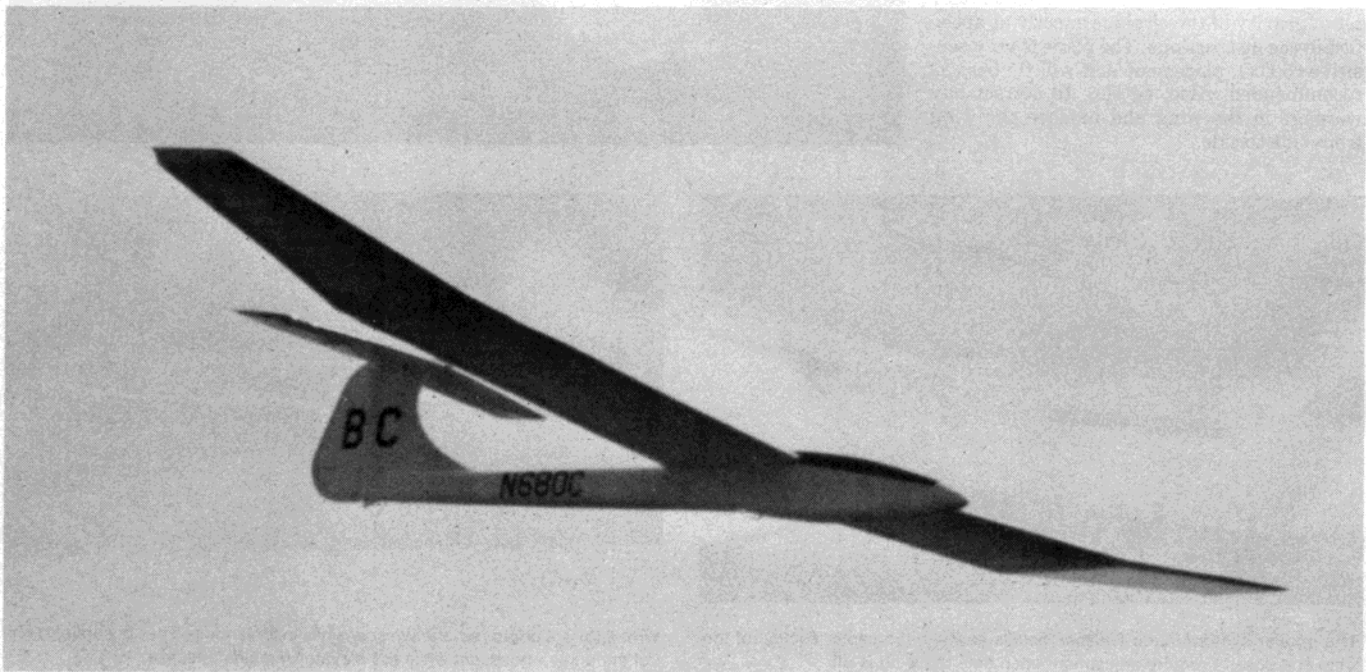
chase the thermals around and still make it back to the landing site. The high-start launches in a stiff breeze are fast and high. You can fly the *Whisper* on windy days when the "floaters" have to stay in the hangar.

In very calm conditions, I found the glider will still go up the high-start nicely, but it requires full tensioning of the elastic in order to get good altitude. I was able to work some light lift and got several long flights. Whatever the conditions, I found that the *Whisper* likes to fly *fast*! Although it has a wide speed range airfoil, it seems to develop more efficiency at higher speeds. To get the best glide angle, the plane should look like it is flying slightly nose down. The glide will be very

flat. At speed, it is easy to search out thermals or get out of sink areas.

Conclusion

The *Whisper* is not a trainer or a floater — it is a high performance ship that combines speed, penetration, and thermaling ability with sleek, sharp appearance. The overall kit quality, wood selection, and parts-fit were outstanding. For competition or sport, I think that the *Whisper* will pose a threat to some of the well-known designs and will make a name for itself on the contest scene. If you are ready to move up to a glider with real performance that is good looking as well, you should consider the *Whisper*. 



F8F BEARCAT

Originally intended as a higher performance *Hellcat* derivative, the smaller, lightweight XF8F-1 first flew from Bethpage, N.Y., on August 31, 1944, piloted by Robert Hall. Powered by an R-2800-22W engine, its top speed was 424 mph at sea level, with an initial climb rate of 4800 ft/min, considerably in excess of the earlier F6F *Hellcat*. Production aircraft, powered by the R-2800-34W engine, began to be delivered during February 1945, with VF-19, the first Navy operational squadron, commencing training on May 21, 1945. The end of World War II, however, precluded deployment of the *Bearcat* into combat.

Continued product improvement produced the F8F-2 in 1948. This version incorporated 20 mm cannon (as did the earlier F8F-1B), revised cowling and taller fin and rudder, along with other minor improvements. A total of 24 squadrons flew the *Bearcat* by late 1948.

Although U.S. Navy combat service never materialized, surplus *Bearcats* were used in the mid-1950s Indo-China war, having been supplied to the French *Armée de l'Air*, and later, the Royal Thai Air Force. Some surviving French *Bearcats* served with the 514th Fighter Squadron of the Republic of Vietnam Air Force.

Including the two prototypes, a company demonstrator, and Al Williams' *Gulfhawk IV*, Grumman had produced 1265 F8Fs when production ended in May 1949.

The *Bearcat* set a climb record on November 20, 1946 that held for several years — 10,000 ft in 94 seconds, after a takeoff run of but 115 ft. On August 16, 1969, a modified *Bearcat*, *Conquest II*, captured the piston engine World Air Speed Record at 483.041 mph, flown by Darryl Greenamyer. The *Bearcat* was also used by the U.S. Navy's Blue Angels flight demonstration team, and continues today as a superb Unlimited Class closed course racer.

F8F-1 SPECIFICATION

PERFORMANCE

Max. speed421 mph at 19,700 ft
 Cruise speed163 mph
 Rate of climb4570 ft/min
 Service ceiling38,700 ft
 Range1105 st mi

ARMAMENT

Four 50-cal machine guns
 (Four 20-mm cannons — F8F-1B)

DIMENSIONS

Span35 ft 10 in.
 Length28 ft 3 in.
 Height13 ft 10 in.
 Wing area244 sq ft

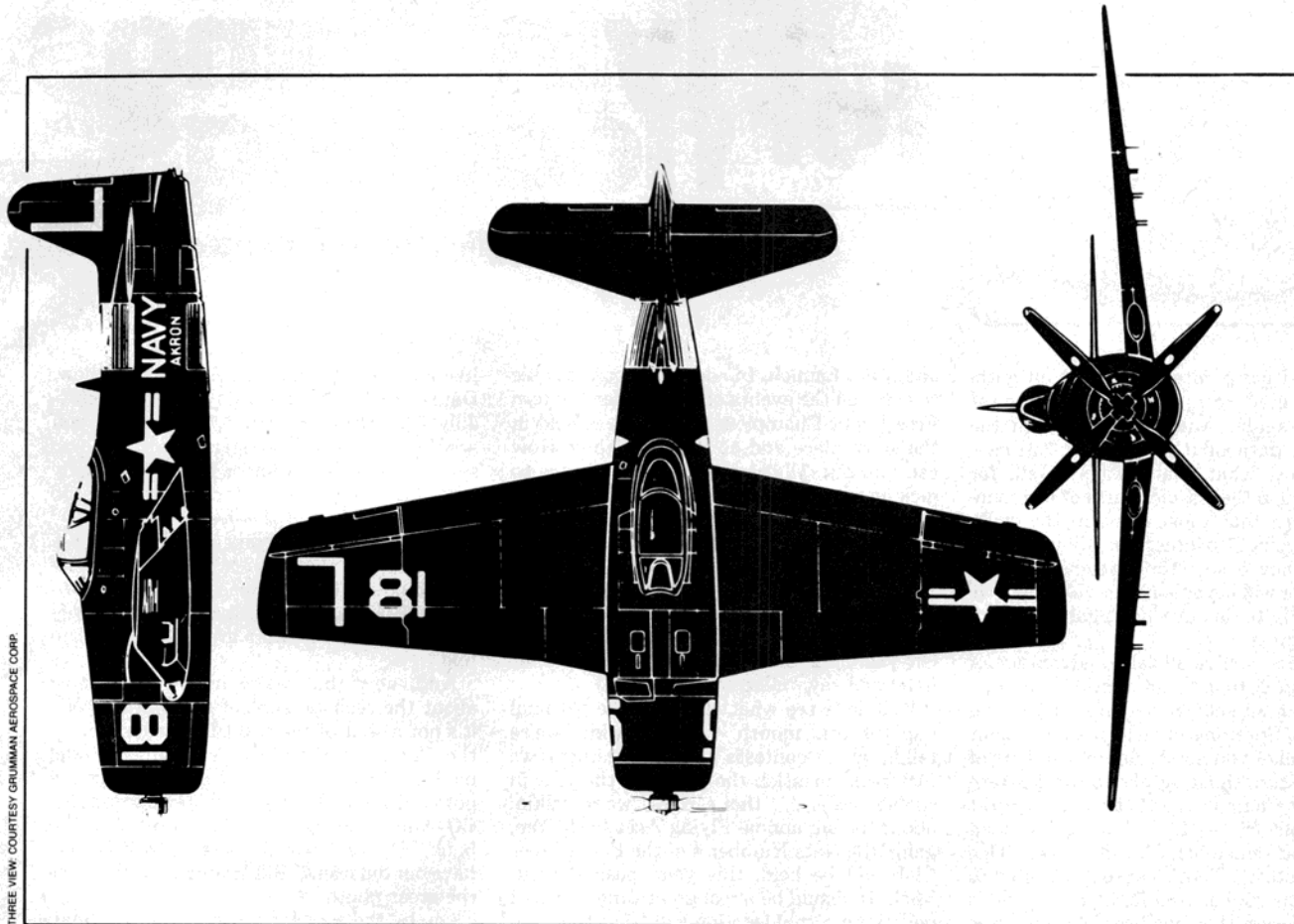
WEIGHT

Empty7070 lb
 Gross12,947 lb

POWER PLANT

2100 hp Pratt & Whitney
 R-2800-34W

THREE VIEW: COURTESY GRUMMAN AEROSPACE CORP



GRUMMAN AEROSPACE CORPORATION



Flyin' things for fledglings

More news from the gang. **By Earl VanGorder**

Hi gang, nice to see you all gathered round in the old hangar again. And, hey! . . . catch the date on this issue . . . June—right? Know what that means? Well, for those of you in the warmer parts of the country, it means that those of us in the chilly north are about to greet the flyin' season again! Oh boy, it sometimes seems that Old Man Winter will never leave us—but, here we are . . . ready to do our thing again. . . . and, it's really great.

I sure hope you've all taken advantage of the long winter to get a lot of stuff built and, now, we can all get out and start trimming 'em all out. Speaking of that, it's also about time that all of you northeastern members of the gang start thinking about the Eastern Free Flight Champs and that special contest that our old friend, Don Ross, runs along with it. You remember, he calls it the "One Design Contest". That's cause it's limited to one old time rubber free flight design. This year, the design that has been chosen is the old Comet *Sparky*, a real classic and a great flyer.

Here's the scoop: the contest will be held on June 23/24 at Galeville, NY at the old Army Air Base . . . same as the last two years. There will be six events built around the old *Sparky* which include: Mystery Time, ROG Endurance, Tissue Tow, Fly 'N Run

and Mass Launch. In addition, you'll be able to enter all the events of the regular Eastern Free Flight Championships which is held in the same place and at the same time. How can you miss? Lots of fun, and a chance to pick up some hardware and some neat prizes, too.

If you want any more details on this great "fun" get-together, get in touch with the "head honcho", Don Ross at 38 Churchill Rd. in Cresskill, NJ 07626. No kiddin', gang, if you live in the northeast, don't miss this one. Oh yeah, I'll be there, too, to shake your hand and say, "Glad to see ya'".

Well, let's see what else is in the old mail bag for this month. I guess, while we're talkin' about contests and get-togethers, we just gotta mention the biggie of the year in rubber scale. . . . that's right, we're talkin' about the big annual Flying Aces bash! Yep, gang, the Nats Number 4 of the Flying Aces Club will be held, this year, near Detroit, Mich. It should be a real great time and, as I get it, the actual location will be at the Ford Test Track at 22 Mile Rd. and VanDyke in Utica, MI. Headquarters will be in the Midway Motor Lodge at 31800 VanDyke in Warren, MI. But, if you really want all the scoop on entries, reservations, etc. get a SASE off to the Contest Director, Ralph Kuenz, 14645 Stahelin, Detroit, MI 48223. He'll give you all the dope on entry fees, motel rates, and

just about everything else you want to know. Dates are Friday, Saturday, and Sunday—July 13th through 15th. This is where you see the greatest rubber scale jobs you'll ever see and also have a lot of fun with a really great bunch of guys. No kiddin', gang . . . go for it! This is one of the best!

Speaking of the Flying Aces, I've got a great photo to show you of one of their member's models. This is a neat little *Luton Minor* by Bob Clemens of Rochester, N.Y. Real pretty little model and a great flyer, too, I'm told.

And, now that we're into photos—how about the realistic shot of the *Spitfire*? No, it's not a shot of the real thing taken during the Battle of Britain—it's a super model made by Doug McHard of England and it's powered by a CO₂ engine (oops, pardon me, CO₂ motor). Doug built it from plans in the book, *Flying Scale Models of WWII*. We have our old friend, Bill Hannan, to thank for the great photo.

Oh, by the way, for those of you who may not know why I corrected myself and said, "CO₂ motor—not engine" . . . let me explain . . . An engine is a power unit which develops its power internally (i.e., by the burning of fuel such as gasoline, diesel oil, etc.). A motor, on the other hand, gets its power from an outside source, like electric power or steam, etc. Since the CO₂ power plant does not de-

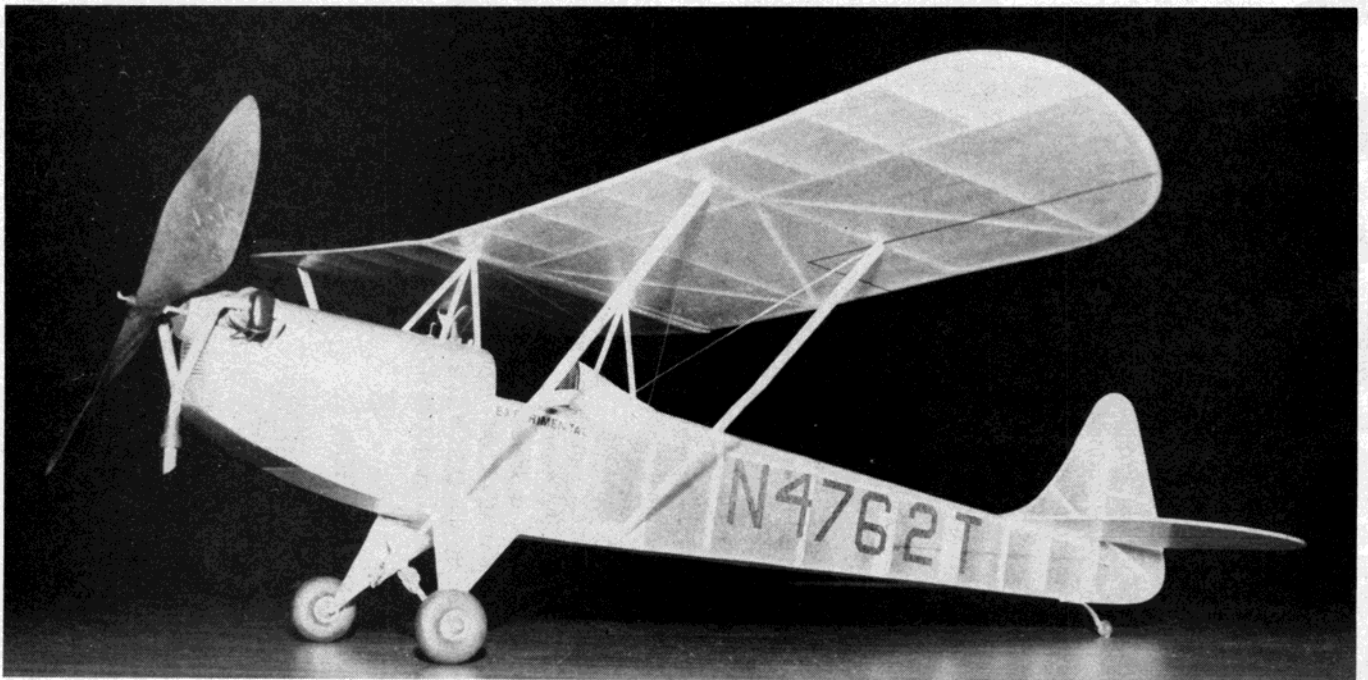


PHOTO: BOB CLEMENS

The Flying Aces Club boasts members such as Bob Clemens of Rochester, New York who did this *Luton Minor*. Looks good and flies great.

velop its power internally, but, rather, gets it from the outside source (namely a CO₂ cartridge) it falls into the category of, technically, a motor as opposed to an engine. Now that you have absorbed that little bit of useless information, you can "wise off" to all your friends (Well done, Van—Ed.).

And, while we're still in the "photo" department, I gotta show you the latest effort of our old friend John Downer, from down Georgia way. John continues to make those unusual WWII fighter types fly well in peanut scale. His latest is the French *Bloch MB152*, scratch built from Dave Diel's plans and patterns. It's a pretty little fighter type and, as you can see, John's model flies very well—as usual—which says a lot for either John's building or Dave Diel's designs. For those of you who are interested in the rare WWII types, I'll repeat Dave Diel's address. It's Box 101, Woodville, Ohio 43469. Send him a SASE for a complete list of available plan and pattern sets and prices. You'll be glad you did.

Again, while we're still on photos, I gotta show you another real "cutie". Another old friend of the column, Lou Roberts, from out in Denver, has dug into the past a bit to come up with an old Bill Hannan plan for one of the "soda jet" types, the basis for the fuselage being a soda straw. Lou did the Russian Sukhoi *Fishpot* and reports that it really flies well. If this little gem turns you on, don't write to me! I'd suggest that you go right to the designer, Bill Hannan, for answers as to availability of plans and price. Drop him a note at: Box "A" Escondido, CA 92025.

Gee, gang, I've got so many things and so many photos that I want to share with you that some are just gonna have to wait until next month. There are a couple of things that I want to pass on right now, though. First is about an outfit called Scale Model Research. They have a new owner and are expanding rapidly. But, for better than five years, this firm has been providing high quality, full color documentation photo packs of full scale aircraft for the discriminating scale model enthusiast. They offer the world's largest collection of photo packs of almost 600 subjects. They provide a neat catalog which lists all their items along with the prices and you can get a copy by sending one dollar to the following address: Scale Model Research, 418 E. Oceanfront "B," Newport Beach, CA 92661. Take a shot at it . . . you might find just the photos you've been looking for.

And, I also wanted to tell you that Rusty Toliver, who operates the RET Flying Aces Plan Service, is still at it and is producing more goodies. Yeah, Rusty continues to produce more of the "golden oldies" from the pages of the old FLYING ACES mag—and, not only the plans, but the entire construction article, too.

I'm not even going to attempt to list all the neat stuff that Rusty has available. You're gonna have to send a SASE for his list, but, in the meantime, he has a couple of specials FLYING MODELS

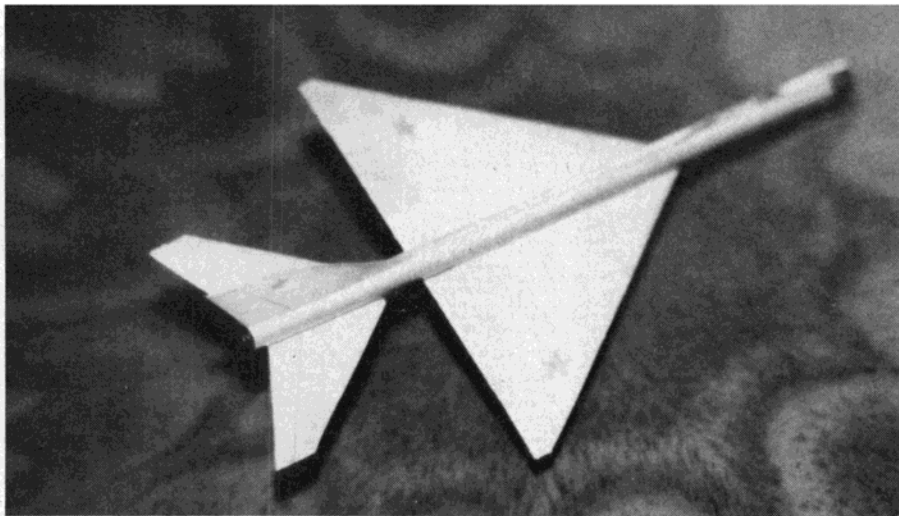


PHOTO: LOU ROBERTS

This Russian Sukhoi *Fishpot* (above) is a Bill Hannan design built by Lou Roberts who offers plans for it. John Downer built this Bloch *MB 152* (below) from Dave Diel's plans. John likes rare WW II planes.

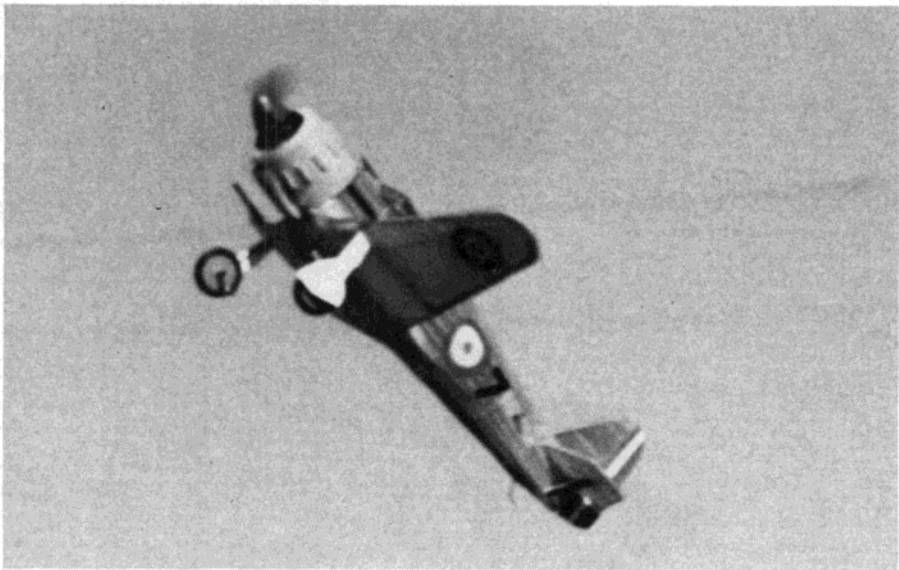


PHOTO: JOHN DOWNER



PHOTO: DOUG McHARD

From the other side of the "big pond" comes this CO₂ powered *Spitfire* by Doug McHard of England. He built it from plans presented in the book, *Flying Scale Models of World War II*.

for our readers. How about this?

The *Fokker C-14*, one of Henry Struck's best, and maybe the best 22 inch span plan in the world for the price of only \$1.50.

Or, how about this one . . . *Whisper*, an all balsa glider from the February 1941 issue of FLYING ACES. A very flyable model. Yours for a SASE and 50 cents (for Juniors, only a SASE and 25 cents!) That's for both plan and instructions!

There are also great *Pietenpol* plans for only one buck a set—while they last! A word

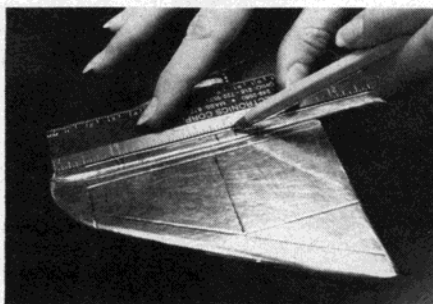
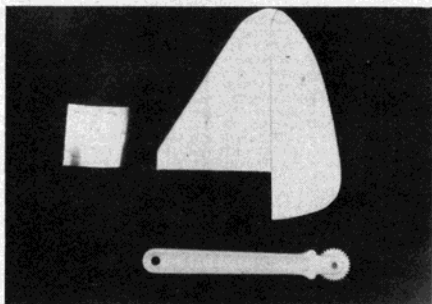
to the wise. . . The address? Sure, I won't forget. It's RET Flying Aces Plan Service P.O. Box 7893, Midfield, AL 35238.

Well, gang, it's that time again when we gotta close the old hangar doors on another session. As I said, I've got loads more neat items to tell you about, but there just gonna have to wait 'till next month. Hang in there and I'll be seein' ya.

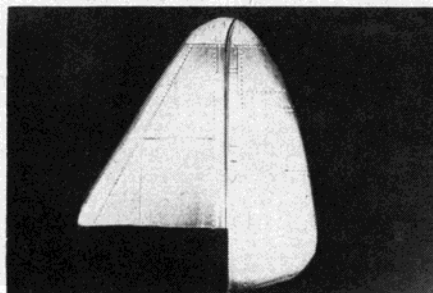
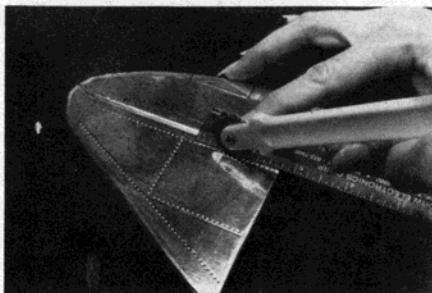
Keep in touch with your old modelin' buddy at 10 Brothers Rd. in Wappingers Falls, NY 12590.

R/C Sport Scale

By Rich Uravitch



The rudder and fin of a P-47 *Thunderbolt* (above left) a piece of Chrome MonoKote, and a dressmaker's pattern tool illustrate the technique of creating an aluminum finish. After covering, the panel lines (above right) are scribed with a ball point pen and ruler. With the panel lines scribed, "rivets" are added using the patternmaker's tool (below left). Panel lines and rivets added (below right), the assembly is ready for the burnishing process. The finished product (bottom) reflects an authentic aluminum finish.



PHOTOGRAPHY: RICH URAVITCH

S ometime during the course of your Sport Scale involvement, you will undoubtedly be confronted with the problem of finishing your model in a natural aluminum scheme. Most of us, especially those who prefer military fighter subjects, work neatly around the problem by scouring our documentation sources for something other than a silver based airplane. This approach frequently works, but is just as frequently a compromise because, inevitably, the airplane you *really* wanted to duplicate was basically silver! Sure, there are ways to do it . . . plenty of silver or aluminum paints around . . . epoxies, lacquers, enamels but most of them, at least those I've tried, are lacking in at least one of two areas: either they don't really *look* like alclad or, if they do initially, when you shoot the protective clear top coat on, they "grey" out. The silvers that look right are generally high in metallic particle content which makes them inherently susceptible to softening or staining when exposed to our glow fuels. So we shoot clear over them . . . and they go grey.

All is not lost guys, a material that we've had available for a long time fills the bill handily . . . MonoKote™! Yup, from the same guys that invented the propeller, Top Flite. The pictures show the application of Chrome MonoKote to the empennage of my P-47 *Thunderbolt*. First off, Chrome MonoKote, straight off the roll, doesn't look any more like aircraft aluminum than Dolly Parton resembles Twiggy, but, a little work with a ball point pen, dressmakers pattern tool, 600 sandpaper and steel wool (00 Grade) or Scotchbrite pad creates a very convincing, lightweight, and easily accomplished illusion.

The pictures should pretty much tell the story; cover the parts with the MonoKote in the usual manner, draw the panel lines on with a ball point pen, pressing sufficiently hard to make an impression in the balsa; use the dressmaker's pattern tool to create the "rivets", and burnish with 600 wet-or-dry sandpaper, steel wool, or Scotchbrite pad to simulate the different shades of aluminum skin.

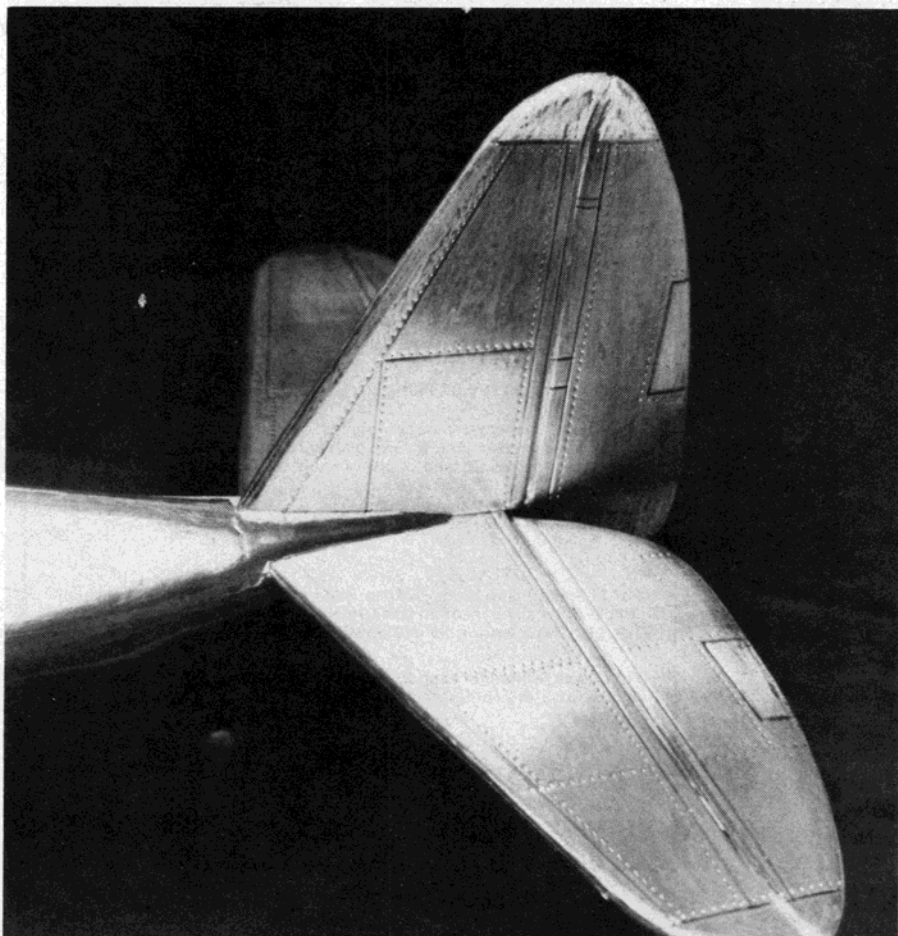
No fiberglass resin, sanding, priming, spraying . . . nothing but the MonoKote equipment you already have and a 98 cent tool! Easy enough?

A side advantage of this technique is that it saves MonoKote! When covering large surfaces like wings or fuselages, use overlapping smaller pieces to simulate the skin panels of the real aircraft. It looks very effective and allows you to work smaller areas individually, nearly eliminating the possibility of wrinkles. Use a straightedge to make your cuts and overlap the panels about 3/32 of an inch.

Next month we'll show you how to create some very realistic "weathering" effects by using the Chrome MonoKote as a base. So, if you don't like your "aluminum" airplane, "scour your documentation" for an alternate scheme and join us then . . . 'til next time . . .

CE

JUNE 1984



R/C giant scale

By Frank Costello

Those of us who enjoy putting the scale in giant scale know how hard it is sometimes to find documentation for that new bird, or, decent pictures (especially in color) to complement a rather shaky 3-view. Fortunately, there is no lack of info for the popular birds like the *Mustang* and *B-17*. Volumes of documentation are available on the *Thunderbolt* and *Zero*. Even a supposedly secret plane like the *SR-71* has enough available to do a very credible job in your presentation.

Yes, hunting down scale data is relatively easy when your subject is known but when you're doing a *Nord 3202* (huh?) or an *Inland R-400 Sport* (wazzat?) life can get downright miserable. You see that rare buzzard in some unknown out-of-print mag and say to yourself: "Boy, that would make a great model but where would I find the info?"

Well, fear no more, troops, because help is on the way. Fortunately for us a few scale modelers have elected to combine the hobbies of aviation and photography (bless their hearts) to produce some superb, detailed photos of those rare obscure buzzards that nobody knows about, as well as the popular ones everyone knows about but can't get pictures of.

Dale Wiloughby (of glider fame) started a company named Scale Model Research about five years ago to provide high quality, full color documentation photos of full size aircraft for the scale builder. Since then he has steadily added to his list as he found rare birds around the world in his travels. The complete selection is now over 550 packs of photos with more added every month, both popular and obscure subjects.

Scale Model Research was recently (last November) purchased by Bob Banka, an avid California scale modeler and a friend of Dale's. Bob will continue to offer the entire line of photo packs and has persuaded Dale to continue his photographic endeavors and enlarge the collection.

I couldn't begin to describe the selection here because of space so I will simply tell you to send a buck to Bob Banka at Scale Model Research, 418 East Ocean Front B, Newport Beach, CA 92661 for his excellent catalog.

Another fine company in this same line is *Aircrafts in Detail* with Gary Brounstein as head honcho. Gary's selection is over 300 strong with the emphasis on the rare and the hard to find bird. All photos are custom hand-printed in black & white and, believe me, the crisp detail and clarity of image will amaze you. Gary will even custom make 8 x 10 enlargements, on request, for any of his pictures if you need them. Two bucks will get Gary's catalog. Send to *Aircrafts in Details*, Box 2516, Van Nuys, CA 91404-2516.

Dr. Lyle Pepino of 3209 Madison Ave., Greensboro, NC calls his business *Scale Plans and Photo Service*. I was fortunate enough to talk with this gentleman at last year's *Chicopee Nats* where he had a booth at the *AMA HQ* hotel. A sincere man with a

genuine interest in providing a quality product. His selection is also quite extensive with Photo packs, three views, and cutaways for 800 aircraft! He had just the right Sopwith *Pup* pictures I needed. Three bucks gets his 18 page catalog.

Having sampled the products of all of these fine gentlemen, I can attest to their quality. If they can satisfy me, I'm sure they will satisfy you.

New Items

Boy, once our jumbo turkeys started taking off (pun intended) everybody wants to get in the act. Joe Utasi of Jomar Products, though, has been in it since the grass roots beginning with his excellent coupled aileron and rudder system and twin engine synchronizer, both excellent products I have seen and used.

His newest release is a novel battery back-up system that can be used with standard four cell battery packs. Called the S2B2, it has no relay and is completely solid state, using the latest in power MOSFET transistors for switching. Operation is the same no matter what capacity battery is used. It switches over to the back-up battery when the main battery drops to 4.4 volts and lights up a remote LED at the same time to let you know. It can also be converted for use with five cell packs for those of you who like them.

I haven't seen this unit yet and normally would hesitate to mention it, but Joe has a great reputation for quality so I'm sure this product will measure up to the others in his line. Jomar's address: 2028 Knightsbridge Dr., Cincinnati, OH 45244.

When we first started to see large models out at the flying field in the middle 70's, they were usually scratch-built and almost everything on them was homemade including the

painted-on markings. Fortunately this situation didn't last and we are now beginning to see many excellent decals in our size especially for the WWII fan.

Major Decals is an industrial company that supplies decals to industry for product identification, safety marking, panel labeling, sign making, etc. They have decided to branch out into the model field with an excellent line of high quality decals for model use. These will include British, German, American, and Japanese markings of all scales up to one quarter and, best of all, those hard-to-get propeller decals (Hamilton, McCauley, etc.) without which any scale prop looks naked.

I saw their decal sets at the recent WRAM show and was totally impressed. Check out Major Decals at your local hobby shop.

Bob Seigelkoff at C. B. Associates hasn't been sleeping either. He also has seen the need for those rare propeller decals and has found a supply in Germany just for us. They're available at \$7.95 per sheet direct from C. B. Associates, 21658 Cloud Way, Hayward, CA 94545. Keep up the good work, Bob.

Spotlight

When I first started this column a year ago (has it been a year already?) I mentioned a section called *Spotlight* in which we would highlight a particular modeler and his model in an effort to get everyone to know one another.

Well, to date I haven't received one picture. Surely you are out there. Giant scale is growing like crazy. Shy maybe? Or just bashful? Come on, guys. Let's see some pictures and letters. I'll personally answer everyone I get. Tell everyone what you're flying and how you like it. C



PHOTOGRAPHY: FRANK FANELLI

Everything on Bob Karlson's giant scale FM-2 *Wildcat* was scratch built (except radio and engine). This first Navy monoplane fighter saw action aboard this month's feature, the carrier *Intrepid*.

R/C pattern

By Dean Pappas

Among the recollections I have from contests I flew in back when I was sixteen years old (11 years ago) are the never ending discussions about how Pattern is dying; about how complex Pattern planes were getting; and about how expensive the prospective Pattern flier would find his entry to competition to be.

Probably the most persistent worry was that of: "Where will the Pattern fliers of tomorrow come from?" Well, it's obvious that if Pattern is dying, it's not doing a very good job of it! I don't mean to suggest that we, as a group, should stop critiquing ourselves: Pattern has adapted, when necessary, and stood firm, when it was vital to do so, as a result of this self-examination. As much as we might all disagree about which pattern to fly, or about who should represent us to the AMA, we can all agree about how important teaching is. Possibly one or two out of every ten people you teach to fly will enter his or her first Pattern contest a few seasons after learning. The health of "Patterndom" is yours to protect!

Whew, I had to get that out of my system.

Back to trimming

Last month, I promised to discuss one of the stranger aspects of trimming: airplanes that pull in the positive direction with the application of rudder in one direction (usually right) and to the outside with the other rudder.

There are two basic causes for this problem, and while they once again underscore the necessity of building accurate airframes, it is still frustrating to find straight airplanes with this problem. Even moreso, is the four year old *Curare* that bears a curious resemblance to a pretzel which will trace a perfectly straight line from horizon to horizon with only the application of rudder. Yes, I have seen this airplane, and have even flown it.

For some reason, airplanes that are close to the "all on one line" configuration seem more prone to this condition; this seems to be the price that is paid for this closer to ideal configuration.

Cause number one is incorrect stab incidence; if an airplane displays this tendency, and turns out to have negative in the stab that is not called for by the design, the hacksaw is the most obvious and unattractive alternative. Yech! Put that hacksaw down though, because there are plenty of tricks left in the bag.

Cause number two is due to the fact that our airplanes are not perfectly symmetrical: the fan up front that gives your craft all that "Pattern Performance" is making a mess out of the airflow over the stab. This promises to become more noticeable with the slower turning, higher pitch props that will be making planes more quiet in the future. Spiral airflow causes each stabilizer half to "see" a slightly different angle of attack. This only becomes important in the Knife Edge, where as a

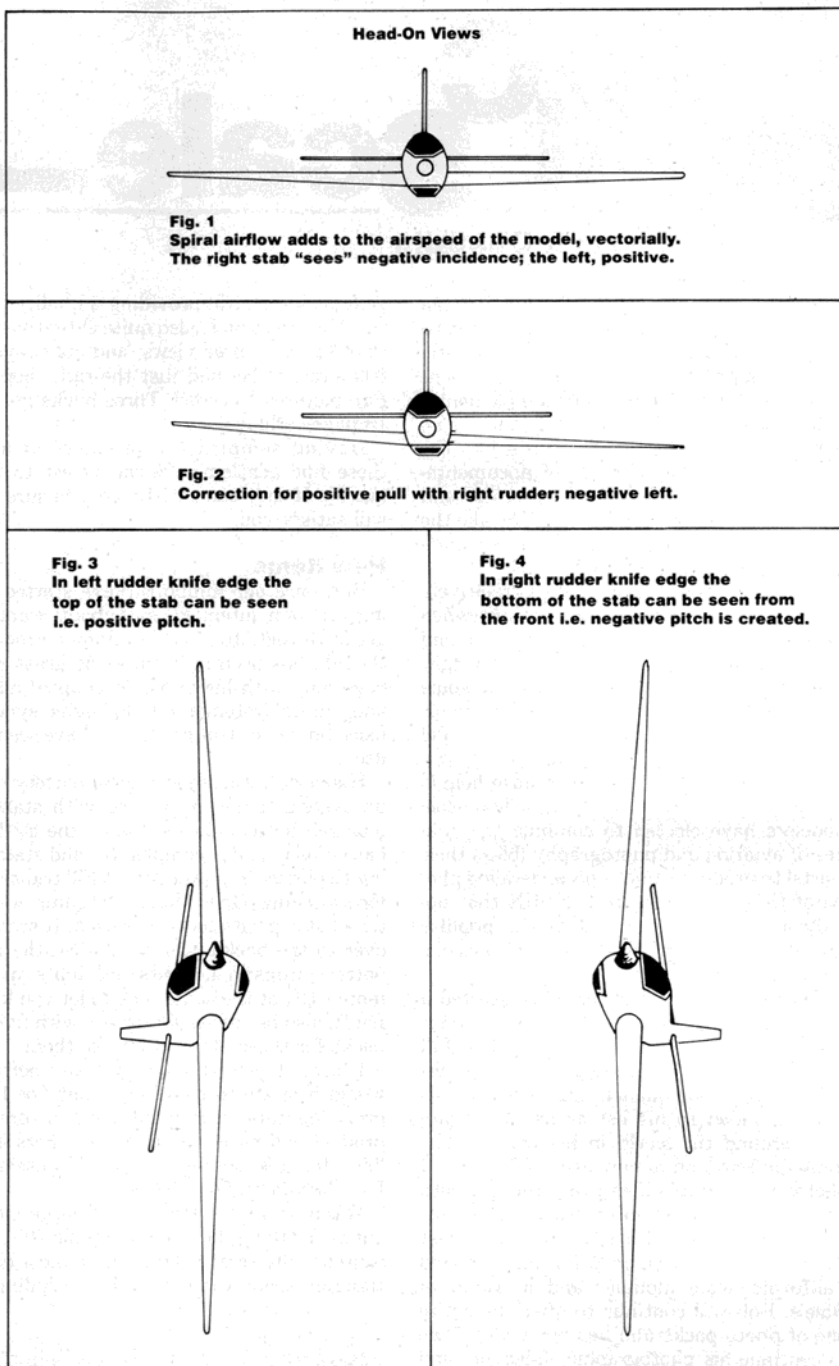


Fig. 1
Spiral airflow adds to the airspeed of the model, vectorially. The right stab "sees" negative incidence; the left, positive.

Fig. 2
Correction for positive pull with right rudder; negative left.

Fig. 3
In left rudder knife edge the top of the stab can be seen i.e. positive pitch.

Fig. 4
In right rudder knife edge the bottom of the stab can be seen from the front i.e. negative pitch is created.

ARTWORK: SCOTT LENGLE

result of the necessary nose-up attitude in yaw, one stab half is partially blanketed. The balance of opposite pitching tendencies is upset. (See Figure 1.)

This condition, or a similar one, can be induced by tilting the wing with respect to the stab. (See Figure 2.) Figures 3 & 4 show how this tilt can be used to induce a different "apparent incidence" in left and right knife edges.

This technique works: I have tried it on friend Rick Constable's *Phoenix 8* that was pitched up with right rudder, and down with left rudder. The rule is to shim the wing so that the wing tip on the side that is the same as the rudder that causes downward pitching is lower than the other.

This was discovered (the way I understand it) by Dave Brown when the previously perfectly trimmed prototype of the *Illusion*, built by Ron Hasselbrock, suddenly started pulling in knife edge. The cause for this

change was the aileron wire being caught in the wing saddle. It acted like a shim, and lowered one wing tip. Once the wire was stuffed into the fuselage, the problem went away. Like any true competitor, Dave was completely willing to tell everyone about this "secret". Hmmm?!

Another technique calls for adding negative to the wing, and in mild cases this works very well. Too much, and the airplane begins to pull to the top in both knife edges. That, believe it or not, is pretty much the state of the art when it comes to trimming airplanes that pitch differently to the left and to the right. By the way, if anyone has an airplane that has this problem, and gets a chance to put a reverse rotation crankshaft and prop on the airplane: I would like to know if the pitching problem changes sense (direction). This would prove the theories I am using to explain the phenomena. Happy Trimming!

R/C Sport.

By Dick Sarpolus

When I think of vee tails I think of three types of aircraft—the Beechcraft *Bonanza*, the Art Chester *Swee' Pea*, and R/C sailplanes. The famous Beechcraft design goes way back to the late 1940's and the *Bonanza* vee tail was in production for more than twenty-five years, finally giving way to a conventional tail assembly on the same basic airframe. The *Swee' Pea* was an early Goodyear Trophy racer, competitive in its time. I assume the initial use of vee tails was simply an effort to reduce drag for higher speeds; it seems logical that one third less tail surface would create one third less drag.

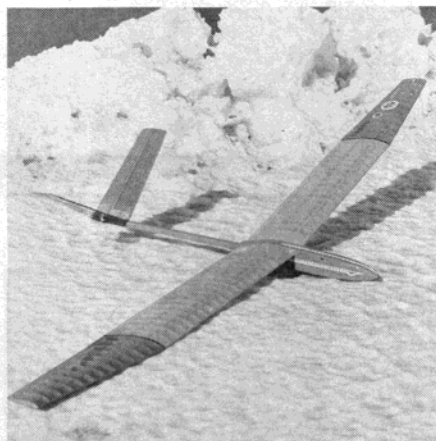
Logic isn't always successful; other racers didn't follow the *Swee' Pea* design approach and went faster. The *Bonanza* didn't slow down much, if at all, when a conventional tail was substituted for the vee version, and it now seems that the vee tailed *Bonanza* suffered from a slight wiggle noticeable in flight which was eliminated with the conventional tail. Reduction in drag would be an advantage in sailplane design, but very few vee tail sailplanes are seen.

While the vee tail may not, in practical usage, have any real advantage, it does offer a unique appearance and may be worthwhile for our R/C modeling use. One hang-up has always been how to get the combined control movement of elevator and rudder from the two movable control surfaces of the vee tail. After considerable vee tail discussion with other modelers, I feel that many of them are still somewhat confused over the actual surface movement required, particularly for R/C sailplane use.

Looking at the vee tail surfaces from the rear of the aircraft, elevator control is obvious. Both surfaces move upward for "up" elevator control, and both surfaces move downward for "down" elevator control. For left rudder control, the left surface moves downward and the right surface moves upward. For right rudder control, the left surface moves upward and the right surface moves downward. Combined control movement is harder to describe; elevator inputs move the surfaces upward or downward together and rudder inputs at the same time move the surfaces in opposite directions in relation to each other. Here's where looking at an actual vee tail in operation is worth a thousand words.

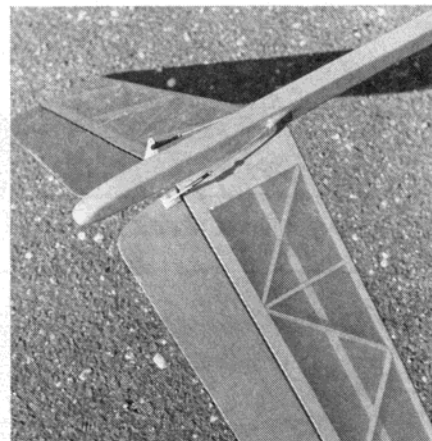
To get the combined control movements using two servos, one for rudder and one for elevator control, many ingenious mechanical mixing devices have been developed. One simple scheme is to hook up the rudder servo with each end of the output arm connected to one of the movable surfaces; this provides the usual rudder control. The rudder servo is now mounted on a freely sliding tray allowing it to move forward and backward. The elevator servo, firmly mounted, has its output arm connected to move the rudder servo on its sliding tray forward and backward, providing the elevator control.

Other devices permit both servos to be



PHOTOGRAPHY: DICK SARPOLUS

Vee tails. Not discussed very often but nonetheless very interesting. The author's *Sliver*, an R/C sailplane (above left) successfully used one. Independent linkages (above right) necessary for control surfaces.



firmly mounted; the DuBro *Vee Tail Mixer* linkage mounts on the output arm of the rudder servo and is connected to the output arm of the elevator servo. The Airtronics *Vector Direction II* mounts behind the rudder and elevator servos and is linked to the servos and the control surfaces. I have seen a number of other mechanical mixer linkages advertised.

Advances in electronics resulting in electronic mixers being included in many of the newest R/C transmitters have eliminated the need for a mechanical mixer linkage. For use with a radio not equipped with mixing capability, Ace R/C offers the *Christy Mixer*, an electronic mixer which plugs between the receiver and two servos to mix two channels using an existing transmitter. The electronic mixing is of course much simpler than any linkage arrangement; each servo is simply linked to one of the two vee tail control surfaces.

When a vee tail is used on an R/C sailplane, the rudder control is used to turn the model just like any other sailplane without ailerons. In this case, the rudder servo is plugged into the aileron channel of the receiver so the rudder and elevator can be operated with the same transmitter stick, standard procedure. However, with a transmitter having rudder/elevator mixing, that's fine for a *Bonanza* but what you really want for vee tail sailplane without ailerons is aileron/elevator mixing.

Possibly the only transmitter with this capability is the *JR Century VII*; as Bob Aberle described it in his review (February 1984 FM) you can set the transmitter up for aileron and rudder mixing, adjust the pot for full mix, flip the vee tail mixer switch, plug the rudder servo into the aileron channel on the receiver—and you have aileron/elevator mixing. Just right for a vee tailed sailplane.

These comments on vee tail control also apply to flying wing and delta wing models, which can use "elevons" with aileron/elevator mixing, instead of separate aileron and elevator control surfaces. Two good examples of these models are the *Mono Wing* by Kalevi Sundqvist in the November 1982 FM and the *Mini-Point* by Bud Roane in the February 1980 FM. Both these unique aircraft, a flying wing and a delta wing, were originally set up with mechanical mixing linkage; it would be much easier to do it now with electronic mixing. If you didn't consider building these models because of the control mixing requirements, take another look at them now (Plans

are still available—Ed.).

My *Sliver* sailplane in the May 1978 FM had a vee tail with mechanical linkage. I really liked that model; it was a floater with fairly good penetration. The vee tail provided positive directional control, with one noticeable characteristic. When coming in close to the ground and heading for the landing spot, control inputs had the tail sort of sliding around in the air. The appearance was unusual, not noticeable at altitude, and didn't really bother the flying; the plane just looked different in its movement.

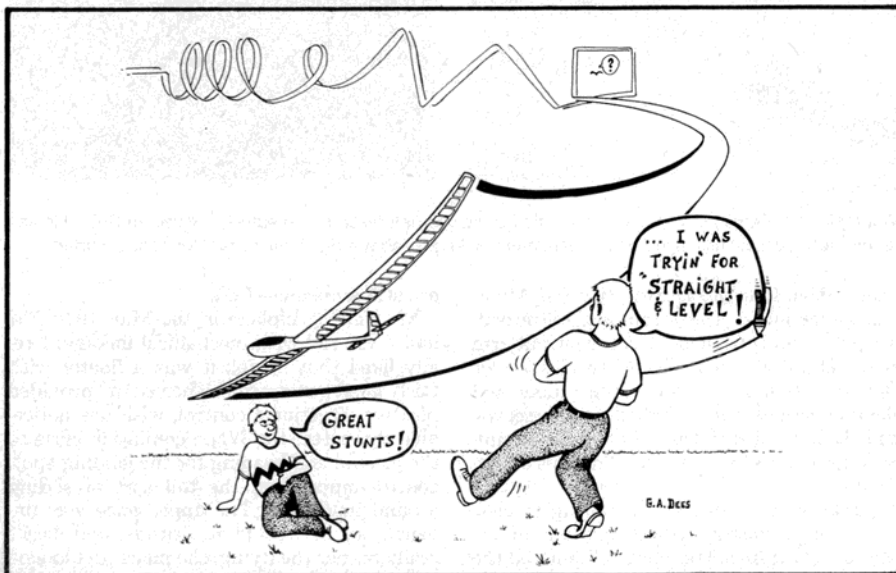
I sold the *Sliver* to a friend of mine and explained to him just how to hook up the vee tail control surfaces; he had never seen a vee tail in operation. He installed his radio gear, using the aileron channel to move the rudder control; right rudder movement for right turn, left rudder movement for left turns, as I described earlier. When he took it to his club field to fly, there was so much arguing about it that he didn't try to fly it that day. The majority of the other modelers there insisted that the vee tail surfaces should turn the model like ailerons—left up, right down for left turn and left down, right up for right turn. I assured him that rudder inputs were correct and he flew it that way, settling the argument.

For a vee tail, I used a 35 degree angle from horizontal for each surface. To size the surfaces, go by their projected area, not the actual surface area. The projected view from the top should be equal in area to a conventional horizontal stabilizer area. The projected view from the side should be equal in area to a conventional fin and rudder. I made the movable surfaces about 40% of the total surface area, on the sailplane. For a power model, the moveable area could probably be about 20%.

On a typical sport R/C model, say a low wing configuration with a tricycle landing gear, using a vee tail could be simplified by forgetting about rudder control. Hook up the elevator servo to both surfaces for elevator control and use the rudder servo only for the nose wheel steering. Rudder control isn't needed for most flying anyway; you won't miss it for sport flying. For a .25 powered Club pylon racer which was hand launched (no landing gear) I used a vee tail for less drag, elevator control only, and just one aileron on the right wing (less drag than two and helps keep the nose up in tight left turns). The resulting racer was very fast and successful.

R/C Soaring

By Herk Stokley



ARTWORK: G.A. DEES

The great and venerable *Hobie Hawk* is on the market and available to modelers again. Let's take some time to look at this "American institution". Several years ago I acquired one of the original Hobie-built versions in a collection of items that I bought from a friend who was getting out of the hobby. I mention the way I came to own the model, because I don't think I would ever have bought one directly. In my soaring experience, I've had a consistent dislike for poor handling qualities in a model, and my opinion was that the *Hobie Hawk* represented the worst example of that condition that I'd ever experienced. It has impressive thermalling prowess, and it obviously can be flown well, but in becoming a highly skilled Hobie pilot, the plane's eccentricities could almost ruin a person's reflexes for flying a normal design. Its difficult handling also limited what could be done with its otherwise excellent soaring capabilities. I'd like to tell you about some of the changes we tried, and the effects they have on the Hobie's flying qualities.

When I decided to try FAI/F3B competition in 1978, our ideas about what makes a good FAI model were much different than they are now. I looked at that beautiful Hobie wing with its elegant curving dihedral, and decided that "IT" was the wing to build my FAI contender around. I had begun flying in soaring competition in 1971, and since then had helped a number of others get into the sport. Some of them had Hobies and I had actually flown the *Stock Hawk* often during those years. As an instructor, I try always to be encouraging. If someone came to ask for advice, I'd try to lead them to a good design, but if someone new came out with a plane, I never put it down. I just try to get it flying well and let them make up their own mind. That forced me to work with the Hobies, but I never did like them. I have always

admired that wing though.

The design problems

Let's take a look at what some of the design problems are and I'll explain some of the changes we made to get around them. I started by building a new fuselage and tail that only used the Hobie wing. This was my FAI model that year. Later, I decided to see if I could tame the *Hawk* by making minimal changes to the existing fuselage and tail. I did that as a design exercise, just to see what would make the basic model fly better. Both of these models work well. My late good friend and "Old Flying Buddy" (OFB) Pete Morrow named these models. Always kidding and laughing, Pete had a wonderful sense of humor and was always ragging someone at the field. It was impossible to get too serious about things when Pete was around. Pete kiddingly started calling the FAI design a "*Herky Hawk*". I never could call it anything else, and the name stuck; even after several others in our club built their own. When about a year and a half later I brought out the less modified version he decided to call it a "*Hobie Herk*" and that name stuck too.

I once told a friend that the only problem with the *Hobie Hawk* is that there isn't enough tail to keep the nose pointed in the right direction. That shortcuts the description I am going to make of its problems, but it does cover most of them. The Hobie has "tip stall". Anyone who has tried to get a little extra height on launch knows that from experience. You will also experience it if you try to stretch the flight on landing - right! To counteract that little problem, the designers put a terrific amount of (1) washout in the wing. The plane also has severe "Dutch roll". That's that wallowing movement you've seen when the plane gets to higher speeds. Airplane designers know that is caused by:

(2) too little vertical tail in proportion to the dihedral effect of the elliptical wing. In normal flight the plane looks like it's diving all the time. On landing the tail is quite high when the nose touches the ground. That makes the plane often rotate back into flight when you really wish it would stay landed. That's because there is (3) too much incidence in the wing.

The modifications

Only three problems. Not that bad really, and not very hard to fix. The *Herky Hawk* took care of them with a fuselage five inches longer than the Hobie, and larger tail surfaces - much larger. It has normal wing incidence, tows beautifully on the winch, and lands straight ahead at a dead stall. Couldn't get much much speed though because of the drag that the extreme washout caused. It also still acted a bit funny when I tried to go fast for the FAI speed task. My OFB Steve McLellon insisted that I cut four rib bays off each wing to get rid of the washout area. I don't think Steve liked the plane. He always called it the "*Hopeless Hawk*". After some resistance I gave in. I removed the four bays from each wing, put on a balsa tip of my own, and what a difference! No trace of the old Hobie handling qualities remained. That model is an excellent flier, and remains a good competition plane today—especially, if the weather is windy.

When I took on the second task that resulted in the "*Hobie Herk*", I started out with the cut-down wing. Thermalling hadn't suffered at all, and I knew that with the short fuselage it would be hard to get enough vertical tail to fly right. First, I took all of the incidence out of the wing. Yes all! I put on some balsa fillets and relocated the front wire down 3/16ths of an inch. I had to square off the plastic ribs on the wing root. Then I built a totally new vertical tail from one-quarter inch square balsa. The new tail has a separate fin and rudder section, and is much larger than the stock Hobie. It is nine inches high and has an average chord of five inches. About 1/3 of the area is the fixed fin. This plane is an excellent flier. I was able to move the towhook back almost an inch, and it tows straight ahead. I did have to crank in a lot of elevator trim to compensate for the wing incidence change but it's not as much as you'd expect. It flies in a normal attitude, and stalls straight ahead without the old tip-stall. One other experiment showed that removing three bays from the wing was not as good as four - sorry. The best news is that it thermals as well or better than before. One more mod helped; I turbulated the wing with three layers of 1/16th wide auto trim tape. The tape is located on the top surface of the wing about 3/4 inch back from the leading edge. The three layers are necessary to get enough thickness to trip the air in the boundary layer. The launches are even better after turbulation and the thermalling is even more consistent.

By Larry Kruse

Last column I used some space discussing the latest advances in CO₂ technology and the added practicality these advances have given this type of power for freeflight applications. More than one of these potential applications was brought to my attention by Ralph Hunt, purveyor of Hunt Models of Dassel, MN, who kits three planes designed specifically for CO₂ engines. Hunt offers a 27 inch *Porterfield*, a 24 inch *Longster*, and, my favorite, a 21 inch *Fly Baby I-B* biplane. All plans are full-size and balsa parts are pre-cut. The wing struts and landing gear have been bent to shape, and inflatable wheels (Trexler, I assume) are included. While the prices are a bit more than you might expect to pay for such kits (\$17.95, \$14.95, and \$15.95, respectively) the quality, the degree of pre-fabrication, and the completeness of each makes it a good value. Trexler wheels alone go at about four dollars a pair, purchased separately. Any or all of these planes can be ordered from Hunt Models, P.O. Box 21B, Dassel, MN 55325. Tell 'em FLYING MODELS sent you.

While I'm on the subject of kits, I also want to mention the offerings of Micro-X, particularly since their kits can be built for either rubber power or converted to CO₂. Micro-X, too, has three models - a *Taylorcraft*, a *Stinson Voyager* and a *PC-6 Porter*, each spanning 22 inches. These are semi-scale offerings, but retain the distinctive looks of each full-scale parent. The kits feature printwood and selected wood strips, full-size plans, and tissue covering. Those of you with past experience with Micro-X know that the wood quality is unparalleled. Being an avid modeler and flyer himself, Jerry Skrijanc really goes all out to put out a top-of-the-line product for other modelers. These kits go for \$6.95 plus postage and handling from Micro-X Products, Inc., P.O. Box 1063, Lorain, OH 44055.

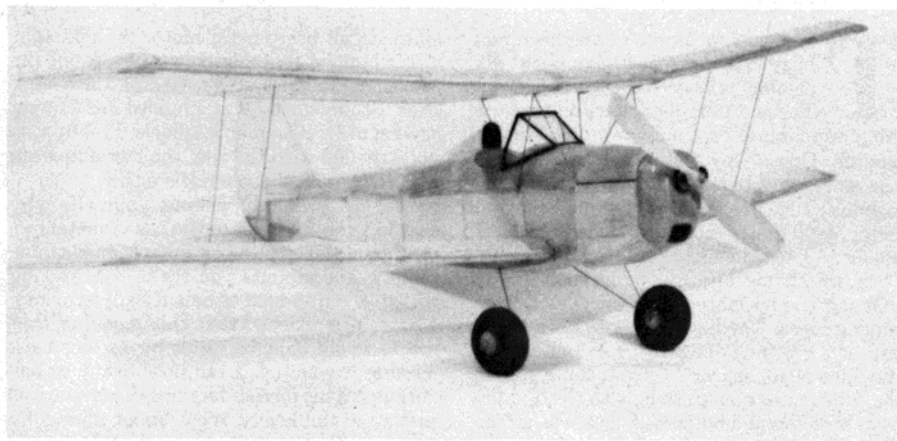
I hope you'll take advantage of one or more of these offerings and get started in CO₂ freeflight. It's a real gas. (Sorry, Bob, I couldn't help it.)

Stick-'em up!

From time to time it becomes necessary to cut out identical fuselage sides, wing tips, ribs, formers, or what have you on a jig-saw during the course of building a model. There are several methods of managing this task, but one of the slickest is the use of double-sided carpet tape. Three or four small pieces placed judiciously between two fuselage blanks keeps them from shifting during the cutting process, but still allows easy separation when the job is finished. Also, the tape is easily removed from the wood. Just by working the tip of your Über Skiver under the corner of each piece, you can strip it off the wood cleanly. On wood surfaces, there's no messy residue to scrape off or glue bumps to sand down.

Another neat use for this versatile tape is for holding sandpaper in place on your sand-

FLYING MODELS



If you're looking for a kit designed specifically for CO₂, Hunt Models' *Fly Baby* biplane offers one choice. The text relates other choices available. Advances in CO₂ technology make adaptations quite feasible also.

ing block. I use it exclusively on my aluminum T-bar sanders. All you do is lay two strips lengthwise on the bottom surface, which gives about a one inch overlap in the center, and then set the thing down on the backside of whatever grit sandpaper you plan on using. A bit of trimming with your shop scissors (not your wife's best sewing scissors, please!), and you've got yourself a super flat sanding surface.

To change paper when the sanding surface becomes clogged or worn out, just strip it away. Ordinarily, most of the tape comes with it, but in cases where it doesn't, a small rag with the corner dipped in dope thinner will dissolve and remove the residue.

The tape is manufactured by several firms, among them the 3M Company, and normally can be found at your local hardware store. While it is not cheap, a two inch wide roll lasts me nearly a year and certainly solves several minor problems.

Sheet balsa structures

As we move through the hobby, even as we move through life, we sometimes tend to forget the pleasures of the simple things that brought us joy in the past. This was most pointedly brought to me after returning from the Springfield Nats. My head was full of the beautiful freeflight biplanes I saw there, but I knew I didn't have the time or the inclination to spend the time building one of these moth-like "flitterers" for my very own.

Looking for an easy way to satisfy my craving, I got to thinking about the little sheet balsa Cleveland kits of the past, all pre-printed with surface and control markings and die-cut for super-simple assembly. I'm not sure but Top Flite may still distribute several models of this type. At any rate, I sketched out a biplane to suit my own taste in one evening, built it the next, and flew it the next.

What a joy! Powered by one of my old Telco CO₂ engines, this sheet balsa wonder circles slowly and majestically in calm eve-

ning air, flight after flight. It's hit fences, trees, kids, bicycles, me and our cat, but it still keeps flying, each time "Hot Stuff'ed" back into mortality and one more flight before dark. How unlike my stick and tissue scale ships which are brought out only on special occasions with almost ceremonial reverence. This little biplane flies on and on, requiring only a new CO₂ charge and no ceremony and no reverence.

I would guess that by the time you read this it will already have been published in FM. It's called the *Prairie Duster* and I hope you like it (see the May 1984 issue of FLYING MODELS for plans—Ed.). But my point was not to extoll the virtues of this little plane. My point was to remind you that there are other ways of building — ways simpler than the stick and tissue structures we oftentimes so painstakingly put together, ways that are just as much fun, just as satisfying, and not nearly so demanding of our time.

Max-Fax does it better

If you're not a regular subscriber to *Max-Fax*, the D.C. Maxcutters news letter, you should be. Regular readers will recall that I've mentioned this publication before for its fine scale plans, photos, and information. This past year, though, Allan Schanzle and crew have really outdone themselves. In addition to their regular sparkling features, they've included two full-size plans. The first was Dave Rees's pretty little *Nicholas Beazley*. The second was Paul Gaertner's *Handley-Page Gugnunc*. The two plans alone are worth the modest subscription rate for six bi-monthly issues. You can get your own copy of whatever *Max-Fax* has in store for '84 by sending ten bucks (for residents of the USA, Canada or Mexico; \$11 everywhere else) to Allan Schanzle, 20008 Spur Hill Drive, Gaithersburg, MD 20879. Now that I think of it, I'd better get with it and renew my own subscription. I'd hate to miss an issue.

My address is Larry Kruse, Box 1137, Liberal, KS 67901.

CA combat

By Rich Lopez

The past few months have been real busy ones for me. I have about six combat related projects underway. The one I am most excited about is the production of cast aluminum FAI motor mounts. One of my flying partners, Myles Lawrence, likes to tinker with metal working machinery. He machined up a really beautiful set of metal motor mounts for one of his FAI models. I liked them the minute I saw them. They are strong and mount in such a way that there is no vibration or chance of them coming loose. The key to this system is the use of $1\frac{1}{16}$ inch long by $\frac{3}{16}$ inch round threaded (4-40) spacers. As you can see from the drawing, the mounts bolt to the spacers from both top and bottom. A lock washer under each bolt insures that they won't loosen up.

Most metal mount set-ups that I have seen use two long bolts to clamp the mounts together. This clamping system is not as efficient as a bolting together through spacers system. I have seen combat flyers use various types of metal mounts. Sometimes they take existing materials such as aluminum "L" angles and adapt them to their models. Pat Willcox, a pilot for Eastern, was in L.A. not long ago and we had a chance to talk models. He had tried the "L" angle mounts and they broke. He gave up on that idea. The 1982 British World Championship Team of N. Gill, V. Hunt, and D. Wiseman and the Mexican Team of R. Monge, L. Silva, and F.

Quezada all used metal motor mounts that were clamped together. I saw several of the Mexicans' mounts break. George Cleveland, Dick Stubblefield, and I ended up buying several of D. Wiseman's models. I really was not satisfied with the way the metal mounts were set up on those models either.

You are probably asking yourself, why should I convert over to the use of metal motor mounts? The number one reason is adjustability. The mounts you see in the drawing will give you $\frac{1}{2}$ inch of balance adjustments. I have often wished that this model or that model would balance just a bit further back because it was just a tad nose heavy or balance just a bit further forward because it was just a tad tail heavy. What about trying different engines on the same model? One brand always weighs more or less than another brand. What about trying a different engine with a different bolt spacing and or a wider crankcase? You would have had to build a special model with wooden mounts. The new Rossi or OPS .15 engines will not fit in the models you built for your Cox, Fox, Nelson, old Rossi, or Super Tigre .15 engines.

Using metal motor mounts will give you the freedom to try different engines without having to build new models. In the case of wider crankcase engines, you could just add plywood shims under the mounts. With an engine that has a different bolt pattern, you will have to have another set of mounts drilled out for that engine. This is a lot easier

than having to build a new model.

It has been quite a learning experience having a product produced. I have found out that machine shops don't like to talk to you about small quantity orders. I had to have a minimum of 1,000 spacers made at a time. The casting and the machining of the mounts themselves was farmed out to another shop. At this moment I only have the prototypes and they look real good. By the time you read this column, some time in May, I will have mounts available for purchase. The first run of mounts will be drilled and threaded for Cox, Fox, Nelson, old Rossi, and Super Tigre .15 engines. The price will be \$8.50 per set with a \$1.00 charge for postage and handling per order. Extra spacers will be \$1.50 a pair.

I have been selected to be the event director for Combat at the Reno, Nevada, A.M.A. National Model Airplane Championships, August 5-12, 1984. If you have any interest in being a judge or helping out with the event please write to me as I am now in the process of putting together the crew to run the event. I hope you are getting your models built and tested for the Nats. It is never too early to cut and measure your lines. I always cut and measure lines out in the front lawn, this gives more testing time at the practice field.

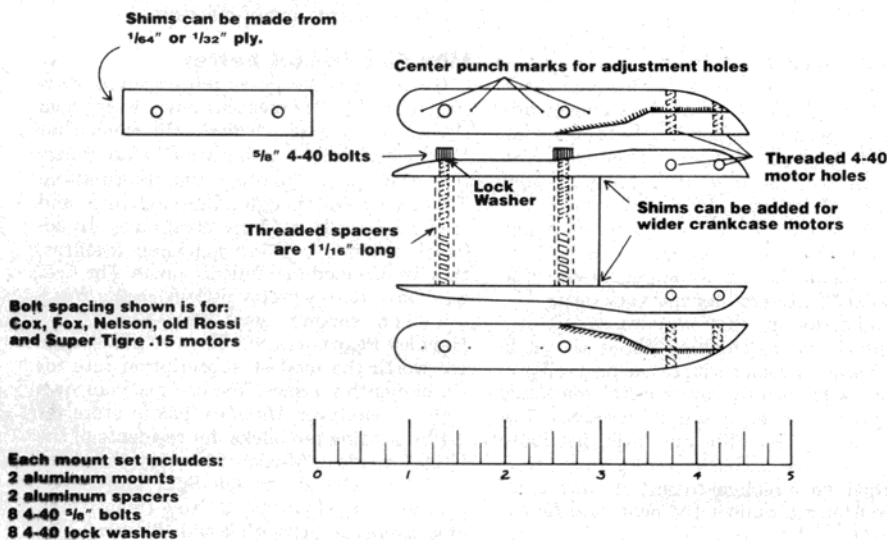
I have contacted the Cox Hobbies people regarding sponsorship for the unofficial 1/2A Combat event at the Nats. I have run the event since 1979 and Cox has always come through. I am certain that they will come through again in 1984. Thanks Cox for all the years of support. Unofficial 1/2A combat is scheduled for Thursday after Junior and Senior Fast Combat. It will be double elimination for at least the first round. As in past years, each contestant will tie up his or her own streamer from materials provided. The string leader can be cut to length and marked at both ends so that everyone knows where to tie. Using this system, there is no chance of anyone complaining about faulty streamers! This might be something to try at your next contest. Entry fee will be \$3.00.

I hope to have the judges at the Nats looking at one model and counting cuts made against it. Phil Cartier brought up this topic in his March column and it makes a great deal of sense. I have been judging combat for years and I believe that is the best way to go. In order to do a good job you have to keep your eyes glued on to one model and that is the only way to do it.

I know all of you have marked the week of September 17-22, 1984 on your calendars and you are considering taking your vacations at that time. That is the week of the World Control Line Championships at Westover Air Force Base in Chicopee, MA. If you have never been to a World Championship, try to make this one, you won't be sorry. This is the Olympics of Control Line Aeromodeling.

Go see the movie *The Right Stuff*. I gave it a 9+ (I gave it a 10—Ed.). Rich von López, 8920 Villanova Ave., Los Angeles, CA 90045.

Von Lopez's Metal Mounts



CA stunt

By Windy Urtnowski

“**D**rafting” is a technique used by motorcycle racers whereby a second bike gets directly behind the first bike, and, by *sharing* the slipstream, the drag on *both* is decreased allowing *both* to go faster. It is a form of co-operation that benefits both. When I was involved in motorcycle roadracing I came to appreciate this and now I’m applying it to my modeling ventures in a *different* way, but with the *same* results.

The “drafting” I’m talking about involves sharing technology between two or more stunt flyers thereby allowing both to gain more as a team than each would have been able to on his own. It’s a kind of “drafting”, and something all of us should put to use whenever we can. None of us can ever hope to be 100% proficient in all the areas necessary to compete at the highest levels. By sharing, or “drafting”, each other we *all* move forward faster than as individuals.

An excellent example of this type of co-operation is Lou Dudka and Glen Meador who have jointly developed the very competitive *Matrix-Eagle* design. They both progressed up the ladder far quicker than if they struggled individually in isolation. By “drafting”, they both benefited and shared their knowledge and expertise.

Another example is Billy Werwage and Dennis Harkai. They, along with Les Nering, are a triple threat technology-wise.

“Big Jim” Greenaway and I share our successes and failures freely, and we’ve both benefited in developing the S.T. .60 and *Sweeper-L.J.* designs.

Imron™ technology has moved on due to the literally hundreds of ships I’ve painted for people; the bottom line is a storehouse of knowledge I’ve banked and apply to each new ship that comes into my shop for “Imroning.”

Bob and Rollie McDonald have a fine nucleus of stunt “savvy” and seem very co-operative in sharing it. Dennis Adamisin and “Big Art” certainly are a *team* worth drafting in the quest for immortality.

The point of all this is none of us are *islands*, and when we try to be, we not only hold ourselves back, but we hold the event back.

Since taking over the PAMPA newsletter I’ve tried to create a forum for the exchange of ideas and technology. I’ve put in a tremendous amount of time, effort, and money to establish and cultivate this medium of exchange. If you’re not now receiving your newsletter, you’re missing a big part of this event. I’ve found in answering my mail and phone calls, almost everyone is willing to do some “drafting.”

The core of PAMPA is made up of flyers more than happy to help if you only ask. Even if you think your question is dumb, *ask*. You’ll never benefit unless you get in someone’s slipstream. Isolating yourself from the mainstream almost guarantees you’ll lag behind the troops co-operating and

FLYING MODELS



PHOTOGRAPHY: CLAUD MAIKIS

Speaking of “drafting”, here’s some interesting technology to share. It’s Claus Maikis’ *Jack in the Box*, an innovative stunt ship with detachable wings, tail, and landing gear and no engine cowl.

working together.

Maybe you’re saying this column isn’t helping you learn how to tweek flaps or re-work your spraygun, but it is focusing on one reason some flyers move into the space age while others sit back chewing the meat off dinosaur bones. It’s a concept that’s more important than laundering your white pants or finding a shirt that matches your blimp.

My contention is that *most* of us are born with relatively equal talent, and that the difference years down the line is that some of us hold ourselves back needlessly in the way we think. Some of us have egos that “Hot Stuff” us to the pavement while others pass us by. Learning to think is one thing my columns are supposed to be about. Maybe it’s the most important thing of all.

My hope is that from this column and the PAMPA newsletter this event will grow. If it does, then that will be my legacy, and I will not have died in vain. We all ultimately leave our mark on this event.

The Gieseke’s, Werwage’s, McDonald’s and Hunt’s left their mark in world competition. Many others left their name on the Walker Cup. Some of us may never get there but we leave our mark in the construction articles we write, or the way we help others up the ladder.

Finding your ultimate niche in stunt can be challenging, rewarding, frustrating, humiliating, educational, destructive, expensive, or anything *you* choose to make it. Like it or not you will ultimately arrive there, and that niche will be *yours forever*. Nobody can *ever* take it from you.

I would like my niche to be that I helped people along the way, that I did my share of innovating, paid my dues cheerfully, and

tried to make people see that we all do some funny things along the way. Sometimes the *hardest* thing to do is learn to laugh at yourself and once you get that piece of the puzzle firmly in place, the rest is easy.

Speaking of laughing at yourself, let me pass along this story. I was using a large bottle of cyanoacrylate in the shop and, as always happens, the tip was clogging so I cut off the top with a razor, and was getting drops of glue out with a toothpick. In my clumsy effort to switch the T.V. channel, I knocked the wide open bottle off the workbench onto my stool, then to the floor. Well I picked up the now almost empty \$10.00 bottle of glue and was so mad I never noticed the more than spoonful of glue on my stool. I moaned and groaned some, re-adjusted the T.V., and *SAT DOWN!* My God, the pain was unbelievable; it felt just like a ball of molten solder had fallen into my sneaker. What was worse was I now had a wooden stool glued firmly to my posterior. You know that *little* puff of smoke you get when a *drop* of cyano goes off—Well I thought the house was on fire. I’m not kidding, it really hurt and I was debating going to the hospital or calling the first aid squad.

I’m not going to admit it, but it took me over an hour to get that thing off and I went and sat in the cool bathtub for the rest of the night saying to myself: “I hope nobody ever finds out about this.”

So if you plan on “drafting” me in the future don’t cut the top off the glue bottles, and when you do something incredibly dumb, rest assured I probably did it too. . . . Till next month, “Think Stunt.” Windy Urtnowski, 9 Union Ave., Little Ferry, NJ 07643.



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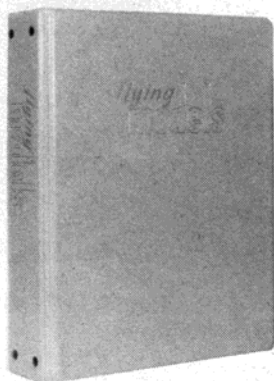
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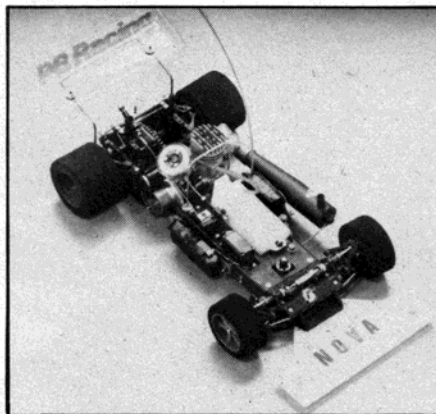
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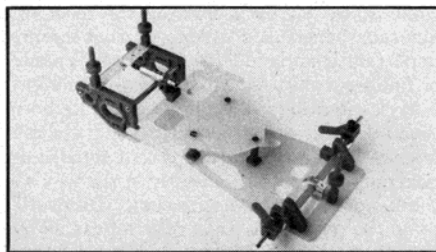
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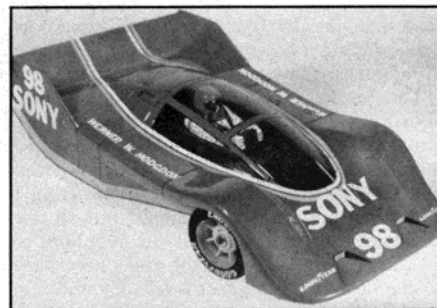


CENTRAL BUILDERS SUPPLY, PO Box 152, Sunbury, PA 17801, has introduced their new 1/8 scale circuit racer, the *Nova* by PB Racing Products. Utilizing a specially developed, precision engineered aluminum alloy monocoque chassis, this gas powered car offers a combination of light weight, rigid stability, and strength. Some of the more prominent features include variable camber and caster front suspension, coil-over shocks, quick release rear hubs, modular construction, integral radio mounting, equilateral weight distribution with an ultra-low center of gravity, and new rear shock absorbers. The *Nova* retails for \$460.00 and is available from Central Builders direct.

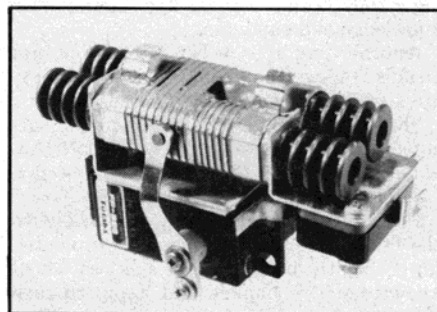


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PARMA INTERNATIONAL, 13927 Progress Parkway, North Royalton, OH 44133, now has the Jomac 1/12 *Schkee* body which is now produced in Lexan. For more information, contact Parma at their address above.



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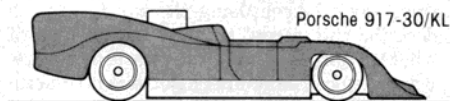
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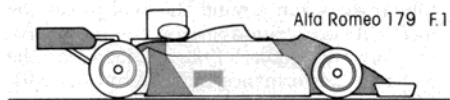
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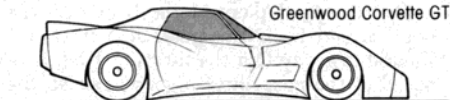
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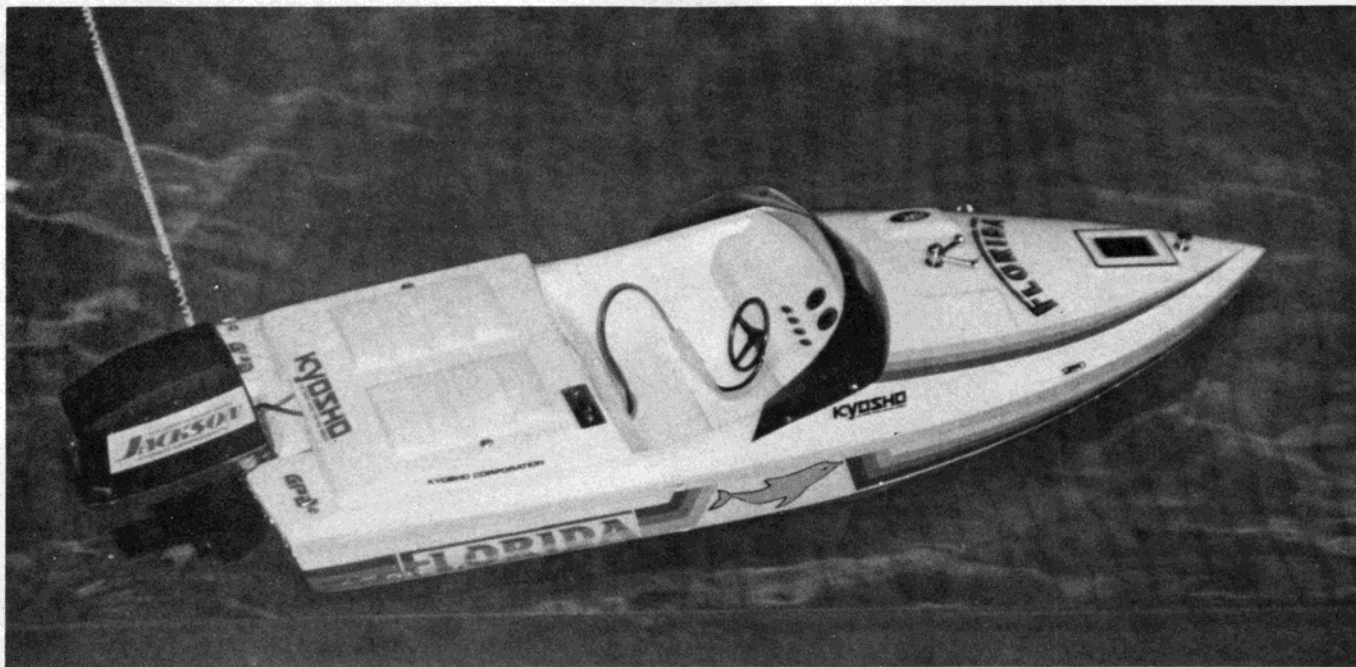
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PHOTOGRAPHY: VIC MACALUSO

Floating easily at the side of the "test pool", Octura's *Florida*, an electric outboard, gives no indication of its surprising performance.

An FM Product Review:

Octura's "Florida"

By Vic Macaluso

Our author found the performance of this electric boat to be embarrassingly good. The text tells why!

Almost all product reviews involve a certain amount of anxiety during initial testing because of the many unknowns associated with this sort of thing. Being an eight year student of the martial arts, one of the first "truths" we discover and hopefully live by is to never underestimate *anybody* or *anything*! If my sensei (teacher) had seen what happened on my first attempt at the performance aspect of this review, I'm sure I would have spent many nights of study relearning this "truth". Actually it wasn't as dramatic as it might sound but a simple underestimation of this "toy" (as I thought) caused a week's postponement of the review, the inconvenience of the entire staff of the local Y.M.C.A. and a great deal of embarrassment on my part. (I'm the boating contributing editor! Things are supposed to go right the first time, everytime, right?!)

The aforementioned incident—of minor influence on world events, but of major embarrassment to me—was actually quite funny. Picture this: the entire staff of the local Y.M.C.A. (on their own time), about 50 or 60 kids from 6 to 16, and Mr. Larry Sribnick (SR Batteries) and myself, all ready for a techni-

cal and well-organized performance review of this "toy". I keep using the word "toy" to describe this model to give you an idea of what my initial attitude was towards this review. Before Larry and I got down to actually timing the runs, I decided that I'd just take a short run around the pool to set the most efficient trim angle on the motor. By the way, the motor I first installed was the 540 high performance unit. (Why fool with the kid stuff, let's start at the top!) Without any ceremony, I plopped the boat into the pool, aimed it in the general direction I wanted to go, and hit the throttle. What happened in the next three seconds caused the aforementioned inconvenience and embarrassment. The boat took off like a shot, bounced off the side of the pool, flipped into the air, landed upside down and *died*! To the inexperienced at poolside, this was "really cool!" To me it was a shock, because now I had to explain the necessity of properly waterproofing the radio (which I didn't do) and why that was it for the day. It's really amazing how quickly an "expert" can look like a turkey to a group of people expecting something a little more spectacular. (No argument here, Vic-Ed.)

So much for embarrassing moment #457!

Now onto the review! Same place, same time, one week later. Armed with at least an understanding of what this 24 inch hull was capable of, I was now able to conduct this review with a little more dignity!

Hull and engine kit

This hull is approximately 24 inches long with a beam of about seven inches and weighs approximately two pounds with radio and batteries installed. The hull is a solid molding of expanded bead polystyrene plastic, with a tough outer covering of what appears to be a very lightweight ABS plastic. Supplied with this kit is the standard Jackson 380 electric outboard, windshield, very complete decal sheet, stand, two-speed speed controller, all necessary hardware required, and a fitting set that includes all deck hardware and one foam doll that can be used as a driver. The only items necessary to get underway with this model are a two channel radio and a battery pack to power the outboard.

The hull comes ready built and needs only the addition of the radio and about one hour's time to be ready to run. The radio hatch and dashboard (battery cover) are of vacuum formed foamboard and are very light and sturdy.

Before I get to the performance of this model I should mention one or two construction and set-up aspects.

Supplied with the kit is double-sided tape to mount the servos and the speed controller. This tape is OK for servo mounting because there are very light loads imposed on the servos, but do not use it to mount the speed controller in the hull. There just isn't enough surface for the tape to properly hold the unit in place without excessive movement causing erratic throttle response. A better way is a couple of dabs of five minute epoxy at appropriate places, held in place until set. As far as radio installation is concerned, any two channel radio will fit with the small, lighter servos being preferred because of some space limitation. There are neatly molded pockets in the radio compartment for each compo-

ment which makes radio installation quite easy. Up forward is a molded compartment in the bow for the motor battery pack. The high rate of discharge of the battery pack, especially with the optional high performance 540 motor, creates quite a bit of heat, (after one run, I found I could not keep the motor at continuous full throttle because of the high heat from discharge of the 1200 Series pack) so venting the battery compartment to the forward deck might eliminate some of this condition. The foam hull is a great insulator so the battery packs cannot dissipate the heat of discharge as well as they should.

All that's necessary to assemble this kit is a screwdriver, pliers, X-Acto knife, an awl, and some five minute epoxy. The most inexperienced person should do a reasonable job in two hours at most.

Performance

Depending on the motor you choose, standard 380 or optional 540, you will have two very different standards of performance. Using SR Batteries EP 900 and 1200 series battery packs (see review of these, this issue) the following performance figures were recorded.

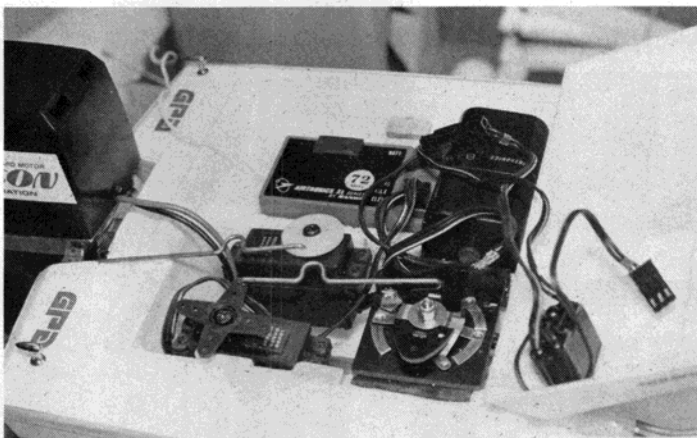
With the 900 series battery pack and 380 motor, equipped with a 1435 plastic Octura prop, a running time of almost nine minutes was recorded. Five different props were tried including the standard 1240 Octura plastic. The 1435 gave the best overall performance as far as speed and motor run were concerned. All of the above being the same except for the use of SR's 1200 series battery pack, a running time of ten minutes, ten seconds was recorded, with no perceptible change in overall speed and handling.

With the above set-up the speed of the boat is quite good and a very lively planing attitude is maintained throughout the entire motor run.

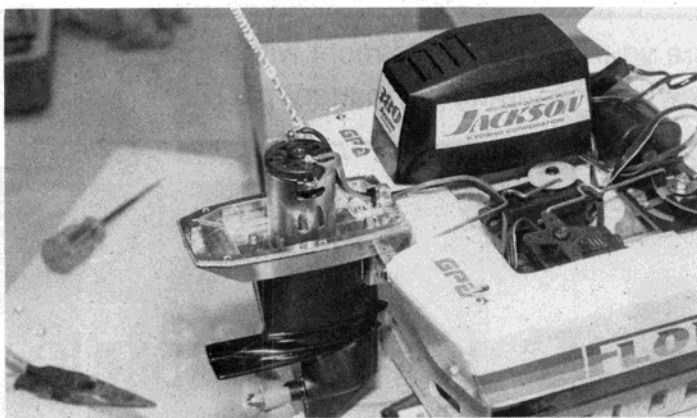
For you wild and crazy people out there who will settle for nothing but the maximum in performance, Octura has made the Jackson 540 motor available. The speed of the boat is easily doubled but so is the drain on the battery packs. Runs of four minutes were achieved using the 900 series battery pack and four minutes, 35 seconds with the 1200 series pack. All these figures were recorded with the 1435 Octura plastic prop. With the 540 motor, the running times were cut by more than 50% but the performance can be called exciting, especially within the confines of a standard Y.M.C.A. pool.

I found this to be a good entry level boat with a great amount of potential in sanction racing classes.

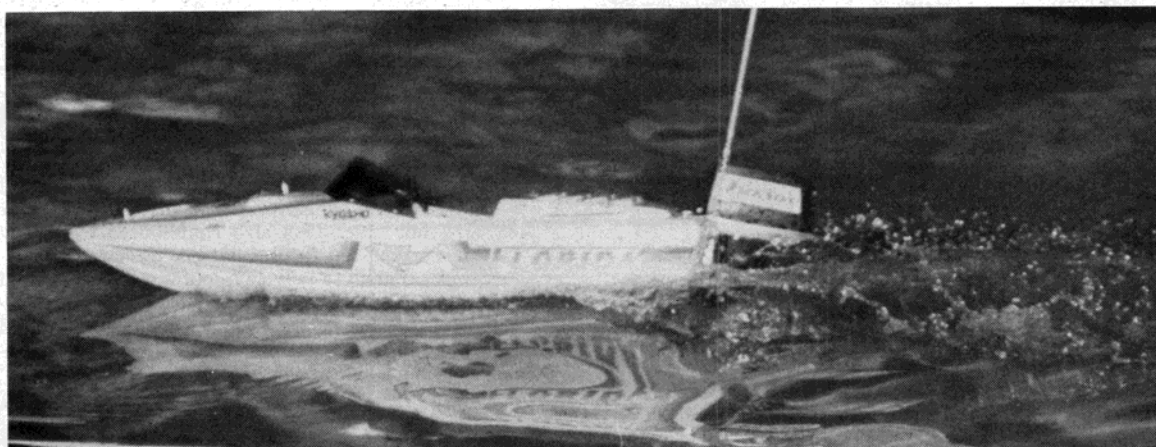
For more information and prices, contact Octura Models, Inc., 7351 N. Hamlin Avenue, Skokie, IL 60076.

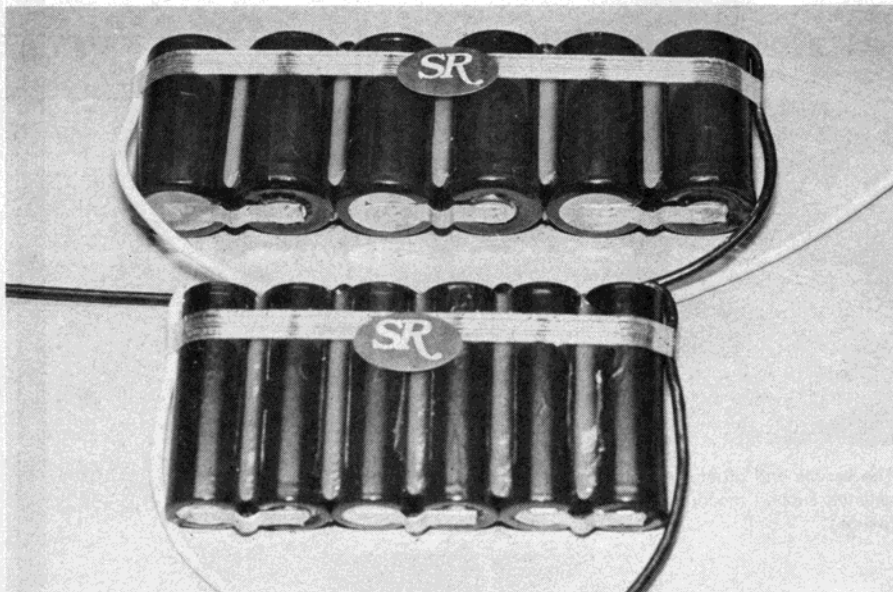


The servos and other radio gear mount in molded foam pockets (above). The antenna support mounts to the transom and the antenna is wound around it (below).



Removing the motor cover (above) let's you see the .05 car motor used with the Jackson 380. The 540 uses a much hotter motor for superior performance.





PHOTOGRAPHY: VIC MACALUSO

Designed specifically for use with electric motors in boats, cars, or planes, the SR Batteries' EP Series Max Pac's come in a 1200 mAh pack (at top of picture) or a 900 mAh pack (at bottom).

An FM Product Review:

R/C Boating and . . . SR Batteries

By Vic Macaluso

Insure your boating investment with these
new aerospace quality battery packs.



There's been a lot of favorable publicity about SR Batteries' products. George Myer, in a *Radio Technique* review in *Model Aviation*, and Bob Aberle in a *FLYING MODELS* article documented their quality and variety.

Most of us in the sport of radio control generally take our battery packs for granted. In fact, unless we actually experience a failure, they go ignored and are expected to supply uninterrupted power for as long as we require them to. (I also believe in the Tooth Fairy!) We boaters seem to be even more guilty of this ignorance because of the generally shorter ranges we deal with and shorter overall running times. (The average run with a .45 or .60 powered boat is six to eight minutes as opposed to 12 to 18 minutes for similar powered aircraft.) Regardless of the type of models we operate, many of us tax our battery packs to the limits in both endurance and environmental duress (vibration, heat, humidity etc.).

In working with Mr. Larry Sribnick, the owner of SR Batteries, I received quite an education about nickel-cadmium cells and battery packs. The biggest lesson I learned is that not all nickel-cadmium batteries are the same and even those with the same rated capacity can have vastly different performance in actual usage.

The battery packs reviewed here are SR's 900 and 1200 Series EP MAX packs, EP meaning Electric Power. The main difference between the EP MAX packs and SR's standard packs is that each cell has a lowered internal resistance to enable them to be charged faster (average 15 minutes from full discharge) and discharged at a much higher rate without damage (more power over shorter period).

All references in this review pertain to the EP Series battery packs but keep in mind that all features discussed also pertain to all of SR's cells and packs. As previously mentioned, the main feature of the EP MAX pack is their ability to be discharged at an extremely high rate without damage. This feature is ideal for electric powered planes, boats, and cars.

Construction of each cell in SR packs is unique in the field of R/C. Most packs use a simple press fit in their intra-cell internal connection. This condition eventually leads to increased internal resistance within the cell, drastically decreasing the capacity of the pack. The press fit connection is also subject to loss of contact due to vibration. If this happens, the pack can no longer supply power. Scratch one model!

SR eliminates these possibilities by internally welding all contacts between cells so that the connections are reliable and stay that way.

The unique construction of SR battery packs continues on all of the external components of each pack. Each individual cell of each pack is joined with a special strain relief section formed into each connecting strap. These straps are then spot welded in several places, (not just one weld) to further increase the reliability of these connections. The purpose of this strain relief section is to enable each cell of the pack to move slightly to absorb vibration and structural flexing without putting strain on the welded connections. Again, increasing reliability.

Next, to hold the pack together a special silicone adhesive is used instead of tape or hot glue. This also contributes to a very strong but flexible battery pack.

Finally, a polyolefin outer covering is used to finish off the pack. This allows SR to retain the pack flexibility yet doesn't soften the way vinyl does under high heat conditions, (very high discharge rate).

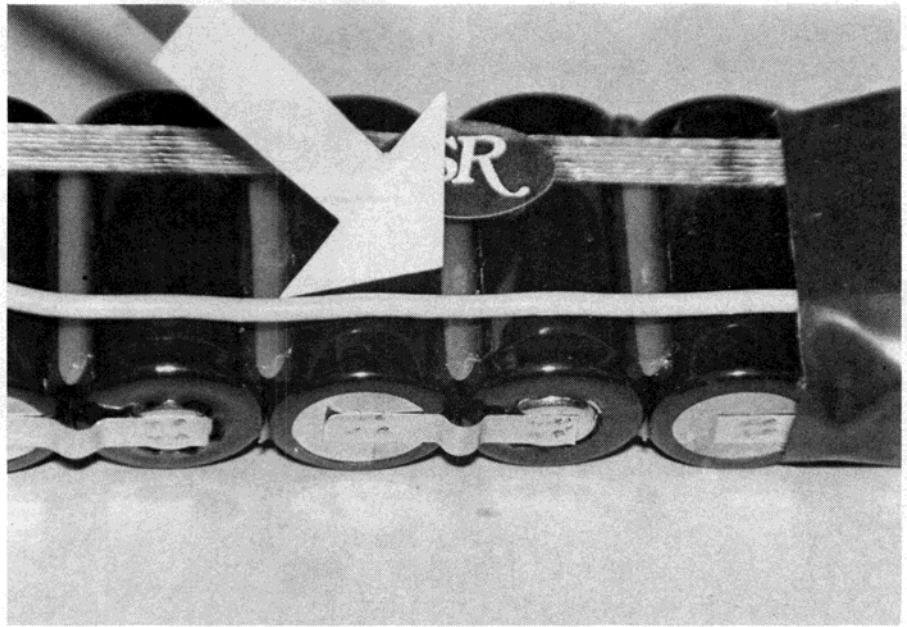
In speaking to Larry about these packs, he emphasized the flexibility feature because the inside of an R/C model (of any kind) is a pretty rough place to be and the flexibility of his packs greatly increase reliability.

As I mentioned previously, there are many different grades of nickel-cadmium cells on the market today with greatly differing capacities. SR Batteries use nothing but aerospace grade cells in all of their packs. These are the same grade of cells used in the F-16 fighter, B1, and B-52 bombers as well as the *Stinger* missile systems used by the good ole' USA military. If it's good enough for Uncle Sam (money is *no* object) they certainly can meet our standards. All kidding aside, when you consider the price of the average R/C model today, don't you think the slightly increased price for these packs is worth the peace of mind? We have enough trouble keeping our models together with our "piloting" without having to worry about battery failure.

Every cell in an SR Pack is matched to every other cell in both capacity and charge/discharge characteristics. The two packs supplied to me for this review (900 & 1200 Series EP MAX) had exactly the same charge/discharge characteristics and no matter what the level of charge in the pack the voltage across each cell in each pack was exactly the same as every other cell in the pack (all readings taken with a digital VOM (volt/ohm meter) to the 1/100 of a volt).

Another feature of SR battery packs is that they will not develop a "memory" from partial charge/discharge cycles thereby decreasing capacity. SR will replace any pack that forms a "memory" within one year of purchase.

According to manufacturer's specs, these packs will only lose 1% of their capacity per day after charging. Charge this week, run



There's a lot of subtle but important engineering in the SR EP MAX Pac. One feature is the high temperature silicone adhesive used to join the cells. Another is the welded strain relief connections between cells.

next week with only a 7% capacity penalty.

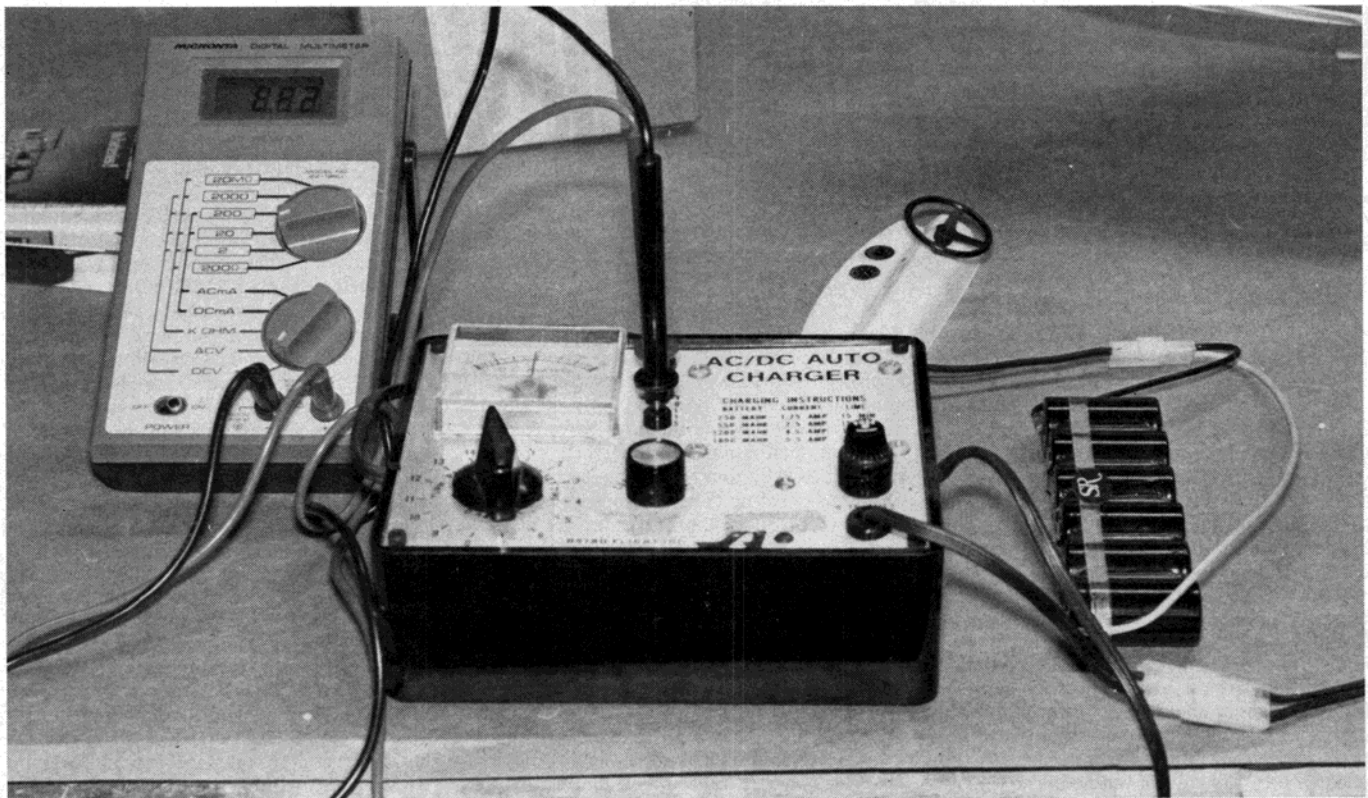
Another feature of the SR EP MAX pack in addition to the very fast charge/discharge rating is that you can leave them charging at a 14 to 16 hour charge rate indefinitely without any damage. SR packs can also be left in any state of charge for periods of up to ten years without damage.

One final but very important feature of all SR batteries is their "precision piston" sealing system. Unlike other cells which will continue to vent once they have been over

charged ("beer can" venting—Ed.), greatly decreasing their capacity, SR cells will re-seal themselves once the overcharging condition has been removed.

What Mr. Larry Sribnick has done is make a superior grade battery pack available to the general modeling public at an affordable price.

For more information, prices and quotes on custom packs contact Larry personally at: SR Batteries Inc. Box 287, Bellport, NY 11713, (516)286-0079.



A digital voltmeter has been hooked up to a fast charger to determine the moment of total charge, the first sign of voltage drop-off.

R/C Scale Boats

By Eric Goldschrafe



PHOTOGRAPHY: ERIC GOLDSCHRAFE

Small scale sister of the real *Texaco Diesel Chief* which appeared in the April 83 column, Glenn Van Cott's *Texaco Fuel Chief* employs many of the techniques and equipment discussed in this update on model tugs.

In the May, 1983 issue of *FLYING MODELS*, the Scale Boating column dealt in part with the group project underway with the Hank's Hobby Shoppe Boat Crew. The gang had made up a plug for a modern tug in 1/2 inch scale, measuring 58 inches in length, and had "pulled" half a dozen hulls out of the resultant mold. The October issue had a photo of Hank Gallo testing his completed hull in Northport Harbor out on Long Island.

A lot of interest, and a lot of questions have made their way to us from all over North America, and as far away as Brazil, about these tug models, so it's a good time for an update and an engineering session. Many ask about the motive power in models of this mass, and, in my opinion, no other motor can beat the Marx Hectoperm with the pile gearbox. This motor retails in the eighty-dollar bracket, but there is no equivalent at any price. The auto windshield wiper and power seat motors might be low in cost, but

they're both high-current units, and the seat, and also power window motors are not designed for continuous use. The wiper motors generally have an oddball shaft that will have to be cut down or modified before using, and then must run through a gearbox to the prop, since they don't have the torque for a direct drive set-up. The Hectoperm puts out plenty of torque when geared at 4:1 or 6:1, and it is very efficient, drawing only a few amps; at full stall, it only draws about twelve amps. The pile gears that come with this motor may be arranged to put out from a 3:1 to a 360:1 reduction ratio. The 4:1 or the 6:1 gear, depending on the propeller selection, will give the best all-around capability.

The May issue also had a product review on the Dynamic 53 inch tug, which mounted a single Hectoperm driving a 4-inch, 4-bladed propeller. This model could easily pull a large cabin cruiser or several loaded rubber boats in tandem. Hank's new tug mounts a pair of Hectoperms, driving twin props in Kort noz-

zles. Since the Kort nozzles increase the efficiency of the propellers, this tug ought to be more than twice as powerful as the single-engine craft.

An installation such as this requires that everything be securely mounted, because the torque produced could rip apart a poorly-constructed driveline. Dynamic Models has a good mount which allows some fore-and-aft adjustment, and bolts or screws to simply-made wooden blocks resined into the hull bottom. The inboard end of the propeller shaft should also be firmly braced in position, with a critical eye for misalignment which could cause bearings and couplings to wear out rapidly, as well as cut down efficiency. Dumas dogbone and socket universals were used in all of the tugs, mostly because they do a good job, but in the event a hunk of wood or a piece of tow rope gets caught in the prop, the nylon dogbone will shear, saving expensive damage to the motor or gearbox. It's quite easy to loosen the Dynamic motor mount a little, slide the motor back a bit, and slip in a new dogbone. Hank has done this in the middle of Long Island Sound from a rubber boat — he and some friends were towing themselves to a picnic site with a convoy of tugs and boats when the universal let go. By the way, Dynamic has metric-sized couplings that fit the Hectoperms and mate to the Dumas parts.

Stock Dynamic prop shafts and housings are utilized, with automotive wheel bearing grease used as a lubricant. This grease won't break down, even after years of use, and it won't mix with water, which helps to keep it out. I've used this stuff for over twenty years, and never had a bearing wear out or water leak in, and never had to re-pack even a home-made shaft.

Club member Irv Hermann fabricated a matched set of four-blade props out of brass, and a pair of Kort nozzles from PVC plastic pipe for Hank's tug, and the difference in performance was immediately realized. The thrust was tremendous, enough to cause minor driveline problems at first. Dynamic Models has thrust bearings which must be used on the propeller shaft in front of the prop, or serious problems will show up later, such as broken gears or motor parts. One of the photos shows the Kort nozzles, standard twin rudders, and the flanking rudders. This setup might seem somewhat complicated, but the twin rudders are tied together, and all four flanking rudders are linked together. The flanking rudders are operated by their own servo, independently from the main rudders, to gain increased maneuverability. An experienced skipper can move a tug equipped this way in a sideways movement from a dead stop. Hank uses a four-channel control system, one for each speed control, one for the main rudders, and one for the flanking rudders. Heavy-duty servos are useful for moving the multiple rudders.

While Hank was busy testing out all of the mechanical parts and linkages (we think that

this might be the first tug equipped this way), another group member went ahead and finished his tug, done in a more conventional manner. Glenn Van Cott, of Cold Spring Harbor, NY, modelled his boat after the *Texaco Fuel Chief* (alert readers will recognize this as a sister ship to the real *Texaco Diesel Chief*, which was featured in the April, 1983 issue of FM). Glenn is most qualified as a model tug builder, being employed by Jakobson Shipbuilding in Oyster Bay, NY, a yard that has produced many fine tugs in full scale.

The model *Fuel Chief* is powered by twin Hectoperms driving two conventional propellers. The battery, as with all of the other tugs mentioned in this article, is an automotive-style lead-acid battery. This is really quite cost-effective, as you'd probably spend two or three times as much for nickel-cadmiums or gel cells with as much amperage, and then you'll only have to add ballast to make up the difference. A car battery should run one of these boats for several days before it needs re-charging, and a deep-discharge marine battery should last longer.

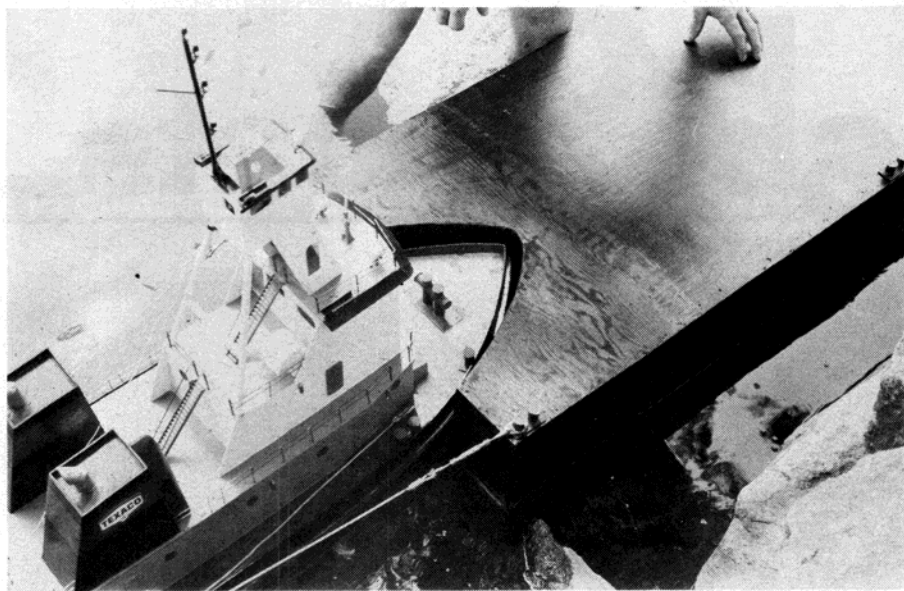
Besides the powerplant described above, Glenn detailed the upperworks in prototype fashion, with a complete set of lights to top it off. Not only do the navigation lights and towing lights work, but a set of deck lights illuminates the entire boat for operating in evening and night sessions. A barge was also built for this model, but with a "notch" in the stern for the "unitized" tow method. As may be seen in the photos, the tug's bow fits into the "notch", and when the lines are hauled in tight, the two vessels form a single unit. This arrangement allows precise control in congested waters, which is difficult with a stern tow, especially in river currents. Glenn has used this feature to rescue disabled or foundering models, by having one of the gang ride prone on the barge while he maneuvers into position. The disabled model is taken in tow, or, raised up onto the barge where the flat surface allows damage-free transport back to shore.

The *Fuel Chief* is finished in standard Texaco livery, with a black hull, red oxide main deck, medium gray cabin and upper decks, white wheelhouses, black funnels, and red, black and white logos.

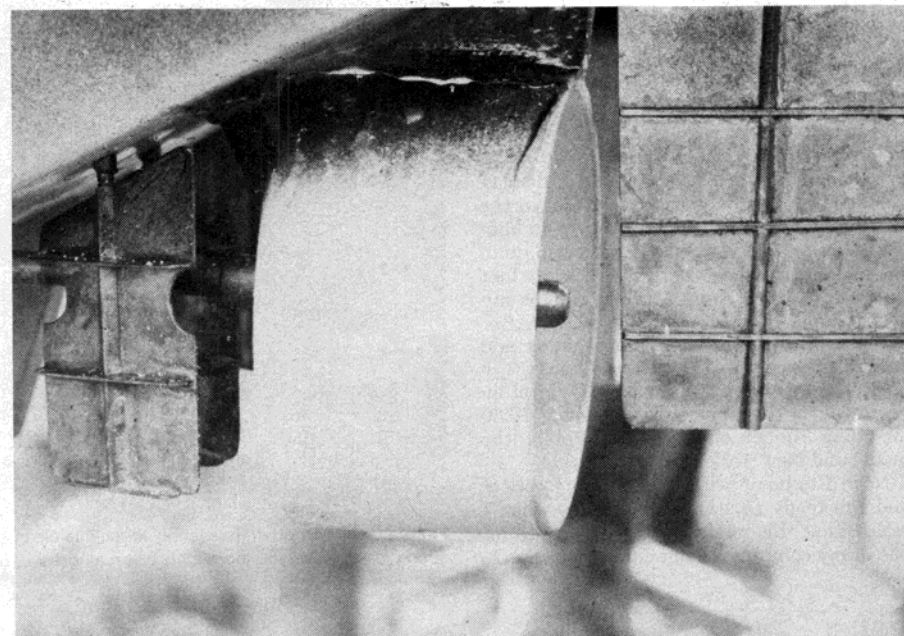
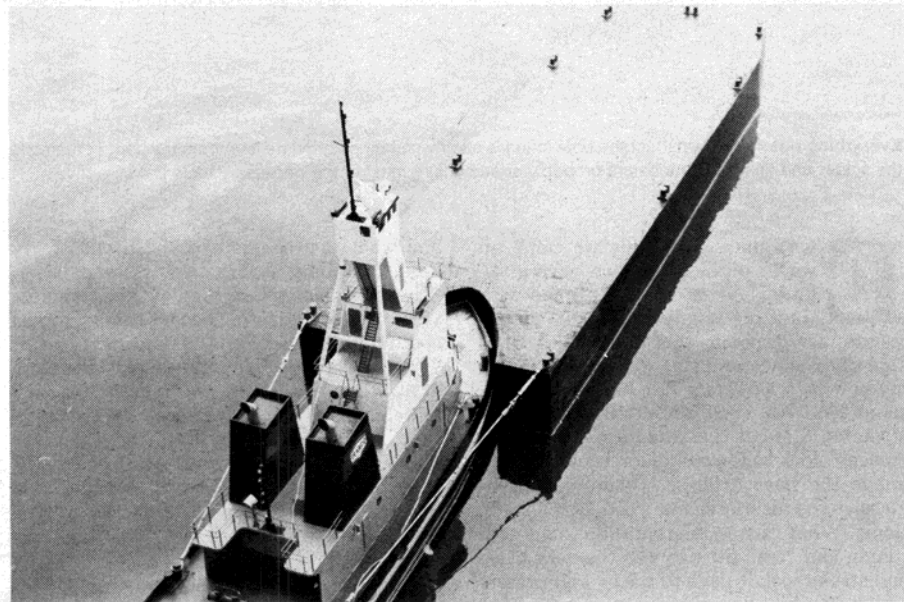
Clayton exhibit

Our good friend Abe Taubman (of Taubman Plans Service) gets involved with model boating in many ways. Besides having what is probably the largest selection of plans in the world, he is the secretary for the Ship-crafter's Guild in New York City. He attends all of the shows in the northeast, indoors and out, and he helps out with the big static and R/C scale boat show at the Shipyard Museum in Clayton, New York, to be held over the Memorial Day weekend. Anybody interested in attending a quality show at a very scenic location (along the St. Lawrence River) should contact Abe at 11 College Dr., Box 4G, Jersey City, NJ 07305, for details. ☞

FLYING MODELS

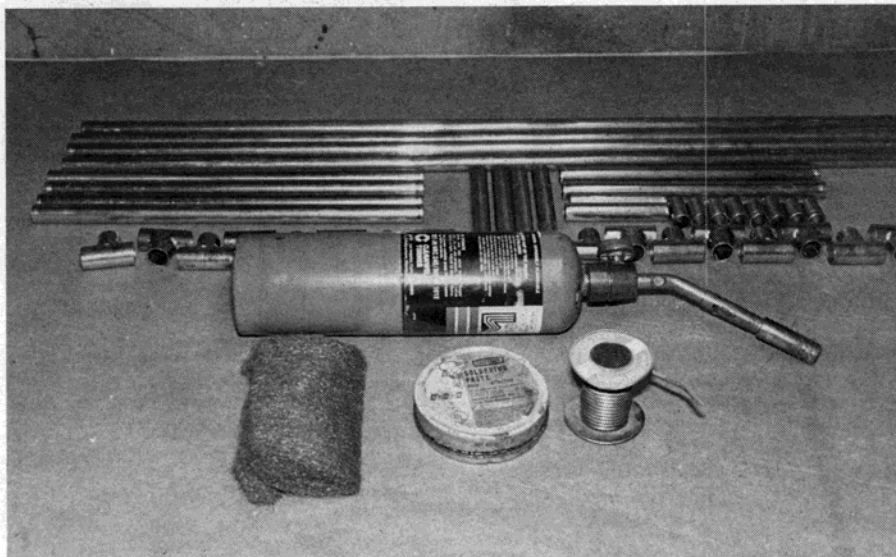


A barge complements Glenn's tug. A notch was cut in the stern (above) of the barge to mate it firmly to the bow of the tug. With this unitized tow, precise control is maintained (below), a necessity in congested waters. With the combination of Kort nozzle, standard and flanking rudders (bottom) a tug skipper can move his tug sideways from a dead stop. Flanking rudders are independent of the main rudders.



R/C Sport Boats

By Vic Macaluso



PHOTOGRAPHY: VIC MACALUSO

Everything needed to construct the boat stand is a fairly common hardware item from the copper tubing to the solder and flux. Most modelers probably already have most of the necessary tools shown above.

Every once in a while we come up with a problem that has several solutions, at several prices, and with just as many different visual results. The problem this month was what kind of display stand should I use to display my new $\frac{1}{5}$ scale *Atlas Van Lines* at the upcoming WRAM and Toledo consumer shows. I wanted a stand that would give a certain "macho" look to the overall presentation and image the boat exudes. I dismissed plexiglass as too futuristic and wood as too traditional. What caused me to decide to go with tubing and "tee" fittings was the very basic and strong look it gave to the overall presentation. My first decision was to go with PVC pipe and tee fittings because of the ease with which this material works and that the only tools needed to accomplish this project are a hack saw and the proper adhesive. My mind was made up to use PVC materials until I saw the price! With all costs factored in, the cost to build this simple stand with PVC pipe would have been \$32.80! No way was I going to spend that much just to build a display stand. I was just about ready to leave the plumbing department and head over to lumber (all of a sudden wood did not seem quite so traditional) when the price of a 10 foot length of $\frac{1}{2}$ inch copper tubing caught my eye. It must be mis-marked at \$2.69! After checking through several more pieces and checking the prices of $\frac{1}{2}$ inch tee fittings (17¢ apiece) my decision was made. My total investment for the stand shown here was \$9.60 including rubber end caps to protect the model and New York state sales tax!

Now, I'm home with all this shiny copper and I'm ready to start cutting pipe when I realize that this might be a good how-to for one of my columns, so out comes the camera

and what you see here is the result of my need for a light, strong display stand.

I won't go into the design of this stand (obvious from the photos) because every model is different so all dimensions will have to suit your particular model and display position. My *Atlas Van Lines* was tilted approximately 30° to display the scale cockpit interior.

The first thing to do is gather up the proper tools. A pipe cutter is recommended because it eliminates the burrs resulting from cutting with a hack saw. Steel wool, sol-

dering paste, (flux) solder and a propane torch are all the other tools necessary for this project.

If you are a plumber or pipe fitter you might as well stop reading here because you already know how to "sweat" (solder) a joint, but if you're like most of us this process still has some aura of mystery attached to it, so read on.

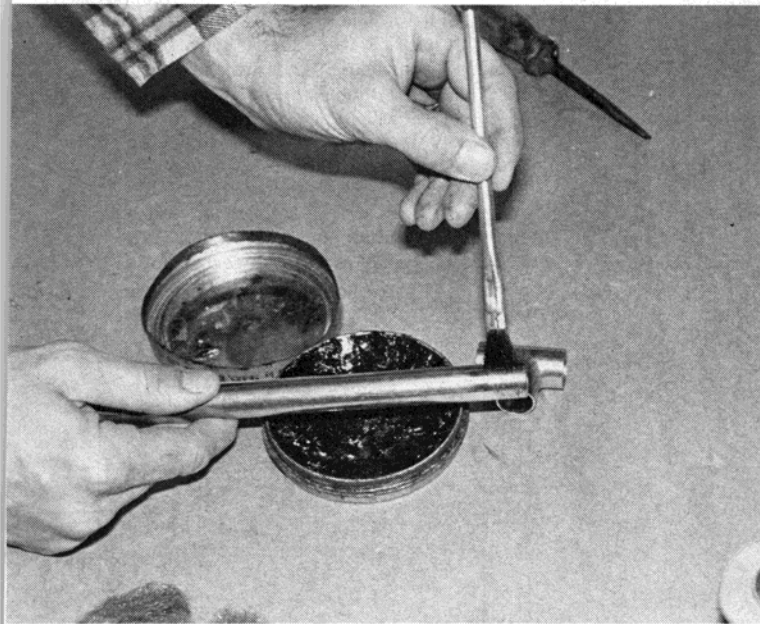
Assuming you have settled on a design and have pre-cut all of the necessary pieces of pipe, the next thoughts and only thoughts should be *clean, bright and shiny!* In order to successfully "sweat" solder copper tubing these three words should govern everything you do before the actual soldering. Using steel wool or fine sandpaper *thoroughly* clean and polish the ends of the pipes that will be soldered into the tee fittings. Also clean and polish the *inside* of the tee fittings that the pipes will slip into. I can't stress enough how important this is. Even a slightly contaminated joint (finger prints are enough to do it!) will not solder properly and fail at a later time.

Once you have properly cleaned all joining surfaces, using a small "acid" brush, apply a light coating of soldering paste or flux to all mating surfaces. This will insure an even flow of solder into the joint as it's heated. With this step complete, assemble as much of the stand as possible before starting to solder. With my stand, I was able to assemble the whole thing. With this method you can move and align each part of the stand for a perfect fit. At this point, you should be ready to start the "sweating" process. It's also a good idea to raise the stand above the work surface on bricks because these will carry away very little of the necessary heat and will also protect your work surface.

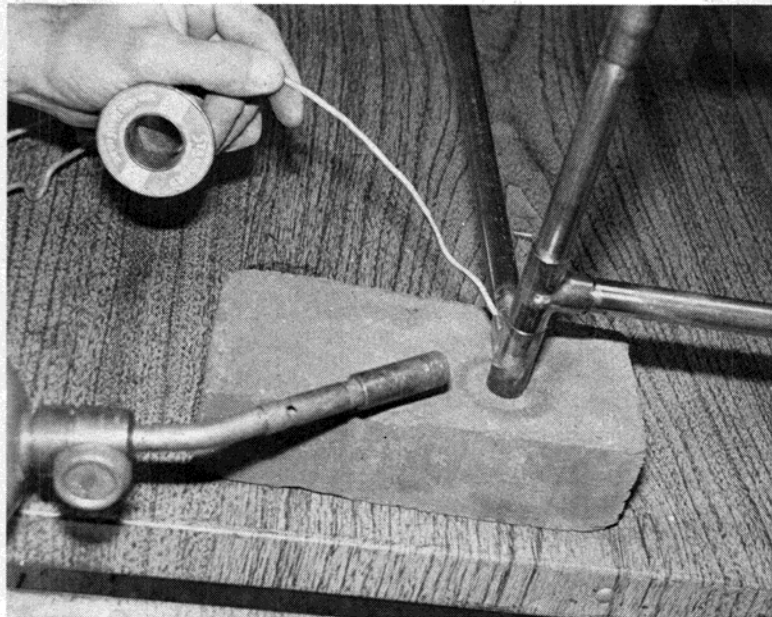
Wearing eye protection we are now ready



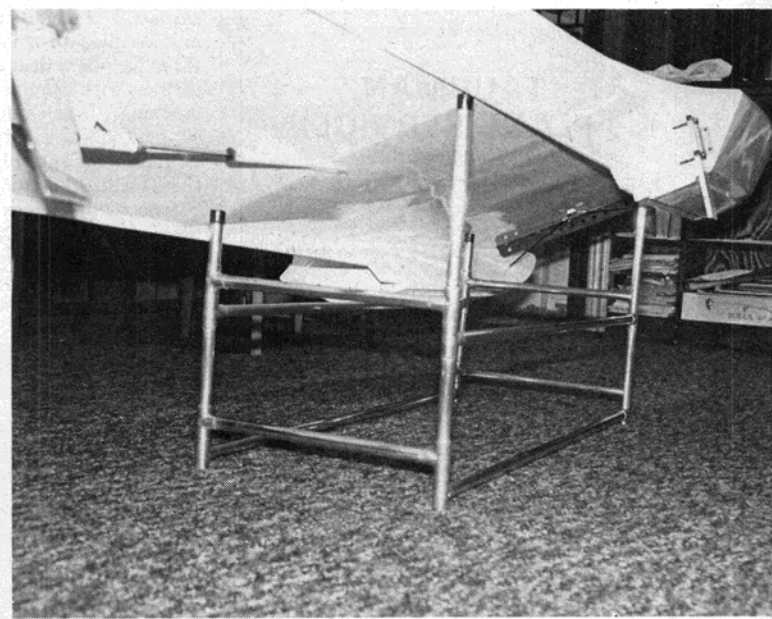
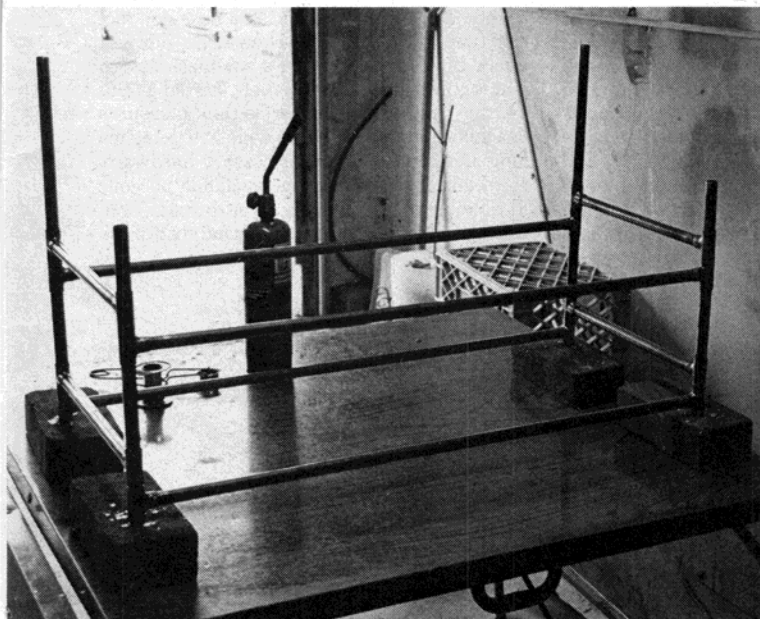
First lesson learned in "soldering school" is clean and bright. No amount of heat or flux will give a good strong joint unless you thoroughly clean all grease, oil, or oxide off parts to be soldered.



After the parts have been cleaned, soldering paste, or flux, is applied to all surfaces on which the solder must flow (above). The stand assembled and soldered (below), waiting for a final polishing and the protective end caps. The net result is a strong easily assembled stand.



As you solder, heat is applied evenly to the joint in the amount sufficient to just get the solder to melt and flow smoothly into the joint (above). Too much heat and the solder flows too much and puddles. The boat rests on the assembled stand (below) in preparation for its WRAM debut.



to start soldering. Starting on the higher joints (any solder that splashes on the lower joints will be removed when they are soldered), apply heat (torch) slightly on the tee fitting side of the joint. As the joint heats up, touch the solder directly to the joint. If the right amount of heat has been applied the solder will instantly melt and be drawn (wick) into the joint and toward the heat source by

capillary action. When no more solder will flow into the joint it has been properly "sweated" and the heat should be removed. Using this method, solder all the joints, being careful not to move anything until the solder hardens (it only takes a few seconds). If the solder does not flow properly, one or all of three things could be happening. Too little heat, dirty joint, or too much heat. This is

not a difficult thing to do but it does take a little practice to develop the right "feel" for things. Be patient and it will work.

The nicest part about making a display stand from copper tubing is that when all the construction is complete a little steel wool and copper polish will yield a gleaming piece of work you will be proud to display your model on.

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(When sending inquiries, please include a S.A.S.E.)

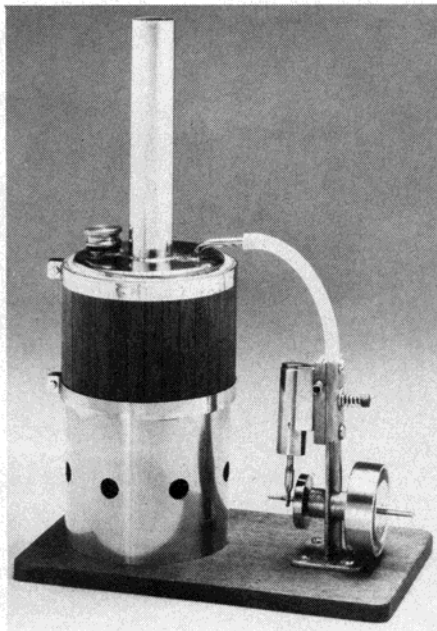
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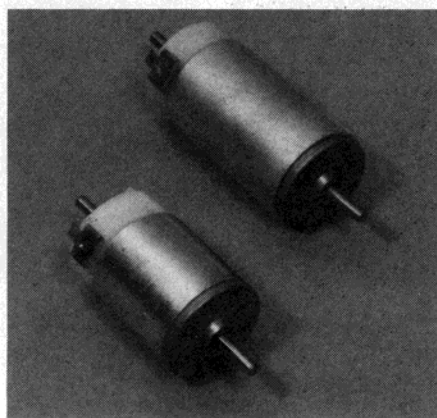
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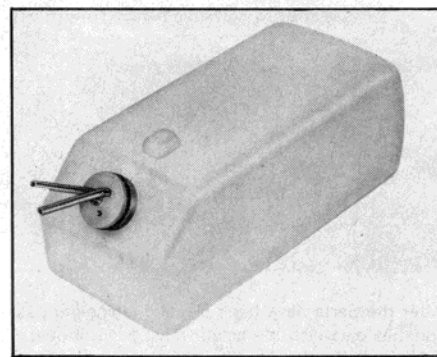


MIDWEST PRODUCTS CO., INC., PO Box 564, Hobart, IN 46342, has introduced a small steam engine which can be used with the Midwest/Laughing Whale boat line. The engine, the Model VI Steam Engine, Boiler, and Burner, is a small single cylinder oscillating unit coupled to a vertical boiler. Some features include a heavy copper boiler wrapped in brass with genuine mahogany lagging, and machined brass parts. Assembly requires simple tools and only a little soldering is required. The Fantail Launch II (kit #958) and the Tug kit (kit #956) are perfect subjects. Sterno fuel provides 10 minutes of running time. The Steam Engine retails for \$59.95 and is kit no. 980. See your local hobby dealer or contact Midwest at their address above for more information.

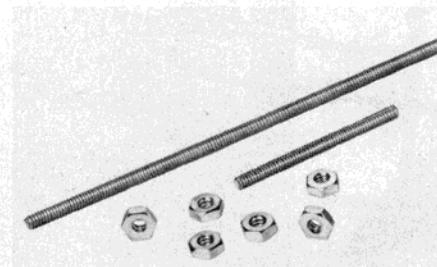


DYNAMIC MODELS, Drawer C, Port Jefferson Station, NY 11776, has recently added a number of high quality, low cost electric motors to their model boating product line.

They are smooth, quiet, interference-free motors ideal for small models or for twin engine power in hulls 24 to 50 inches long. Catalog number L-1 measures 4.750 inches long and 1.625 inches in diameter and turns up 2300 RPM @ 12VDC, 0.30 amps. Number S-1 measures 3.50 inches long with a diameter of 1.625 inches and runs at 2075 RPM @ 12 VDC, 0.22 amps. Both motors have a heavy gauge steel can with a solid nylon end bell, and quality oilite bearings on both ends. Number L-1 sells for \$12.95 each while S-1 is \$9.95 each. Contact Dynamic Models at their address above for more information.



SULLIVAN PRODUCTS, PO Box 5166, Baltimore, MD 21224, has added a new size fuel tank to their extensive line. The new 24 ounce tank is the same new seamless design and is compatible with all fuels. Listed as SS-24, this heavy wall slant style tank measures 2 3/8 inches high x 3 inches wide x 7 1/8 inches long and comes with all necessary hardware. It retails for \$3.95 and is available at your local hobby dealer. For more information, contact Sullivan Products at their address above.



SULLIVAN PRODUCTS, PO Box 5166, Baltimore, MD 21224, now has available a new product, 4-40 full thread studs. There are two lengths, 1 1/2 inches (#491) and 12 inches (#495) as well as matching 4-40 nuts (#490). They're at your local hobby dealers; if you'd like more information, contact Sullivan Products at their address above.

TOWER HOBBIES, PO Box 778, Champaign, IL 61820, has added the Hydrom-M 12 volt motorcycle battery to their line of R/C



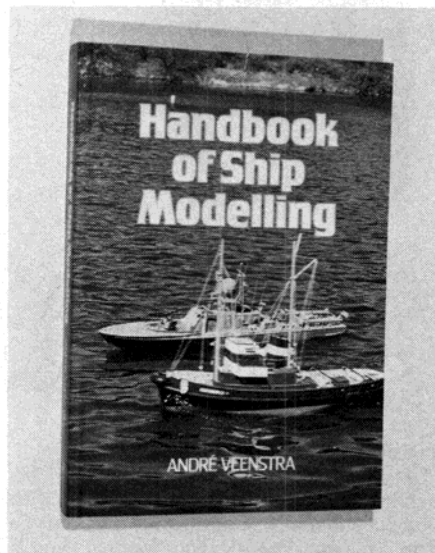
equipment. This battery adds one additional feature to Tower's previous 12 volt battery. The new Hydrom-M has a clear plastic case to see through to check electrolyte level for charge determinations or bad cell detection. The battery measures $4\frac{3}{4} \times 2\frac{3}{8} \times 5\frac{1}{8}$ inches and delivers 5 amp hours. For more information or to place an order, contact Tower at their address above or call (Cont. US only) 800-637-6050.



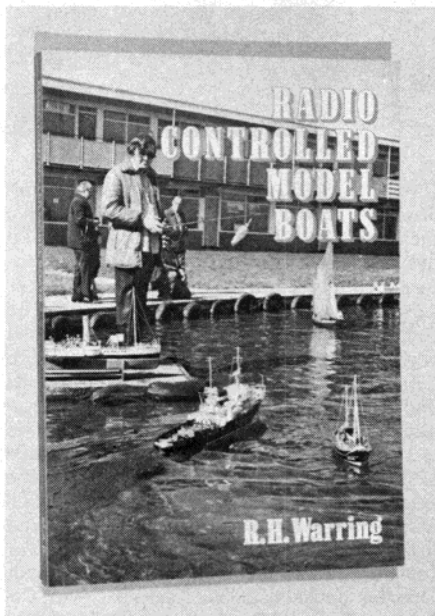
SATELLITE CITY, PO Box 836, Simi, CA 93062, is now distributing a new, "in-between" size bottle of their popular Hot Stuff™ cyanoacrylate adhesive. The new $\frac{3}{4}$ ounce size, in the "E-Z Squeeze" bottle, will list for \$3.95 and will still have Satellite City's unconditional guarantee. Check your local hobby dealer for availability.

ARGUS BOOKS, LTD., 14 St. James, Watford, Herts, England, has recently introduced *Handbook of Ship Modelling* by Andre Veenstra, a member of the British scale boating team. Originally published in 1981, the book is a complete how-to for scale model boaters and covers the latest in technology. The format is 6×8 inch soft cover format which has 242 pages and 13 chapters covering many important aspects of preparation, construction, R/C systems and installation, propulsion and power, finish, detail, and scale oper-

FLYING MODELS



ating mechanisms. Besides the clearly written text, there are close to 150 illustrations and just as many photos as well as appendices to guide the scale boater in his own project. Carstens Publications, PO Box 700, Newton, NJ 07860 offers this book for \$11.95 to American scale model boaters. For additional information, contact them at their address or call 201-383-3355.



ARGUS BOOKS, LTD., 14 St. James, Watford, Herts, England, has released *Radio Controlled Model Boats* through American distributors. This book, written by R.H. Waring, is a beginner's overview of the basics involved in R/C model boating, whether it be competition, scale, or sail. The 124 pages, in 6×8 inch soft cover format, illustrate with numerous charts, illustrations, and photos the techniques involved in the construction, set-up and operation of model boats. Eleven chapters introduce the novice boater to the radio system and its installation, the electric motors and glow engines used for power, and the important "little" things to know before the model's maiden voyage. *Radio Controlled Model Boats* by R.H. Waring is available from Carstens Publications, PO Box 700,

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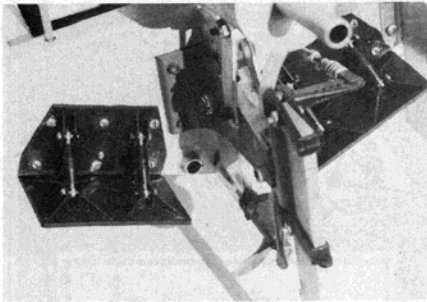
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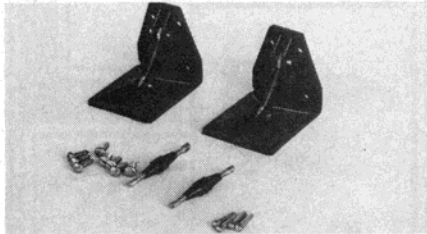
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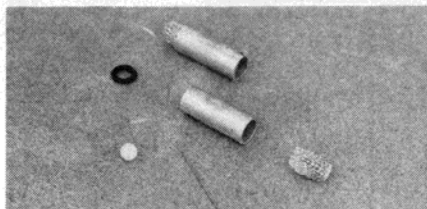


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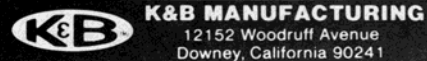


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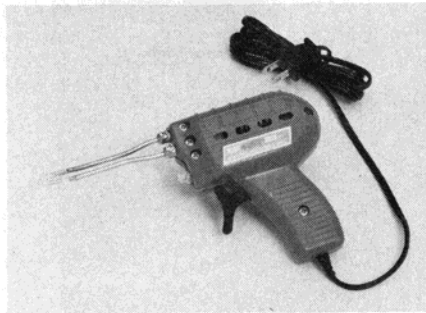
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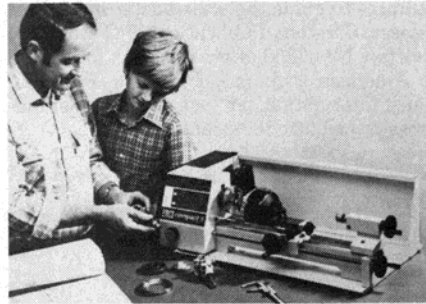


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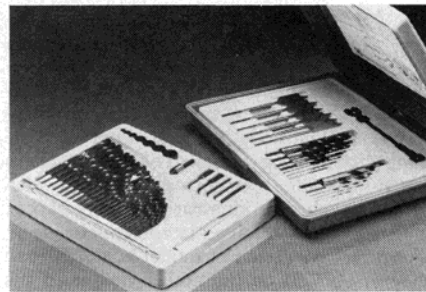
Newton, NJ 07860 for \$8.95. Contact them if you'd like additional information.



POLK'S MODEL-CRAFT HOBBIES, Dept. 0764, 346 Bergen Ave., Jersey City, NJ 07304, has available a low-cost soldering gun with quick heat and a comfortable pistol type grip. This gun, SG-101, lists for \$6.00 and is available from Polk's. For more information, or to order, contact Polk's at their address above.

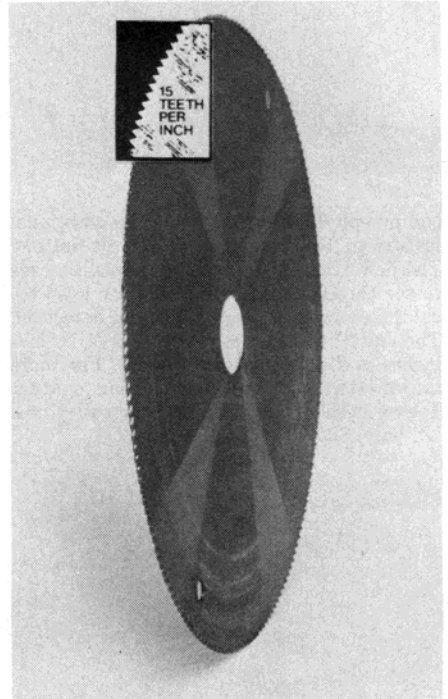


EMCO MAIER, 2050 Fairwood Ave., Columbus, OH 43207, has introduced a new five inch precision lathe designed for home shop use, instrument makers, and modelers to perform straight turning, facing, boring, taper turning, and thread cutting. Named the Compact 5, it has a five inch swing over bed with six spindle speeds ranging from 250 to 2800 RPM. The combination of its heavy bed and belt drive make this 2/3 HP lathe virtually vibration free. Distance between centers is 14 inches and the hole through the spindle is .63 inch. Weighing only 44 pounds, the Compact 5 has a full line of accessories available as well as a complete vertical milling and drilling attachment. Base price is \$795. For further technical information, contact Douglas Jackson, 2050 Fairwood Ave., Columbus, OH 43207 or call 614-445-8328.

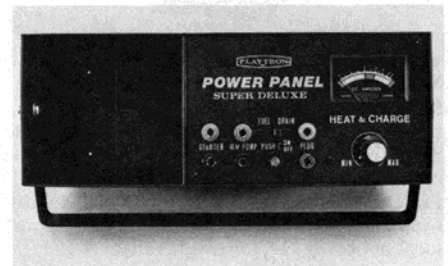


DRI INDUSTRIES, PO Box 20612, Bloomington, MN 55420, has introduced a seven set 63 piece drill bit shop. The seven sets are organized in one heavy duty, carry and store, corrosion resistant case and con-

sist of: six piece power wood drill bits; seven piece drill bit set; 29 piece high speed drill bit set; seven piece brad point wood drill bit set; five piece masonry drill bit set; five piece power screwdriver and socket bit set; and a four piece accessory set. The entire collection of 63 drill bits retails for \$73.89 and comes with lifetime guarantee for the original purchaser. Contact DRI Industries at their address above for additional information.



JARMAC, PO Box 2785, Springfield, IL 62708, has developed a unique, fine tooth, four inch, circular saw blade for cutting wood, non-ferrous metal, and plastics. Made of tempered spring steel, the blade has a 1/2 inch arbor, is .016 inch thick (with a slightly wider cut due to kerf of saw teeth) and has 200 teeth on it. It is rugged enough to cut up to 5/8 inch oak and makes smooth, burrless cuts. For more information about this new saw blade, contact Jarmac at their address above.



AIRBORNE R/C DISTRIBUTORS, 7929 Parston Dr., Forestville, MD 20747, has introduced the Playtron Power Panel Box which has been designed to house both the Playtron Super Deluxe Power Panel or the Playtron Custom Power Panel. The extra thick, black enamel aluminum case will take all field abuse and there is plenty of room for a starter, fuel pump, and battery along with some extra little necessities. The Power Panel is not included. The box comes for \$24.95 at your local hobby dealer.

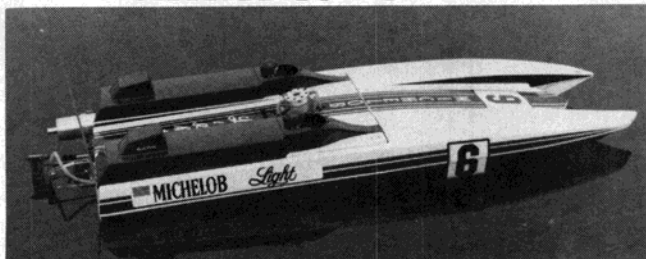


The full scale "Michelob Light" is always a top contender.
Photo courtesy of the "Needle-Nose Race Team".

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The "Michelob Light" is an Off-Shore Racing "Cat" that performs as well as it looks. Inspired by our proven "Mean-Machine" hull concept, our new semi-scale "Michelob Light" boat provides scale-like realism for the sport boater and top performance for the competition minded. An extra large hatch area exposes the entire aft section of the boat, enabling even twin engines to be installed without any cramping problems whatsoever. This boat will be a real crowd-pleaser wherever you race. It's got the potential of a winner!

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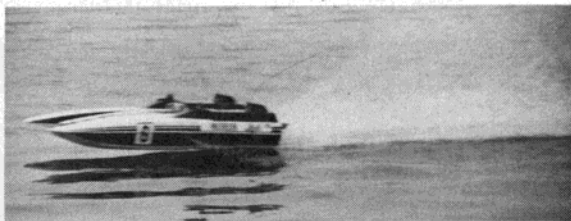
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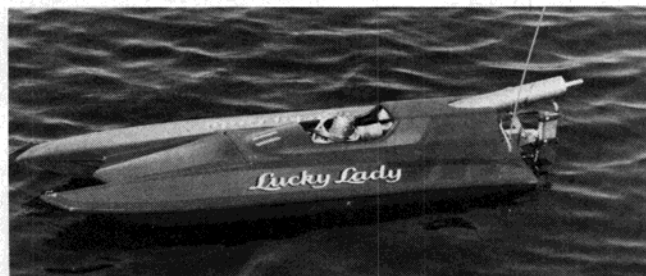
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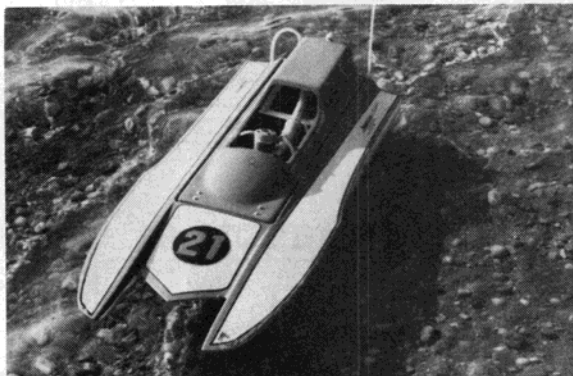
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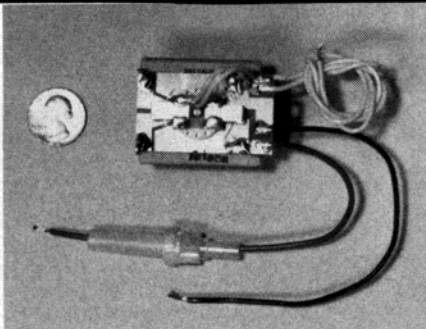
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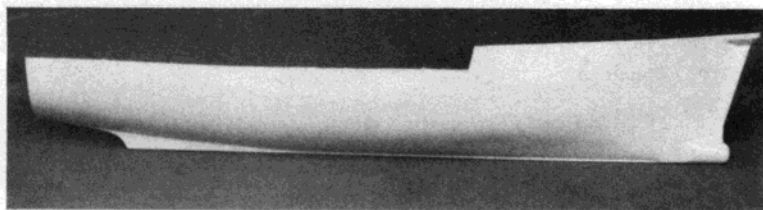
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R/C Model Boating National Organizations

AMYA

American Model Yacht Association

Barbara Maire, Exec. Sec.
2716 Briarwood Drive West
Arlington Heights, IL 60005
312/439-3121

IMPBA

International
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timetable

of coming events

ANDREWS, TEXAS—May 5-6, NAMBA District 7 points, heat racing, outboard, outboard OPC, deep vee, and unlimited hydro, hosted by Basin Aquanauts at City Park. Contact: Jim Olson, 7501 Mockingbird Land #9, Odessa, TX 79763; 915/381-6716.

SO. EL MONTE, CALIFORNIA—May 5-6, NAMBA Saturday Ladies & Kids Annual Day, Sun. unlimited hydro, hosted by Aili Racing Team with K & B Manufacturing Co. at Legg Lake. Contact: Jack Garcia, 8309 Birchcrest, Downey, CA 90240; 213/928-4865.

KENNEWICK, WASHINGTON—May 5-6, NAMBA District 8 points, heat race, offshore outboard, sport 40, deep vee, hosted by Bangor Model Boaters Assoc. at Columbia Park Lagoon. Contact: Rick Grim, 9015 Blake Ct., NW, Bremerton, WA 98310; 206/698-1141.

HUNTSVILLE, ALABAMA—May 5-6, IMPBA Heart of Dixie Classic Boat Race, open 3.5 outboard, open 7.5 outboard, open hydro, open mono and F hydro, hosted by Birmingham Model Boat Assoc.; mufflers or tuned pipes required. Contact: Thelmon Rochester, 7721 8th Ave. So., Birmingham, AL 35206; 205/836-2047.

WHEELING, ILLINOIS—May 6, IMPBA heat racing, hosted by Racing Dolphins at Potawatomie Lagoon, starts 9 a.m.; 95 dB limit, no 60 or greater classes. Contact: Bob Oaks, 220 Lewis Ave., Wauconda, IL 60084; 312/526-8526.

LANSING, MICHIGAN—May 6, IMPBA heat racing, all classes, hosted by Lansing Model Boat Club at Crego Park, starts 9 a.m.; tuned pipes required. Contact: Terry Walton, 1950 Hamilton St., Holt, MI 48842; 517/674-4907.

ANCHORAGE, ALASKA—May 13, NAMBA District 11 points, heat race, offshore, outboard, deep vee, record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Ralfuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

TACOMA, WASHINGTON—May 19, NAMBA enduro, outboard, sport 40, hosted by Puget Sound Model Boat Club at Lake Waughop. Contact: Jerry Dunlap, 119 Crestwood Dr., SW, Tacoma, WA 98498; 206/584-7131.

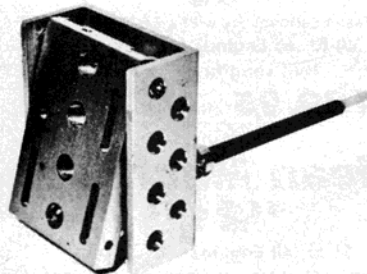
SACRAMENTO, CALIFORNIA—May 19-20, NAMBA District 9 points heat racing, unlimited hydro, sport 40, hosted by Sacramento Model Boat Assoc. at Beach Lake. Contact: Rich Kasis, 1271 Kennedy Lane, Sacramento, CA 95822; 916/442-8108.

VICTORIA, BRITISH COLUMBIA, CANADA—May 19-20, NAMBA District 16 points, heat racing, outboard, sport 40, hosted by Vancouver Island Model Boat Assoc. at Elk Lake. Contact: Ian Moore, 1998 Ferndale Rd., Victoria, BC V8N

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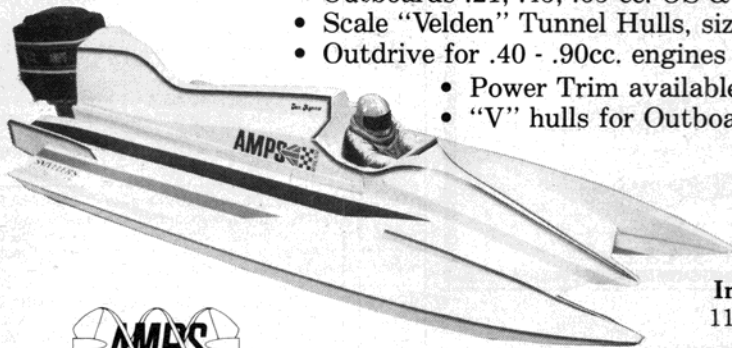
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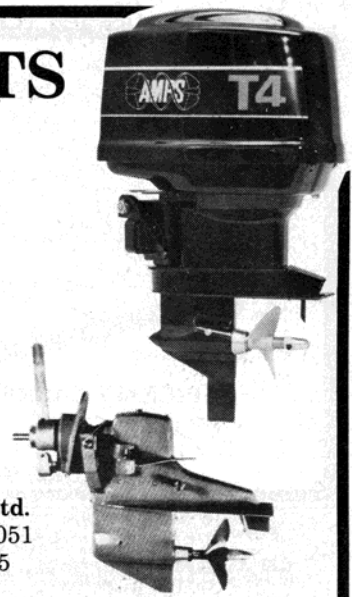
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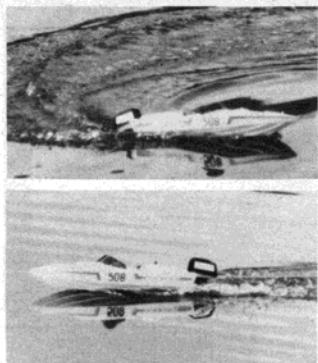
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LOMBARD, FLORIDA—May 19-20, IMPBA Fun Run, scale, electric, steam only, hosted by Northwest Commodores at Lombard Lagoon, from 9 a.m. to 4 p.m. (North Ave. & Grace St.). Contact: Larry Menconi, 8315 South Lockwood, Burbank, IL 60459; 312/425-6318.

SYLVANIA, OHIO—May 20, IMPBA open class hydro and deep vee, hosted by Propwash Unlimited at Olander Park, starts 9 a.m.; tuned pipes or mufflers required. Contact: Randy Beach, 936 Cloverdale, Toledo, OH 43612; 419/476-2724.

ST. LOUIS, MISSOURI—May 26-27, IMPBA unlimited hydro, mono trophies thru 5th, outboard tunnel hull 3.5cc and 7.5cc trophies thru 3rd, hosted by The St. Louis Thunder Boaters Gateway Unlimited at MO-WA-CO Lake, from 9 a.m. to 5 p.m. Sat. and 9 a.m. to completion Sun.; expansion chamber pipe required (or equivalent), no backup boats. Contact: Leah Kettle, 2000 Avon Dr., Florissant, MO 63033; 314/838-8358.

OKLAHOMA CITY, OKLAHOMA—May 26-27, NAMBA District 7 points, heat racing, outboard, outboard OPC, sport 40, deep vee, and unlimited hydro, hosted by Oklahoma City Model Boat Assoc. at Ghost Lake. Contact: Denny Preston, 3013 Hillside Dr., Del City, OK 73115; 405/672-4658.

CALGARY, ALBERTA, CANADA—May 26-27, NAMBA District 16 points, enduro, heat race, Super X hydro, unlimited hydro, outboard OPC, deep vee, hosted by Calgary Model Boat Racing Assn. at Carburne Lake. Contact: Brian Jessup, 639 Canterbury Dr., SW, Calgary, Alberta T2W 1J4, Canada; 403/281-4193.

SAN DIEGO, CALIFORNIA—May 26-27, NAMBA District 19 points, outboard, OPC outboard, hosted by San Diego Argonauts at Model Yacht Pond. Contact: Eddie Patten, 111-32 Madrigal, San Diego, CA 92129; 619/487-3646.

SO. EL MONTE, CALIFORNIA—June 2-3, NAMBA District 19 points, heat racing, hosted by Prop Nuts Model Boat Club at Legg Lake. Contact: Roger Wiechman, 1683 Mulberry Ave., Upland, CA 91786; 714/981-9482.

ANCHORAGE, ALASKA—June 3, NAMBA District 11 points heat race, offshore, outboard, deep vee and record trials, hosted by Alaska R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

WELLINGTON, OHIO—June 9-10, IMPBA multi racing A-B, C-D, E and F mono and hydro, scale hydro, and outboards (tunnel hulls only), hosted by Cleveland Model Boat Club at Clare-Mar Lakes, Inc., starts 9:30 a.m.; one boat per class. Contact: Bill Deptowicz, 4151 Oak Point Rd., Lorain, OH 44053; 216/282-2549.

CORALSTREAM, ILLINOIS—June 9-10, IMPBA heat racing, 3.5 outboard tunnel, B hydro, EF mono, EF hydro on Sat., B and D mono and D hydro, scale on Sun., hosted by Fox Valley R/C Boaters at Heritage Lake, starts 9 a.m.; 95 dB limit. Contact: Bernie Rich and John Copeland, 397 Bob o Link Dr., Bloomington, IL; 312/894-8548.

CAMPBELL, CALIFORNIA—June 9-10, NAMBA District 9 points, heat racing, sport 40, unlimited hydro, hosted by Marine Modelers of Santa Clara Valley at Campbell Perk Pond. Contact: Gary Morton, 22 Lyonridge Ln., San Mateo, CA 94402; 415/574-9120.

SO. EL MONTE, CALIFORNIA—June 9-10, NAMBA District 19 points, outboard, outboard OPC, hosted by Team International at Legg Lake. Contact: Tom Haggerty, 6378 Thunderbay Trail, Riverside, CA 92509; 714/681-1127.

EDMONTON, ALBERTA, CANADA—June 9-10, NAMBA District 16 points, heat race, offshore, outboard, OPC, deep vee, unlimited hydro, hosted by Edmonton Model Boat Racing Assn. at Lake Hermitage. Contact: Louis Omerzu, 10801 150 Street, Edmonton, Alberta T5P 1R6, Canada; 403/483-8392.

FORT COLLINS, COLORADO—June 16-17, NAMBA District 7 points, heat race, outboard OPC, sport 40, unlimited hydro, hosted by High Altitude Model Boaters/Rocky Mountain Marine Modelers at Sportmen's Lake. Contact: Doug Grant, 5374 D. West Canyon Trail Dr., Littleton, CO 80123; 303/973-7663.

HUNTSVILLE, ALABAMA—June 16-17, IMPBA heat racing and Second Annual Rocket City Classic, outboard riggers run with hydros, open water on June 15, hosted by Huntsville Model Boating Assoc. at Brahan Spring Lake, starts 8 a.m.; tuned pipes or mufflers required. Contact: Jim Brown, 3811 McEwen Dr., Huntsville, AL 35807; 205/852-0457.

OXFORD, MICHIGAN—June 17, IMPBA model boat race, hosted by Oakland R/C Model Boat Club at Oakland Pond, starts 9 a.m.; 3 boat limit, muffled or tuned pipes required. Contact: Keith Lowry, 241 Poco Ct., Rochester, MI 48063; 313/651-4358.

ANCHORAGE, ALASKA—June 17, NAMBA District 11 points, heat race, offshore, outboard, deep vee, record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

SEATTLE, WASHINGTON—June 23, NAMBA record trials, hosted by Seattle Model Yacht Club at Twin Lakes. Contact: Ron Erickson, 2212 NW 60th, Seattle, WA 98107; 206/782-7855.

SO. EL MONTE, CALIFORNIA—June 23-24, NAMBA District 19 points, heat racing, hosted by Fish & Chips / "R" / Outlaws at Legg Lake. Contact: Richard Fish, 19030 State St., Corona, CA 91720; 714/734-1709.

AKRON, OHIO—June 23-24, IMPBA A-B, C-D, E and F mono and hydro, outboard tunnels and scale hydro, hosted by Firestone Model Boat Club, starts 10 a.m.; tuned pipes suggested. Contact: Ralph Hoffman, 7301 Stone Hill NW, Canal Fulton, OH 44614; 216/854-3236.

WATERLOO, ONTARIO, CANADA—June 23-24, IMPBA heat racing, A-B, C-D, E-F mono and hydro, 20 outboard, District 1 scale 60 highpoint, hosted by Golden Triangle Marine Modelers at Columbia Lake, University of Waterloo, starts 9 a.m.; mufflers required. Contact: Jim Hallman, 45 Ripley Cres., Kitchener, Ont. N2N 1W2, Canada; 519/742-4533.

EVANSVILLE, INDIANA—June 23-24, IMPBA Third Annual Little Thunder on the Ohio Regatta heat racing, hosted by River City Racing Club at Moutoux Park, starts 10 a.m. and goes to dark. Contact: Walter (Curly) Burks, R.R. 1 Box 37, Poseyville, IN, 812/673-4603.

OXFORD, MICHIGAN—June 30, IMPBA Governor's Cup 1/8 scale hydro only, 4 heats plus winner take all final, hosted by Oakland R/C Model Boat Club, starts 11 a.m. Contact: Jerry Badgero, 1940 Lakeville Rd., Lot 45, Oxford, MI 48051; 628-9361.

WICHITA, KANSAS—June 30-July 1, NAMBA District 7 points, heat racing, hosted by Air Capitol R/C Model Boat Club at Windmill Lake. Contact: Ernest Nickens, 2428 Cedar Crest Dr., Wichita, KS 67223; 316/722-1974.

CALGARY, ALBERTA, CANADA—June 30-July 1, NAMBA District 16 points, enduro, heat race, deep vee, outboard OPC, unlimited hydro, Super X hydro, hosted by Calgary Model Boat Racing Assn. at Carburne Lake. Contact: Brian Jessup, 639 Canterbury Dr. SW, Calgary, Alberta, Canada T2W 1J4; 403/281-4193.

FREMONT, CALIFORNIA—July 7-8, NAMBA District 9 points, heat racing, sport 40 unlimited hydro, hosted by Model Mariners Inc. at Kaiser Kove. Contact: Keith Lingscheid, 32715 Lake Mead Dr., Fremont, CA 94536; 415/487-1942.

FT. WAYNE, INDIANA—July 7-8, IMPBA oval heat racing classes, hosted by Driftwood Model Boat Club at the 3 Rivers Festival, starts 9 a.m.; muffling devices required. Contact: Larry Eubank, P.O. Box 266, Grabill, IN 46741; 219/627-5270.

SAN ANTONIO, TEXAS—July 7-8, IMPBA hydro 20 - 40 - 60, mono 20 - 40 - 60, 20 outboard, scale hydro, open deep vee enduro (2 rounds), 4 entries per event, hosted by San Antonio Model Boaters at Loop 410 South at Interstate 35 South. Contact: John Borden, 10362 Sahara Dr., Apt. 4901, San Antonio, TX 78216; 512/341-4417.

BARTOW, FLORIDA—July 7-14, IMPBA Internats, all classes, hosted by Florida Associated Speed Team, from daylight till dark (1/2 hour drive from Disney World, Cypress Gardens, Sea World, etc.). Contact: Don Pinckert, 9 North Grant Ave., Masaryktown, FL 33512; 904/799-0595.

ANCHORAGE, ALASKA—July 8, NAMBA District 11 points heat race, offshore, outboard, deep vee, record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/248-2643.

OLYMPIA, WASHINGTON—July 14, NAMBA outboard OPC, outboard championships, hosted by Evergreen Model Boat Club at Lake Capital. Contact: Tom Dudley, 4112 - 60 St. E., Tacoma, WA 98443; 206/922-1486.

KENT, WASHINGTON—July 21-22, NAMBA District 8 points, heat race, offshore, outboard, sport 40, unlimited hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Pete Ferguson, 17331 SE 136th, Renton, WA 98056; 206/932-6031.

DALLAS, TEXAS—July 21-22, NAMBA District 7 points, enduro, heat race, outboard, outboard OPC, scale, unlimited hydro, deep vee, hosted by Big "D" Boaters at L. B Houston Park. Contact: Don Farmer, 2717 Willow Way, Mesquite, TX 75150; 214/270-7926.

EDMONTON, ALBERTA, CANADA—July 21-22, NAMBA District 16 points, heat race, offshore, outboard, outboard OPC, unlimited hydro, deep vee, hosted by Edmonton Model Boat Racing Assoc. at Lake Hermitage. Contact: Louis Omerzu, 10801 - 150th St., Edmonton, Alta. T5P 1R6, Canada; 403/483-8392.

ANCHORAGE, ALASKA—July 22, NAMBA District 11 points heat race, offshore, outboard, and record trials, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

ROSEDALE, WASHINGTON—July 26-29, NAMBA Scale Naval Warship Combat & Maneuvering, hosted by North American Scale Warship Combat Club at Meyer's Pond. Contact: Hal Smith, 826-A - 34th Ave., NW, Gig Harbor, WA 98335; 206/858-5221.

FREMONT, CALIFORNIA—July 28-29, NAMBA District 9 points, heat racing, unlimited hydro, sport 40-I, hosted by The Pipeline Racing Team at Kaiser Kove. Contact: Bill Prigley, 39624 Lahana Way, Fremont, CA 94538; 415/656-7072.



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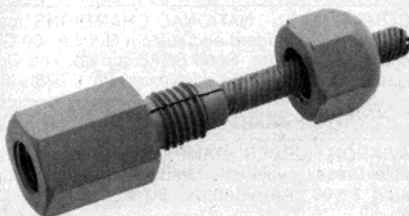
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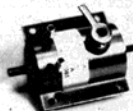


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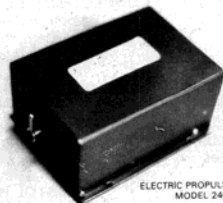
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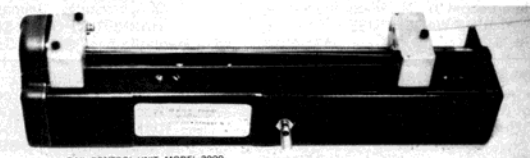
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Advertising Index for June 1984

Ace R/C Inc.	22
Aeromarine Laminates	82, 83
America's Hobby Center	13-15
American R/C Helicopters, Inc.	20
Associated Electrics	71
Beehive R/C Model Aircraft Co.	22
Bru-Line Industries, Inc.	87
Campbell's Custom Kits	16
Carolina-Taffinder	16
Carstens Flying Plans	29, 60, 61
Johnnie Casburn Mfg., Inc.	21
Champion Model Aeroplane	6
Cirus Hobbies	7
Cleveland Model & Supply Co.	9
D.G. Products	26
D&L Scale Ships	86
Davis R/C Hobby	12
Gene Dubois	16
Dynamic Model Products	84
Enya Products Co.	Cover III
Flying Models Magazine	19, 70, 90
Flyline Models, Inc.	21
Foam Scale Models	22
Fox Manufacturing Co.	23
Futaba, Inc.	Cover IV
GT Models	12
G&M Models	87
Golden Age Reproductions	8
Goliath Whirlwind Aircraft, Inc.	7
H.B. Engines®	53
Historic Aviation	11
Hobby Warehouse	86
Hugo International	12
Ikon N'WST	8
Indoor Model Supply	18
International Hobbies	85
International Marine Exchange	86
K&B Marine Specialties	82
K&S Engineering	12
King's Radio Control Hobbies, International	18
Paul Clement's Kitty Hawk Models	23
Stan Terryll-Lawrence Creek Studio	12
M.A.C.K. Products	87
Marine Specialties	81
Mark's Models	18
Micro-Mark	9
Mini-Marine Products	84
Model Products Corp.	18
Steve Muck's R/C Model Boat Supplies	80
Norco Marinecraft	87
Northeastern Scale Models	23
Nowlen Aero	4
Octura Models	86
Peck-Polymers	6
Penn Valley Hobby Center	8
Powermax	12
Prather Products	85
RAM (Radio Controlled Models, Inc.)	84
Repla-Tech International, Inc.	18
Rhom Products Mfg.	17
Richardson Precision Machine, Inc.	16
Rocket City R/C Specialties	4
Roush Manufacturing	4
Saf-Flite Models	6
Satellite City	70
Semco	17
Shamrock Competition Imports Inc.	85
Sig Mfg. Co.	16
Specialty Hardware Co.	23
SR Batteries Inc.	9
St. Croix of Park Falls Ltd.	21
Sterling Models	8
Tanha Tech	9
Tarno Aero Engines	6
Tatone Products Corp.	23
Taubman Plans Service	80
Teleflite Corp.	10
Tiny Tots	22
Tower Hobbies	10
Verdell Instrument Sales Co.	53
VL Products	20
World Engines, Inc.	Cover II
X-Acto	53
Zenith Aviation Books	5
Nick Zirolli	17

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Transmitter RF input 700 milliwatts • Modulation System: FM • Pulse Time Neutral Position: 1.4 milliseconds • Pulse Time Minimum Position: 1 millisecond • Pulse Time Maximum Position: 1.8 milliseconds • Operating Voltage: 9.6V to 12V • Typical Current Consumption: 150 milliamps • Dimensions: 7.1"x2.3" x 6.02" • Weight: 1.4 lbs • Frame Time: 18 milliseconds • Large easy-to-read battery meter (D'Arsonval meter to monitor battery condition) • Integrated circuit encoder for precision reliability and low current drain • Transmitter frequency: 72 megahertz band • 34 click stop trim levers for precise control • Positive throttle ratchet • FCC Type

Accepted • Diode protection on charging circuit • Easy to grasp knob switch • Neck strap attachment • Handle grip provided • Crystal controlled oscillator circuit • Knurled metal finger grips for positive grasp • 8 nickel cadmium rechargeable batteries supplied

Receiver FCC Certified • Operating Voltage: 4.8 to 6 volts • Operating Frequency: 72 megahertz • Intermediate frequency: 455 kilohertz • Selectivity: ± 4 kilohertz 6 DB down • Sensitivity: 5 microvolts • Typical Current Consumption: 10 milliamps or less • Dimensions: 1.6"x2.4"x.8" • Weight: 1.55 oz. • Antenna Length: 39 1/2" • C-MOS integrated circuit decoder • Receiver Type: Superheterodyne • Crystal controlled oscillator circuit

Servos Four servos provided • Three operate in standard direction, one servo operates in reverse direction • Idle

Current Consumption: 10 milliamps at 6 volts • Size: 1.6"x1.7"x.8" • Weight: 1.6 oz. • Three different style output discs supplied for each servo • Amplifier powered by dual inline integrated circuit and two external motor drivers • Rotary Output Torque: 41.6 inch-ounces • Splined output gear shaft for easily trimmed output • Heavy duty 3-piece servo case to resist crash damage • Powerful 17mm motor

System Features 15 month limited warranty • Servo trays supplied • Frequency flag is provided • 500 milliamp hour nicads supplied for receiver and servos • Dual output charger with light emitting diodes to indicate receiver battery and transmitter battery charging • Receiver and transmitter batteries can be charged simultaneously or independently • Switch harness with charging jack for easy charging

Acorns 5-Channel System with 4 servos, nickel cadmium battery pack, dual output charger, transmitter, receiver, switch harness with charging jack, servo trays, frequency flag. Featuring:

Transmitter Output 500 milliwatts • Modulation System: FM • Pulse Time Neutral Position: 1.4 milliseconds • Pulse Time Minimum Position: 1 millisecond • Pulse Time Maximum Position: 1.8 milliseconds • Operating Voltage: 9.6V to 12V • Typical Current Consumption: 150 milliamps • Dimensions: 7.1"x2.3"x6.02" • Weight: 1.4 lbs • Frame Time: 18 milliseconds • Large easy-to-read battery meter (D'Arsonval meter to monitor battery condition) • Integrated circuit encoder for precision reliability and low current drain • Transmitter frequency: 72 megahertz band • 34 click stop trim levers for precise control • Positive throttle ratchet • FCC Type Accepted

• Diode protection on charging circuit • Easy to grasp knob switch • Neck strap attachment • Handle grip provided • Crystal controlled oscillator circuit • Knurled metal finger grips for positive grasp • 8 nickel cadmium rechargeable batteries supplied • Dual rate control provided for ailerons • Dual rate control provided for elevator • On-off switch for 5th channel • 4 switches for reverse servo direction

Receiver FCC Certified • Operating Voltage: 4.8 to 6 volts • Operating Frequency: 72 megahertz • Intermediate frequency: 455 kilohertz • Selectivity: ± 4 kilohertz 6 DB down • Sensitivity: 5 microvolts • Typical Current Consumption: 10 milliamps or less • Dimension: 1.6"x2.4"x.8" • Weight: 1.55 oz. • Antenna Length: 39 1/2" • C-MOS integrated circuit decoder • Receiver Type: Superheterodyne • Crystal controlled oscillator circuit

Servos Four servos provided • Idle Current consumption: 10 milliamps at 6 volts • Size: 1.6"x1.7"x.8" • Weight: 1.6 oz. • Three different style output discs supplied for each servo • Amplifier powered by dual inline integrated circuit and two external motor drivers • Rotary Output Torque: 41.6 inch-ounces • Splined output gear shaft for easily trimmed output • Heavy duty 3-piece servo case to resist crash damage • Powerful 17mm motor

System Features 15 month limited warranty • Servo trays supplied • Frequency flag is provided • 500 milliamp hour nicads supplied for receiver and servos • Dual output charger with light emitting diodes to indicate receiver battery and transmitter battery charging • Receiver and transmitter batteries can be charged simultaneously or independently • Switch harness with charging jack for easy charging

Altech Marketing Inc., Enya Engines, Acorns Radio Control Systems

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