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WRAM
Show Report

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Two channel system, lightweight micro receiver, (2) 505 standard servos, battery case to accomodate drycells, switch harness, operating instruction manual, avail. on 27 MHz, 72 MHz (new freq. only), and 75 MHz. (Not included but are required 12 Double A batteries)

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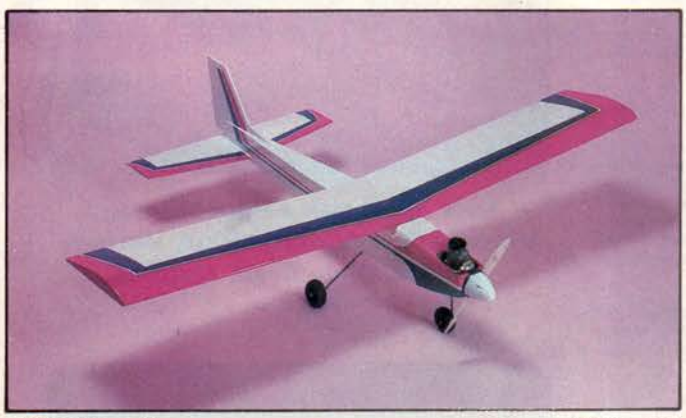
$139.95 with (4) 505 servos

Sugg. Retail $289.95



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WORLD ENGINES

INTRODUCTION

First, we want to tell you about all the different things we had in our Toledo booth this year. Even with this small type we are not going to make it in this short space.

We have to comment on the O.S. merchandise that we displayed on the table this year. We had on display the new O.S. Shay gear type live steam locomotive. This is a $15,000. retail item and we had a show special of $12,500. Surprisingly, two or three people at the Toledo Show expressed an interest in this locomotive. One of these interested parties has built the 3 ½" gauge Porter. The Shay runs on 4 ¾" track.

Mr. Mihara and Mr. Ojuri came over from Osaka, Japan and brought with them a display board of engines and some pictures of new engines. On the display board, the new engines were a 2.4 cubic inch Twin and 2.4 cubic inch four cylinder engine. The four cyclinder engine was a flat four and the same cylinder configuration you would find in a Piper Cub.

DESCRIPTION	PRICE
FF 240 Four Cylinder	$1250.
FT 240 Twin	$900.
FR 5 300 Radial	$1500.

We placed three large pictures of the new five cylinder radial on the O. S. board in our booth. These engines will retail for $1500. and the total of the five cylinder displacement will be 3 cubic inches. All the cylinders for the flat four are serviced by one carburetor. Both the four cylinder engine and the five cylinder radial are going to be delightful size engines for quarter scale. You not only get the scale appearance but you have got an engine that fits right in to the quarter scale size planes that would use this type of engine.

With all of the excitement in front of the booth some folks did not get around to looking at what we had on the backdrop boards. In the case of O.S., we showed all the helicopter engines as well as the new 108 size glow engine, some of the race car engines and the standard sport and pattern engines. Also on the display were photos of the new locomotives, the USRA Mountain and the T-6 Super.

HANNO PRETTNER CALYPSO

Hanno Prettner was at the trade show. He was at the Simpro booth working with their radios; however, we did get a chance to spend some time talking to him about the Calypso. The first Calypso kits are going to work with a 60 size engine. It will be the same size as the turn-around pattern version. These are particularly nice, almost ready to fly kits employing a blow molded fuselage with wire cut foam wings, which have been temperature soaked for three days to get them out of the mood groove of any warping. The wings are then covered with Obeechi. The rudder is cast on with the fuselage and the tail is made basically in the same manner as the wings.

Although the Calypso is a World Champion pattern airplane it is a type of airplane that anyone can fly. It is very forgiving and should be a delightful model even for the beginner. The Aviomodelli Calypso kit will retail for $199.95.

TARTAN AIR INTAKE

There was a lot of attention being given to these engines at the Toledo Show as they have a lot of style and they are nice looking in the front of any airplane. The Super Tartan with the Schnuerle porting offers about 50% more power than the standard Tartan and provides a lot more cooling fin area. When the Super Tartan was being developed it was put on an engine mount and run for 100 hours without any major signs of wear or any big problems developing. No repairs had to be made to make the 100 hours endurance test.

Early pictures of the Tartan engine showed the air intake in a configuration that hung down the the main engine frame. The configuration is still being offered and still works well in some installations. We are also offering the flat version. The engine that we are now selling has both the vertical and the flat part kit so the engine may be used with either configuration. In the future we are just going to stock the flat version; however, we will have some parts available to change to the B and C versions. The B version has the air intake hanging down, while the C version has the air induction routed past the rear of the engine.

We are now stocking the Super Tartan Twin with ignition and we are offering the Super Tartan Single, both glow and ignition version.

DESCRIPTION	PRICE
Super Tartan Twin Ignition	$695.
Super Tartan Twin Glow	$575.
Tartan Twin Ignition	$625.
Tartan Twin W/Muffler	$475.
Super Tartan Single Ignition	$225.
Super Tartan Single Glow	$175.

S-29 R/C RING SUPERTIGRE $84.95

This is Mr. Garofali's latest engine. It is a new basic engine, not a "re-hash" or a "stretch". Crankcase is all new. From a mounting standpoint, the S-29 will interchange with the O.S. 28 bolthole pattern.

There are quite a number of kits for .20 and .25's and the S-29 Schnuerle with ball bearings provides an opportunity to fly these models with a little more power - yet with still a compact engine.

Mr. Garofali has spent the last seven or eight years refurbishing his factory with the latest in Swiss and German grinding equipment. At this time his engines require virtually no break-in - a lot less break-in than some of his earlier models. He is also now making his piston rings in plant so more dimensional control can be held on the ring tolerances. This also adds to the quick break-in of the engine. Harry Roe's in plant test on this engine with 15% nitro, 20% Ucon oil fuel on a 8 x 6 TopFlite prop was 14,500 RPM's.

Check with your hobby dealer on this engine as World Engines has offered many hobby dealers an introductory promotion on this engine.

TEX WORLDTEX SOLARFILM

We have been offering Worldtex now for just over a year. We showed the material for the first time at Toledo last year. The reports from model builders on Worldtex have been very enthusiastic. Most say "this is the best covering material that I have ever used." The reason for this is the material's ability to cover compound curves. The material's adhesive also works well. No secondary adhesive is necessary. For an easy covering job, a couple of sprays with pure polyurethane makes a nice finish for very easy clean up - wiping the oil off of your model after the flight.

Solarfilm is a vinyl base covering material now distributed in the United States by World Engines. One of the differences between this covering material and the others is that Solarfilm goes on with less heat. This makes it a natural when covering foam and foam core board aircraft as the low heat does not cause any foam growth of the basic material. This material is also offered at quite a competitive price.

Worldtex comes in a 27" x 78" sheet which retails for $12.95 per roll. Solarfilm's sheet size 27" x 78" retails for $6.95 per roll.

CHEROKEE MODELTECH $96.90

The model of the Cherokee shown in the photograph was built in Cincinnati by Paul Benkner. Paul used the same color scheme that we saw on the original MODELTECH photographs. This was the model that was on our backdrop board at Toledo 1984. We also had some MODELTECH kits that were assembled but not covered at the show to reveal the quality of the woodwork on these kits.

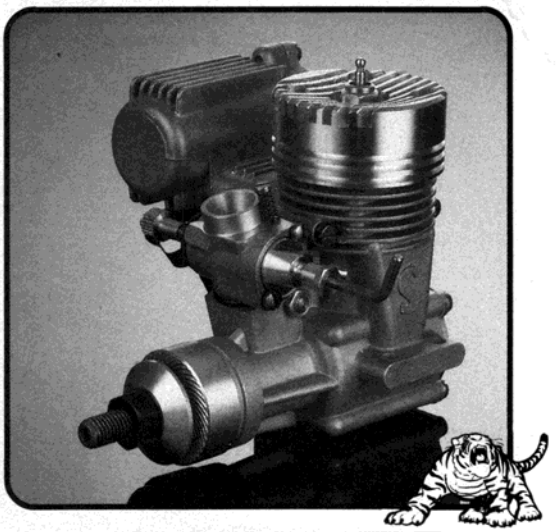
MODELTECH kits are wood kits. The wings for the most part are wire cut foam covered with 1/16" balsa. On all of the models, the wing tips are even sanded to shape for you. The wings are divided in half mainly for transporation of the kit. It is an easy matter to join the wings. In a matter of two or three hours of work you can easily assemble this airplane making it ready for painting or covering.

These are great models for Solarfilm. The wood can be filled and painted without covering if that is the method in which you generally finish your model.

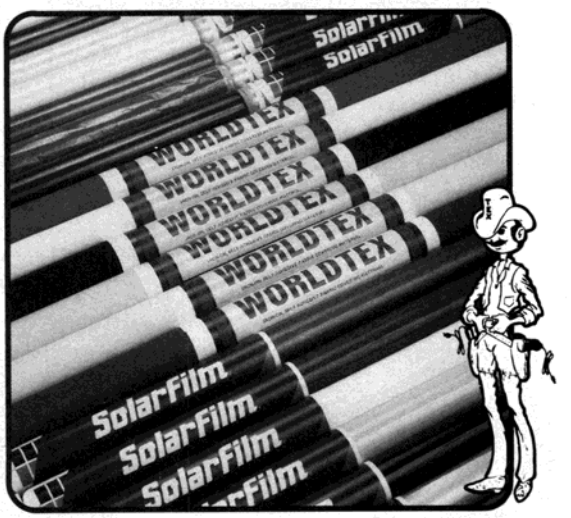
If you were at the WRAMS Show or the Toledo Show possibly you saw one of these models displayed from the box, as it is received by your hobby shop, or as a finished model.

With little or no advertising the first shipment of these models sold out completely. The second shipment is in transit at this time. The second shipment is all Cherokee and Luckystik's. The complete range of models is listed below:

DESCRIPTION	PRICE
Angel 1600	$65.90
Lark MK-11	$85.90
Luckybird (19-25)	$77.90
Luckystik (35-45)	$99.90
Piper Cherokee (19-25)	$96.90
Thunderbird (19-25)	$96.90



SuperTigre's New S-29 A ring engine - interesting for small helicopters.



New Worldtex colors coming: Vintage Red, Vintage Blue, Vintage Yellow, Olive Drab, Natural.

MODELTECH Piper Cherokee A "built" model from Hong Kong.

WORLD ENGINES

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flying models

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On the cover

Destined to be a very popular combination is Great Planes' Cap 21 kit powered by Enya's 4-cycle 1.2. Our Technical Editor has much good to say about this set-up! Photo: Bob Aberle

July 1984 Vol. 87 No. 7/524

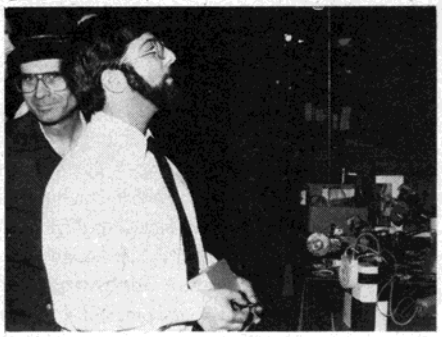
Aircraft features

R/C model boating

Departments

CARSTENS PUBLICATIONS

editorial



If you practice long enough, Dean, you may finally learn how to fly. FM's Pattern columnist Dean Pappas tries out Dave Brown's new R/C flight-simulator, a software program for Apple computers.

Hit of the show!

Ever notice that it depends on who you talk to as to what the hit of the latest consumer show was? It can be likened to the ficticious college National Football Championship in a way; each news service has their vote on the top team, but no trophy is ever awarded. The recent WRAM and Toledo shows are a good two cases in point.

Scale fans will probably expound the virtues of the new engines for the giant birds, or perhaps a new retract unit will steal the show in their eyes. Pattern types may wax enthusiastic about the latest kit or super buttons-and-whistles radio. Sport flyers will be hard pressed to voice a favorite, as it is in this area where there is always much new and exciting to see. Truly, it depends on *your* perspective and *your* interest in the hobby at the time.

For me, the choice was easy this year. If you recall, I wrote a piece in an editorial a few months back about "flying" on the old Atari™. Upon arriving at the Westchester County Center this year, Dave Brown grabbed my arm and directed me towards his booth, where the "hit of the show," for me, awaited. Dave is marketing a true R/C flying program for use with Apple II computers. Yes sir, it is actually here; flying right in the living room!

Dave's program features an image of a pattern type plane that has a contrasting trim scheme on the bottom to aid in orientation. In your hand is a familiar two stick transmitter case that is wired into the computer. Advance the throttle and the image begins to move. A bit of back stick and you're "airborne". The plane is even equipped with retracts! An information panel at the bottom of the screen tells you of your airspeed, altitude, and distance from the pits. Go too far out and you'll lose it; too close and you'll hit the pits (crash). The plane behaves in every respect like a model. After a brief period on the sticks, it was possible to fly actual pattern type flights including loops, rolls, spins, and controlled landings. Dave says that he has flown the entire FAI pattern on the screen.

Just like the real thing, there will be mishaps. When a crash does occur, the computer gives you an estimate of the cost to repair the model. Great stuff!

This may be just the R/C teaching vehicle we've needed. I feel that with an hour on Dave's program a student could master the orientation problems associated with R/C flight. Safe solo flights on a "real" model would happen much quicker and certainly cheaper when you consider the cost of *real* repairs.

Needless to say, the crowds were six deep at Dave's booth at both the WRAM and Toledo shows this year, with everyone wanting to get in a bit of stick time. More than being the "hit of the shows", it may just be the "hit of the hobby" for the year and a way to vastly increase our numbers once it's potential is explored. We'll keep you posted . . .

A good shrink

Top Flite's fabulous MonoKote™ has been with us for years, and has enabled many a modeler to enjoy a beautiful, long lasting, fuel proof, and non-messy method of finishing his latest creation. But oddly enough there are still many who have questions on even the simplest of the techniques for applying the miracle material.

In response to many requests for his "secrets", Bob Lobozzo has written what we feel is the definitive article on applying this material to date. Bob's piece addresses not only the actual art of using MonoKote, but also the preparation of the airframe, planning of a scheme, and maintenance of the finish for long lasting beauty.

Ironically, Rich Uravitch's R/C Sport Scale column for this month deals with a method of weathering a painted MonoKote finish for a fantastic scale effect.

Bob Aberle heats up his iron to put a super light MonoKote finish on Great Planes' CAP 21 which he reviews in this issue.

Hopefully the articles in this issue will help you to improve your techniques with the magical material.—BOB HUNT

Bob

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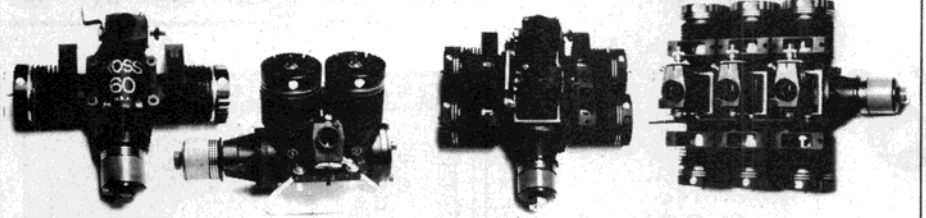

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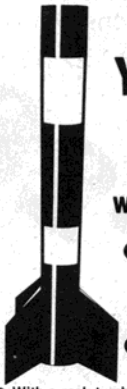

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- **Wing Span** — 51½ in. top wing, 48 in. lower wing
- **Total Wing Area** — 885 sq. in.
- **Overall length** — 46 in.
- **Engine Size** — .50 - .60 cu.in.
- **Flying Weight** — Under 8 lbs.

The Bre-Zee Bi-plane is fully aerobatic. It is the ideal sport model for any of the new four-stroke engines in the .60 cu.in. class. It also performs very well on any .50 to .60 cu.in. glow engine. Its good looks are only matched by its excellent performance in the air.

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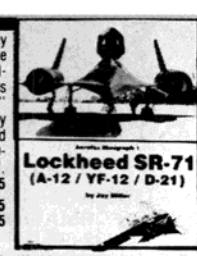
flying report

HISTORIC AVIATION, *3850 Coronation Road, Eagan, MN 55122,* now has available a new 36 page catalog which lists over 1000 aviation titles. This new catalog, free of charge, documents the books covering all phases of aviation — military, antiques, ultra-lights, racing, technical, and modeling. Besides the books, video cassettes covering aviation topics are also included. To order your catalog, call toll free 1-800-225-5575, or write to Historic Aviation at their address above.

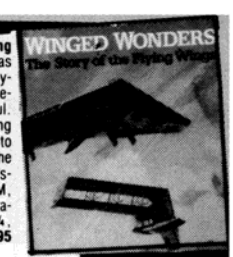
TOWER HOBBIES, *PO Box 778, Champaign, IL 61820,* has started to distribute their new Tower Hobbies Cessna *Skyhawk 172,* a ready-to-fly R/C plane for the beginner. The plane is constructed of a new, exclusive "OHS" molding process. The "O" stands for OPS (oriented polystyrene sheet) outer film which provides a fuel-proof and abrasion resistant finish that duplicates the appearance of the real aircraft. "H" stands for hi-impact polymer outer shells which provide the main structural strength with high resistance to impact. The "S" stands for styrol mini-cell

☐ **WIND AND SAND, The Story of the Wright Brothers at Kitty Hawk,** Wescott and Degen. The Wright Brothers story of the birth of aviation told in their own words and with their own photos. Their diaries, notebooks and personal letters reveal the genius as well as their wit and humor. Witness their experiments with gliders and eventually the first flight of a motorized flying machine. 102 of Orville and Wilbur's own black and white photos which they developed at home, create this amazing documentary. 192 pgs., 8x11½, hardbound. **$19.95**



☐ **LOCKHEED SR-71 (A-12/YF-12/D-21)** by Jay Miller. Billed as a Minigraph (MINIature monoGRAPH), this book is packed with excellent photos, drawings and text on all versions of the famous, yet mysterious, "Blackbird." Detail photos have been selected to convey the maximum information for the modeler and enthusiast alike. Covers A-12, 4F-12 and D-21 Drone. 71 photos, 16 pgs., 8½"x11" softcover. **$3.95**

Vol. 2: F-15 A/B **$4.95**
Vol. 3: F-14 A/B **$4.95**



☐ **WINGED WONDERS: The Story of the Flying Wings** by E.T. Wooldridge. As long as man has aspired to flight, there have been attempts at flying wings unencumbered by the drag of a fuselage or tail. Few were practical or successful. Here for the first time is the gamut of flying wings and tailless aircraft, from early failures to the magnificent Northrop bomber designs of the '40s. More than 200 photos, the story of the restoration of the Smithsonian's Northrop N-1M, several appendices, and an extensive bibliography. Autographed by author. 230 pgs., 8x10¼, softbound **$15.95**

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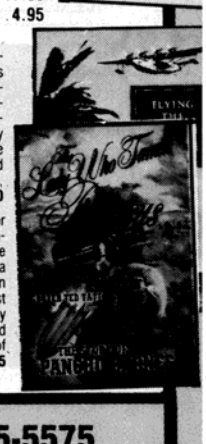

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polystyrene form which complements the structural shell by holding it in place. Specifications: wing span - 53 inches; radio - four channels; and required engine - .19 to .25 (2-stroke) or .35 to .40 (4-stroke). For more information about the Cessna *Skyhawk 172* from Tower, contact them at their address above or call 800-637-6050.

KRAFT SYSTEMS, *PO Box 1268, Vista, CA 92083,* has recently introduced the KP7KB seven channel R/C system. The KP7KB is intended for the serious modeler, offering many of the features most often asked for. Under the front label panel you will find servo reversing and throw adjustments on all seven channels to ease equipment installation and trimming of R/C aircraft. Adjustable dual rates on elevator and aileron and racheted trims on all four primary channels help insure a smooth flying experience. The new transmitter also incorporates Kraft's new micro-touch, precision control sticks and new dura-pot conductive plastic potentiometers on the gimbals. These new potentiometers improve stability and linearity and provide infinite resolution and ultra long life. In addition to these features, there's also flap-elevator and aileron-rudder coupler as well as a provision for bi-directional mixing of aileron and elevator for use in controlling "V" tail and delta winged models. Inside the transmitter, a plug-in RF module is provided for easy frequency changing or updating to FM transmission. Four fast, high torque KPS26KB servos along with the KPR7KB receiver, battery charger, airborne battery pack (nickle-cadmium), and frequency flag complete the '7K system. For more information about this radio, contact Kraft Systems at their address above or call (619) 724-7146.

R&L PERFORMANCE PRODUCTS, *20115 Nordhoff St., Chatsworth, CA 91311,* has just released a new kit, the *Super Sceptor,* a full size pattern airplane capable of the both the

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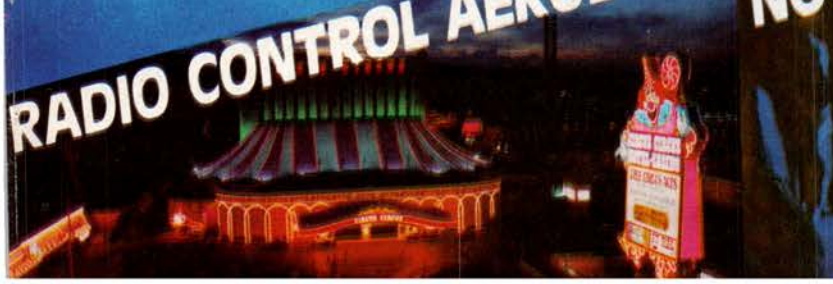

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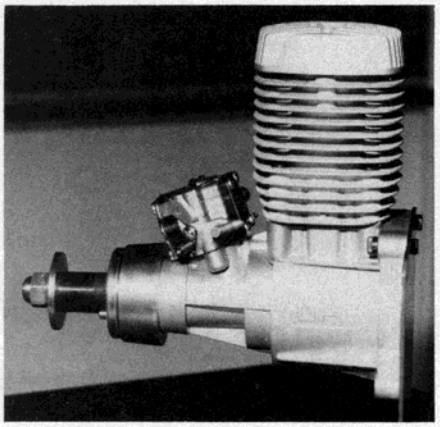
AMA or FAI patterns. Specifications: wing span—70 inches; wing area—900 square inches; weight—8½ to 9½ pounds; and engine—.61 (two cycle). Fuselage construction of this plane, designed by Rusty Van Baren, is epoxy glass and wings are foam core. List price is $119.95. A deluxe version of the kit, containing balsa wing sheeting and all other pre-shaped wood parts is available for $169.95. For more information about the *Super Sceptor,* contact R&L Performance at their address above.



SHAMROCK IMPORTS, *PO Box 26247, New Orleans, LA 70186,* has just released the new OPS 30cc (1.8) Maxi, a model aircraft engine designed specifically for giant scale use. It features a single ring piston and a five intake port liner along with dual ball bearings, roller bearings on both sides of the rod, adjustable exhaust adapter, and Dellorto diaphragm pump/carburetor. Specifications: displacement - 29.83cc; bore - 32.00mm; stroke - 37.00mm; weight - 1700 gr; and, power - 2.45 HP @ 5500 RPM. This two cycle glow engine has plenty of torque to turn a 22 inch prop. List price is $219.00. For more information about delivery, contact Shamrock Imports at their address above.

FUTABA CORPORATION OF AMERICA, *555 West Victoria St., Compton, CA 90220,* has introduced the NR-4M Power Pack designed for use with sailplanes. This lighter, nickel-cadmium flat-pack configuration uses a standard Futaba connector. Another model of this same pack, the NR-4J, uses the J-series gold-plated mini-connector. Specifications: output - 500 mAh/4.8 VDC; dimensions - 2¼ × 2 × ½ inches; weight - 3.6 ounces (100g); and charging rate - 45mA.

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2-56	2.25	5.25	13/16"
3-48	2.25	5.25	13/16"
4-40	2.10	5.25	1"
5-40	2.10	5.25	1"
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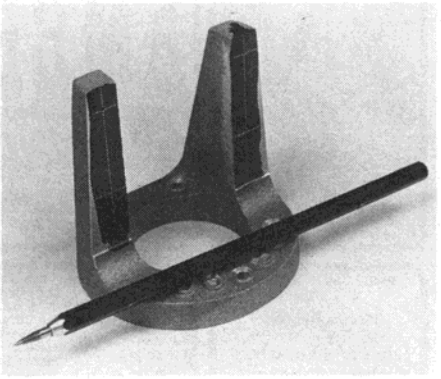

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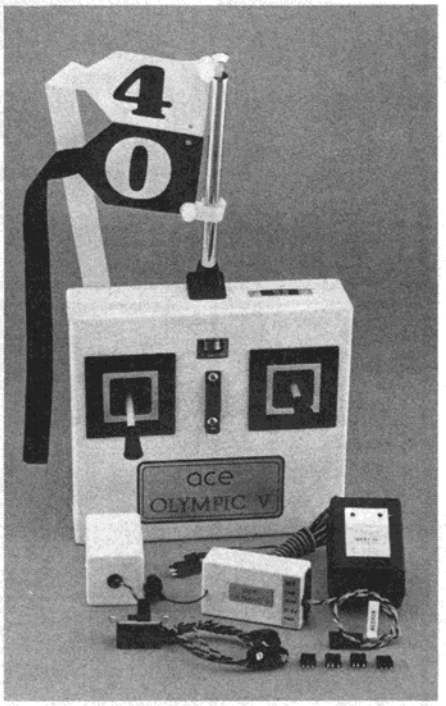

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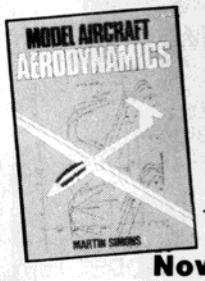

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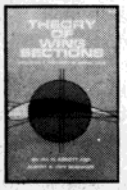

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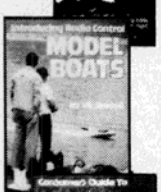

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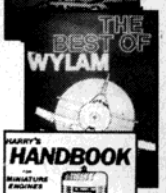

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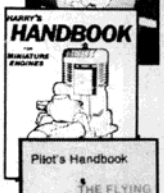

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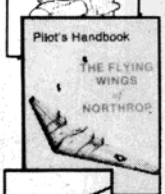

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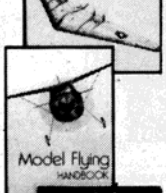

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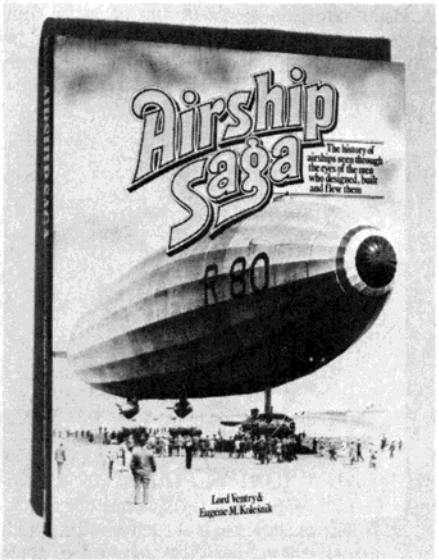
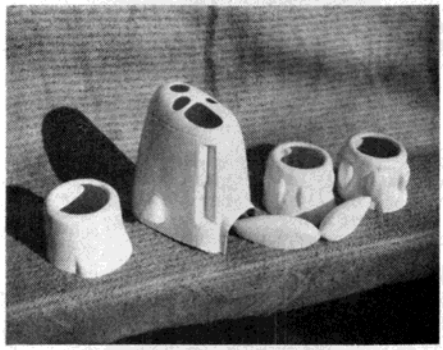
STERLING PUBLISHING CO., *Two Park Ave., New York, NY 10016,* has recently released a new Blandford Press publication, *Airship Saga,* by Lord Ventry and Eugene M. Kolsnik. This book documents the "rise and fall" of the world's first means of controlled flight and the uses to which airships have been put from the very first Zeppelin that flew over Lake Constance in 1900 to the present AD500 of 1978 of Great Britain and the futuristic concepts of airship develop-

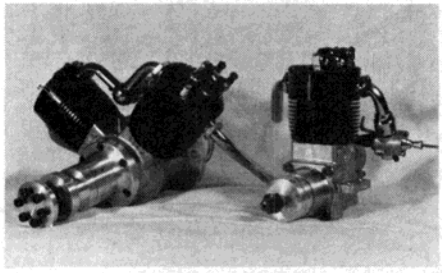


ment. Mixed with the 282 black and white photos and illustrations are first hand accounts by the original aviators and descriptions of the airships of every country which constructed them. For more information about availability, contact Sterling at their address above.

T&D FIBERGLASS SPECIALTIES, *30925 Block, Garden City, MI 48135,* has released some new additions to its line of fiberglass cowls for popular kits and plans. These new additions include a round smooth and one piece wheel pants cowl for the Andrews' *Aeromaster,* a one piece cowl for Pilot's 1/5



scale *PT-19,* a round *Waco* style cowl with molded-in blisters, and a round cowl with molded-in blisters in the *Jungmeister* style. These last two cowls fit the *Aeromaster.* For prices or additional information, send $1.00 for a complete list of fiberglass and plastic parts available from T&D. Contact them at the address above.



PEARSON POWER PRODUCTS, *RR 2 Box 64, Effingham, IL 62401,* has announced

another addition to their line of large four stroke engines for large models. The new Magnum 20cc (1.2 cubic inches) four cycle single cylinder engine is available in either spark or glow version.

NOR-CAL AVIONICS, *PO Box 70956, Sunnyvale, CA 94086*, has introduced the Accu-Tach I, a dual scale digital tachometer which also incorporates a digital expanded scale voltmeter (0-20V). In its use as a digital voltmeter, the Accu-Tach I applies a simulated load to receiver or transmitter battery packs to test true capacity or can be used to check individual cells. As a tachometer, the unit reads out in tens or hundreds.

air mail

Strip ailerons

Re: R/C sport discussions of strip ailerons and flutter by Dick Sarpolus in the May 1984 issue of FLYING MODELS.

Without getting into the great "barn door" vs. strip aileron controversy, why not just mass balance the offending surface. Stiffening strip ailerons only drives the critical flutter speed above the flight envelope. Mass balancing eliminates the dynamic instability.

How you do it varies. A horn at the tip is probably the easiest and least prone to breakage since its streamlined in the neutral position.

ED WESTWOOD
Spanaway, WA

Return of the "B" Team

Just a note to say I enjoyed the Tom Schaefer article on "B" Team race very much. I believe, as Tom does, that "B" Team race is an event who's time has come again! Let's hope the troops can re-group and start building for this really "nice" event!

P.S. I love those old FM mag covers of the fifties.

LES DEILY
Douglaston, NY

Point of Order

I would like to clarify a point concerning the Fokker D. XXI design which I drew up for the December, 1983 issue of FLYING MODELS. It is not a German fighter, even though it appears with the Nazi insignia. The aircraft was designed and built in Holland and fought against the Luftwaffe in the skies of Europe.

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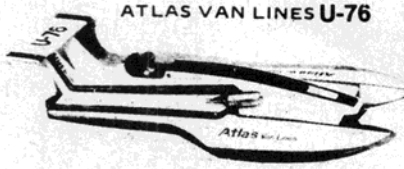

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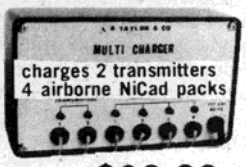

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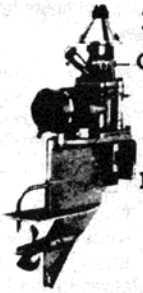

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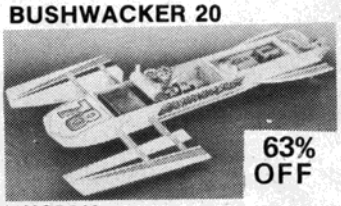

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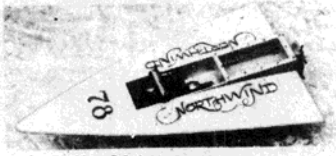

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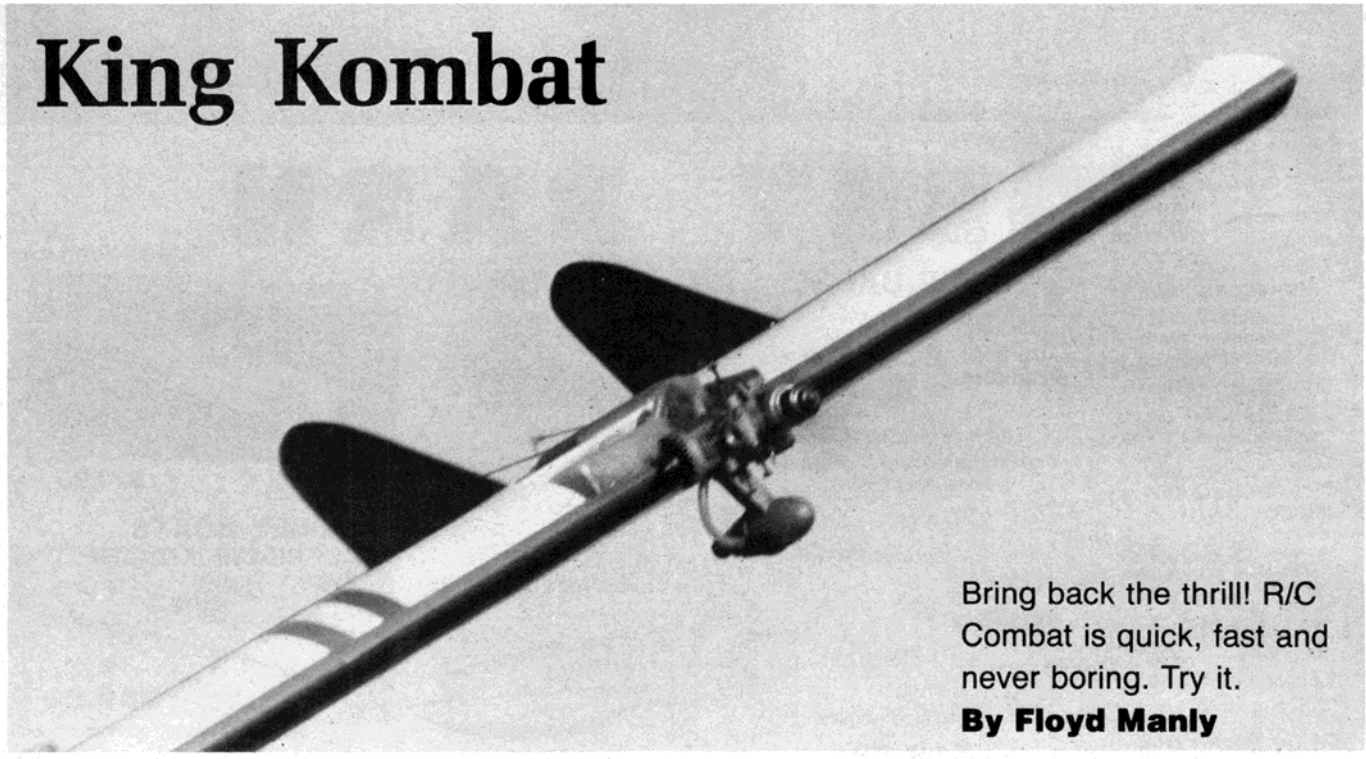
King Kombat



Bring back the thrill! R/C Combat is quick, fast and never boring. Try it.

By Floyd Manly

PHOTOGRAPHY: FLOYD MANLY

Got a case of the R/C blasé blues? The author's got a sure cure, the *King Kombat,* five dollars and ten hours from some exciting flying.

You say ya got a bad case of the "dulldrums"? Ya say R/C was exciting and a lot of fun—for a while—but lately the thrill has dimmed and unless something interesting comes along, maybe you'll hang it up for a while?

Well, we've got a sure cure for that bad case of the frumps! Radio controlled *Combat!*

Start right now, and by Sunday morning you'll have it all back. For about five bucks worth of balsa, and ten hours of your time, you'll have a handful of excitement that will pucker your piker, and get the ole knees knocking again. The *King Kombat* is the epitome of R/C flying. Quick, fast, and never, never boring!

The secret of *King Kombat's* ability to fly, *and* perform, is the elevon control. With the moveable servo tray shown on the plan, one servo operates the ailerons in normal fashion. The other servo is mounted in the tray but its arm is anchored to the airframe. Input of the elevator stick moves the tray *and* the other servo, which is linked to the control surfaces. Pull back on the stick, the tray slides forward, and both surfaces will come up for a loop. Hold full up, then move the stick to one side, the other servo wheel rotates, and one of the surfaces will drop to neutral for a roll. A typical tray is shown without dimensions because your servos may differ in size than the Futaba F-20s I used. Standard servos can also be used if the radio compartment is made longer to fit.

King Kombat's quickness comes from it's size and weight. A wing area of 414 square inches, toting a launch weight of only 28 ounces (That's right. One pound and 12 ounces) means it's in the dagger class of dangerous weapons. It doesn't take much to change directions, and if you're not careful you can bite your own tail off.

If you're wondering about the lack of landing gear, don't! When dead stick, which is the normal landing, the *King* slows down so much that you can ease him in for a one bump landing. It's possible to catch it in mid-air, it's moving so slowly. If you've lost the streamer, she's a little cleaner and faster, but still catchable.

The fin shape is strictly for reference. Any other shape that appeals could be used. Some *Kombats* have been flown with single fins, and a few with tip plates. Tip plates give a "Star Wars" look to a combat ship, but will also make it squirrelly if they're not perfectly parallel with the line of flight. Also, tip plates are susceptible to damage during the bump landings we make.

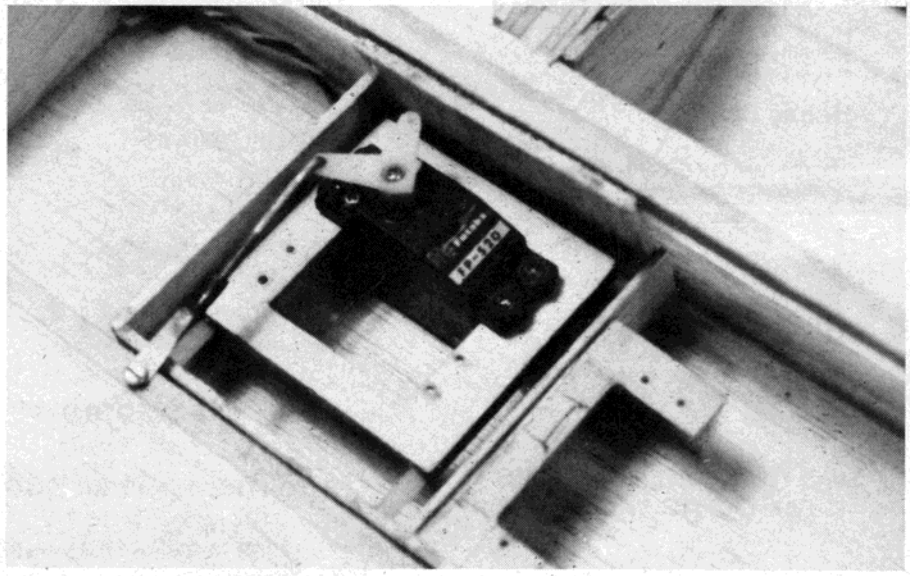
The fuel tank shown is a Sullivan four ounce slant. A two ounce could be fitted under the leading edge sheeting, but the tubing for the clunk is so doggone short that flame-outs happened too often. Even with the four ounces the tubing was too stiff. We replaced it with surgical rubber. On our version, the tank is held in place with a couple of dabs of silicone compound.

Another word of advice is to be sure the antenna is routed out to the wing tip. All you have to do is tangle it once in a spinning prop, and you'll know why it's out there.

If you get enough people interested in R/C Combat, one of you should build a jig to assemble replacement ships. With a jig and cyanoacrylate glues, you can fab up two or three in an evening. I've sold them for $15.00 to the guys that don't have the time or inclination to build.

Trim for flight

Set the elevons with about 3-4 degrees (slight) "up," so when it's handlaunched, you'll get a climb. It's better to have too much "lip," than not enough to keep the plane from diving when the controls are re-



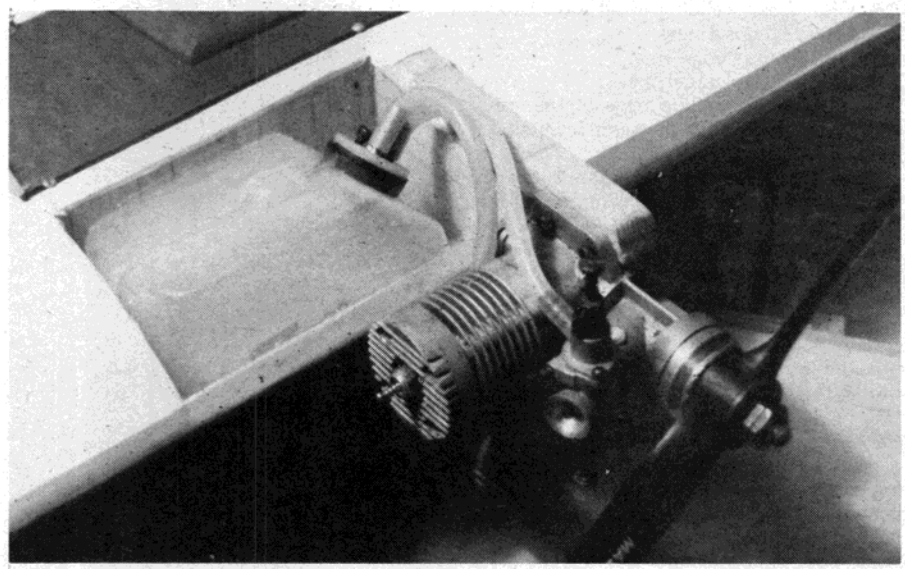
The elevon system shown here provides directional and pitch control. The elevator servo moves the entire servo tray while transmitting up and down movement indirectly through aileron servo.

leased. Check the CG, and stay on the nose heavy side, *or else!* Also check for a heavy tip before flying. Move the batteries or receiver around to get it right. A heavy tip will still fly, but will drop when you're dead-sticking in. Engine control should be set so the trim lever will shut the carb and kill the motor when you're ready to land. A mouse trap trigger to cut off the fuel could be designed to work with full "up" trim and full elevator. More important than mere control during the flight, is the capability of full motor cut-off in the event of an emergency.

Mid-air collisions are a distinct probability with combat, much more so than with any other form of R/C, with the exception of Pylon racing. Besides the danger of loss of limb or life, consider the effect on your radio and motor. The impact difference between a flutter down, and a full bore ripper could cost you dearly.

After you've built and flown one, you'll rush home to build two or three more, just so you won't have to wait for the glue to dry when you might need another one. Let me ease your concern a bit by saying that I have never had a mid-air, and have only seen *one!*

At first, you'll be flying up around pattern height, just happy that you're able to keep it in the air. A couple of flights later, you'll start to catch up and find out that you do have control of it after all. That's when you'll find yourself seeing more and more of the tree tops. Pretty soon you'll start seeing the grass while you're flying. Very soon after that you'll wish that you had those extras hanging back in the shop, because when you do a lot of flying at "one dumb" high, it takes only one dumb mistake to dork. With your second combat ship you'll wish you had three eyes. One to keep on your bird, one to watch the plane you're attacking, and a third to see if anybody is on your tail.

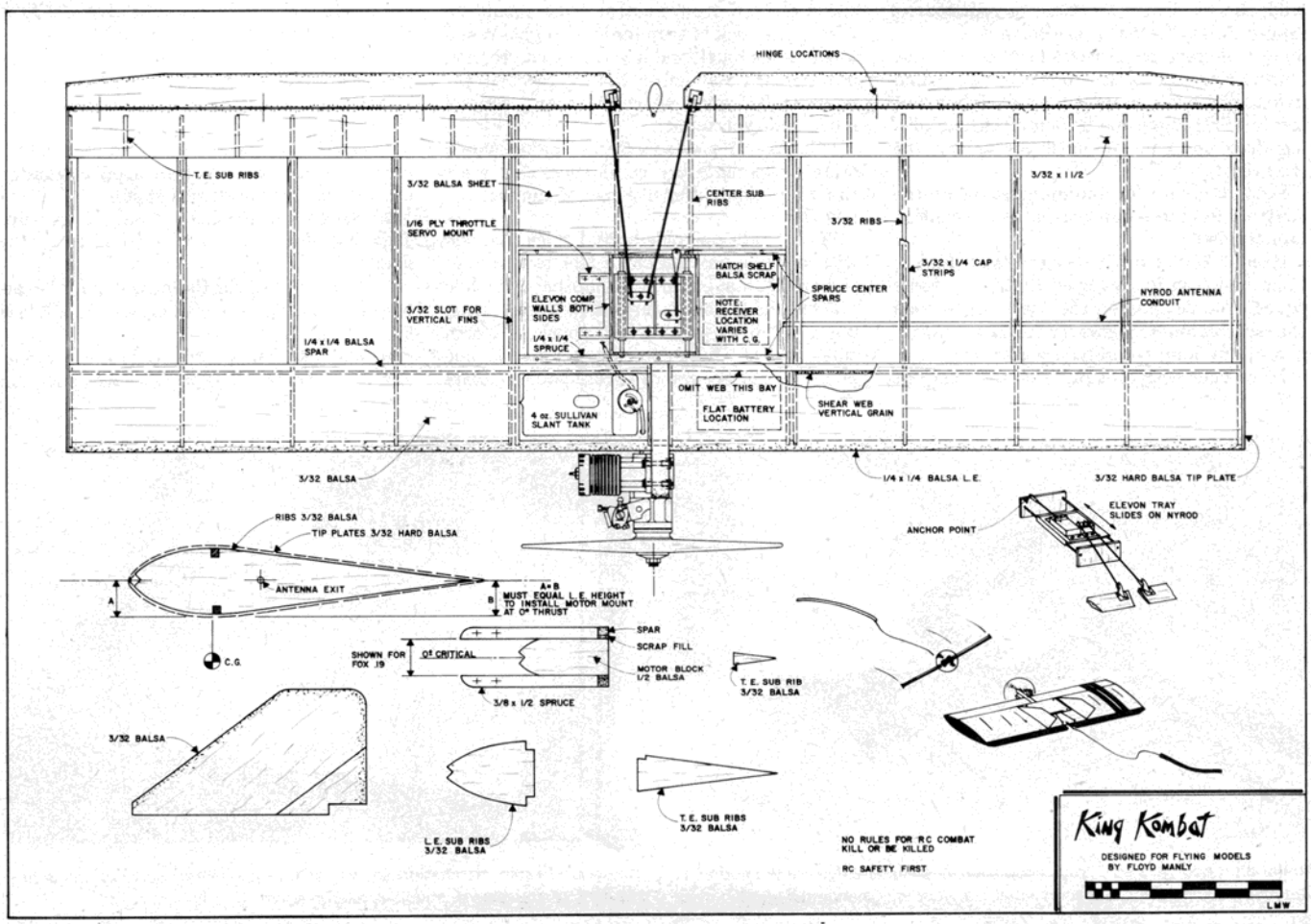


A Sullivan four ounce tank provides plenty of flight time. However, make sure the internal feed tube is flexible enough to withstand the "contortions". The author substituted surgical tube for the silicone.

Construction

The following is a suggested sequence of assembly to assure building a warp-free wing. Cyanoacrylate glue is used throughout, except step 15.

1. Pin down the bottom trailing edge sheet, bottom center sheet, and bottom leading edge sheet.
2. Glue the bottom spar to the leading edge sheet.
3. Glue the ribs to the trailing edge sheet, center sheet, and spar. Allow space for the vertical fins. *Do not* glue to the leading edge sheet yet.
4. Glue top spar to all ribs.
5. Glue top trailing edge sheet.
6. Glue sub-spars.



7. Glue shear webbing in all bays except the battery compartment.
8. Glue leading edge spar.
9. Glue bottom cap strips.
10. Unpin the trailing edge of the wing, and raise it to *exactly* the same level as the leading edge spar.
11. Assemble the motor mount beams, center spacer, and center leading edge ribs, then glue to the spars only.
12. Cut the bottom leading edge sheet to clear the motor beams, then brush water on the outside surface of the leading edge sheet.
13. Re-pin down the trailing edge, then curl the leading edge sheets up to meet the ribs and leading edge spar. Clamp, check for warps, then glue.
14. Cut the top leading edge sheets to clear the motor beams, then glue to top spar.
15. Wet the outside surface of the sheets, apply standard wood glue to all ribs and leading edge spar, then curl the sheets down and pin to the leading edge spar.
16. Glue top cap strips, allowing space for the vertical fins.
17. Glue tip plates.
18. Cut through the top leading edge sheet for the tank compartment.
19. Epoxy *and pin* the hinges into the trailing edge sheets.
20. Install your covering before installing the fins, and resin coating the motor mount and tank compartment.
21. Install servo tray, and all electrics. Locate the battery and receiver to obtain the CG at the spar.

Flying

Two precautions should be, nay, *must* be mentioned before you chuck the *King* up for a test hop. The most important is to expect wild, almost violent, reactions to your control inputs. A way to tone these down is to attach 30 feet of crepe paper ribbon to the tow line. During contests we use 15 feet of two pound nylon fishing leader and 15 feet of ribbon, but for that first flight you'll want all the stabilizing drag you can get until you've got the trim right.

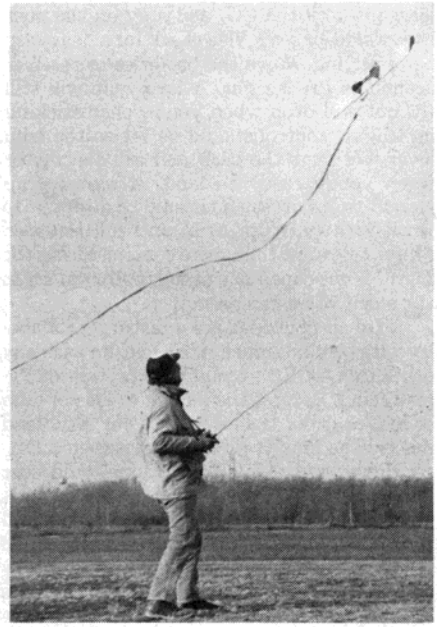
Second: set up for minimum throw on the controls for the same reason as precaution number one.

Ready? You've made sure the tank clunk is floppy enough for inverted flight and knife edges? You've checked the controls? Turned the receiver *and* transmitter on? Don't laugh, it won't be long before you waste one.

Have your assistant pull the streamer out in front where he won't step on it. Then, grasping the wing with one hand between the elevons, and the other out on a tip, *push* the *King* out at waist level. No running and throwing, just stand and push out at the tree tops across the field. This is strongly advised because the grip for an overhead launch tends to flip the wing over on it's back, and she'll come right back at you. You'll be able to launch yourself, one handed, by next week. Trim for launch is usually with two or three clicks of "up" from neutral. This should be within one click of trim for level flight. When it leaves his hand, and if you feel a correction is necessary, remember that it reacts *right now,* so be ready to counter any control movement you input.

It'll take four or five flights before you'll start developing any confidence, and start thinking about offensive moves against opponents.

We fly with no-holds-barred rules. Launch with a minimum tail of 15 feet tow and 15 ribbon, and have at it! Cut another tail while you still have your's earns five points. Making a cut after you've lost your's is worth three points. Just entering a joust is one point. Of course, you can score your contests by any system that suits your club. A points log, with prominently posted standings, generates a lot of interest among non-combatants, and may convince a couple more to join in the fray and fracas.



Launch is a simple but critical affair and can be easily accomplished by the pilot alone. Grasp the model between the elevons and push out. Don't run or launch overhand. It can upset the model.

Tactics

Helpful hints to sudden success. 1. Get up early. This gives you a few moments to get trimmed and set. It also gives you the altitude and speed to make a kill on the other planes climbing up, and might give you first shot at a slowpoke. A kill is a kill!

2. Have a partner watch the other planes and pick out a rookie. A kill is a kill!

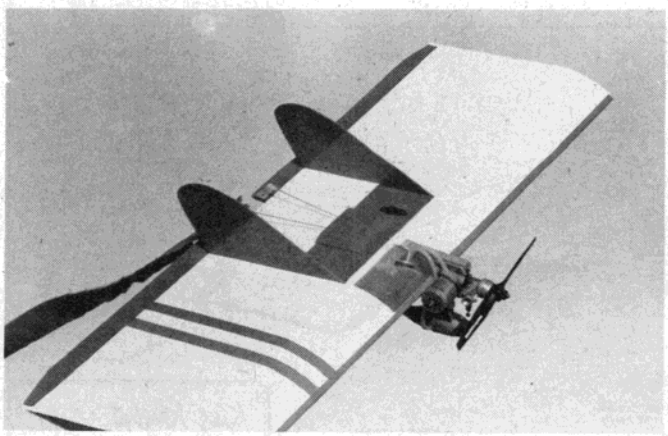
3. Forget about defense. Be on the offense all the time.

4. Once you pick an opponent, hound him until you've got the kill. Don't wander around looking for chance shots.

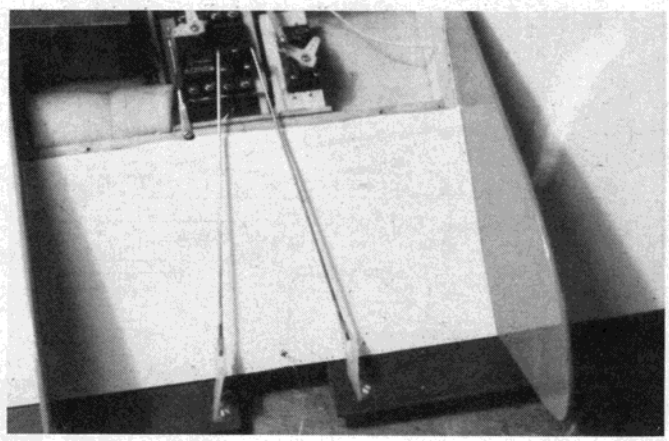
5. Get as low as possible and "shoot" up. This discourages opponents from diving on your tail.

6. At the end of the flight, watch for "dead sticks" coasting in. He's helpless. A kill is a kill.

It takes nerve and verve to fly R/C combat. The *King Kombat* is a winner! Are you?



No landing gear you say? Well, dead stick, floating landings are the norm for the *King Kombat.* Fin shape is optional. Let your imagination go!



Completed radio installation shows servo arrangement. Servo on left is the elevator servo; servo in middle is aileron servo. Throttle's at right.

1984 WRAM Show

By FM Staff

The traditional kick-off of the east coast flying season highlights a wide variety of new offerings. A great show.

PHOTOGRAPHY: FM STAFF

For each of the past sixteen years, the Westchester County Center in White Plains, NY has played host to the WRAM show and has seen new attendance records set almost each year. The empty steps belie the crowds that will shortly fill the arena.

The 16th annual WRAM Show was held on February 25/26, 1984 at it's usual "home", the Westchester County Center, in White Plains, New York (just north of NYC). Through the years this very popular east coast R/C hobby trade show has continued to grow until it would seem that the facility would burst. By our count there were 118 industry and association exhibitors present. Essentially the entire basement of the Center was reserved for the static display of all types of R/C models (planes, boats and cars). A little of everything to see under one roof. During the course of this next year, an addition is planned for the County Center building which should permit even further growth of the show.

This particular year, the prestigious Howard McEntee Memorial Award went to everyone's good friend, Mr. Carl Goldberg. Certainly no one could be more deserving of this honor. The staff of FLYING MODELS enjoyed Carl's visit to the show and wish him a hearty congratulations on receiving his award.

R/C Equipment and Electronic Items

We have now had our new R/C frequencies in use for over a year (since December, 1982 to be exact). After all the information published and distributed this past year, it was disappointing to still see how many people are misinformed. I had hoped that my "Frequency Facts" series (July 1983 to January 1984 FLYING MODELS) would have answered most questions. It apparently didn't, so let's just hit a few of the important points once again (and hopefully for the last time).

The fact that an R/C system operates on FM does not, by itself, make it narrow-band in performance. FM, AM, or the new PCM are all forms of modulation techniques which describe how the signal is broadcast from the transmitter. This is much the same as AM or FM broadcast radio. The more newly designed R/C receivers now include very selective filters in their circuitry. It is these filters (included in both AM, FM, and PCM receivers) that make the receiver narrow-band (or the ability to reject adjacent channel interference). If your car radio jumps from station to station, it is said to have poor selectivity (meaning that it isn't narrow band enough to reject an adjacent station).

There is no significant difference between AM or FM from an R/C modeler's standpoint. The big push this past year for FM R/C is probably due to economic considerations more than anything else. Most foreign R/C manufacturers have supplied the world market for years with FM R/C because it was legal to do so in most countries. Up until the time our new R/C frequencies were awarded it was strictly illegal to use FM in the United States. Now that AM, FM and even PCM is legal in the U.S. it benefits the manufacturer (cost wise) to stick with a common mode of transmission. FM seems to have surfaced as that common mode. Our several remaining domestic R/C manufacturers are now offering FM simply because of the market pressures brought about by the importers. The bottom line is that AM and FM will basically do the same job, everything else being equal.

Another WRAM Show spectator thought that AM would be illegal after 1991. Not true at all! AM, FM, PCM, etc. are all perfectly legal and *without* any time limitation. The 1991 date stems from the fact that in January 1991 all 80 new R/C channels go completely "on the line" at 20 kHz separation. When that happens you will want two specific properties in your R/C receiver: (1) narrow-band performance and (2) something other than a single conversion 455 kHz intermediate frequency (i.f. as we call it). The second item won't come into play until January 1991 because of the considerable effort done by the AMA in the preparation of their R/C channel "Phase-In Plan". But after 1991 you will need a receiver with either dual conversion (two i.f.'s) or one that has a special "nonstandard" or "odd" i.f. Until just before the WRAM Show, the only such receiver in that "1991 category" was the Kraft dual conversion KPR-8FD (which was reviewed in the September issue FLYING MODELS). Probably

the biggest surprise at the WRAM Show was the fact that Bob Novak of Novak Electronics, introduced his new dual conversion receiver. It is designated as the Novak NER-'91AM. Introductory price at the show was $99.00. Normal price will be $124.95. This new 1.5 ounce (up to nine channels) receiver has i.f.'s of both 10.7 MHz and 455 kHz. A sharp Mirata filter provides selectivity of +/-9kHz at 50dB down for excellent narrow-band performance. It is available on 72 and six meter channels with connectors compatible for Kraft, Deans, RS and Futaba. By purchasing this receiver now and tuning it to your existing AM R/C transmitter, you will have a system capability long beyond January 1991 (limited only by the normal life expectancy of the system itself). By Toledo time, Bob Novak expects to also have an FM version of this same receiver. This is being done strictly to placate all those modelers who have already been convinced that FM is better. Bob will therefore give the modeler a choice, AM or FM, but definitely "1991" capability in either case. I hope to review this new receiver if the opportunity presents itself.

A new company made the WRAM Show this year. It is called FBN Inc. Bill Shire of that outfit introduced a neat little, fully assembled and tuned, auto radio converter. Attach it under the dashboard of your car. Hook it up to 12 volts and connect your car radio antenna through it. With a flip of a switch you have standard AM broadcast or 72-73 MHz. That will permit you to tune across your car radio dial and monitor all the R/C frequencies between 72 and 73 MHz. A few R/C transmitters can help you pin-point specific channels on the radio dial. At $19.95 complete, this is a great bargain and something definitely worth trying.

Futaba displayed their new, but already famous, PCM R/C system. Besides the benefits of the PCM mode, the transmitter has more specialty control features than ever noted before. Fortunately I was able to take both the PCM demo system and their new wheel radio (Model 3PG) home with me for product review purposes. So keep an eye out for these articles in the next few months, after I finally figure out all the control features.

Dave Brown's booth probably stole the show from a spectators standpoint. Dave had a TV monitor located at the top of his display. On that monitor was a rendition of an R/C pattern model which could be controlled by a specially set up dual stick transmitter. The heart of this new concept is a software program developed especially for Apple computer owners. The software generates the model image on the TV monitor. By moving the transmitter control sticks you are able to actually "fly" the model. So what you have is essentially an R/C flight simulator. Modeler after modeler waited on line to try their luck with a flight. If you crashed, the screen produced a readout telling you the approximate cost of the necessary repairs to the model (believe it or not!). I tried it and, yes, I did crash. The simulation is quite realistic since the plane reacts to all controls, including throttle commands. Response is approximately correct. Dave will be selling the software diskette for $49.95. Price of the special transmitter box has not been announced. You could also use two Kraft video game type joy sticks connected up by a special "Y" harness which Dave will provide for $19.95 (you supply the sticks, of course). The sign of the times for future - winter season R/C training while there is 20 inches of snow on the ground outside. Think of the potential!

Another newcomer to the WRAM Show was Joe Utasi of Jomar Products. Joe started with an on-board coupled aileron/rudder device several years ago (see the August 1982 FLYING MODELS). His line has since greatly expanded and now includes two types of solid state speed controllers for electric powered flight, a twin engine synchronizing system, an accessory controller which allows individual control of two electric devices from one channel, and a new field type battery charger. What really caught my eye was the new Jomar S2B2 Solid State Battery Backer System. It comes fully assembled for $44.00, can handle heavy duty systems for quarter scale use, and, best of all, works with four cell packs. This is another unit I hope to review in the coming months.

ACE R/C naturally had a large display of all their fine battery chargers. I suspect they now offer something like seven or eight different types to suit every conceivable need. Their new Olympic V R/C system was quite interesting. ACE has finally decided to market a true, low priced five channel system using Silver-Seven components. They will offer a fully assembled five channel Tx and Rx, with full nickel-cadmium batteries and a charger for $139.00. In addition, you will receive a set of mating servo connectors. All you have to do is add your own servos. They can be ACE servos or other brands (using the supplied connectors). If you want to upgrade your existing system and still continue to use your own (favorite) servos, here is your chance.

Larry Sribnick of SR Batteries Inc. introduced his new version of the ACE R/C Digipace battery tester which will have selectable receiver (four cell) charge rates of 50 mA and 120 mA (for 500 mAh and 1200 mAh packs) along with companion discharge load rates of 300 mA and 500 mA. An excellent choice for the quarter scale flyer who normally uses heavy duty battery packs to operate high powered servos. Special unit will only be available from SR at $99.95. SR Batteries also announced several other new items including a Max Power Pack for Sullivan starters, complete with matching charger for $49.95.

The folks at Airtronics Inc. had several interesting items in the form of "hand-outs" at the show. They included a booklet containing a glossary of R/C terminology (excellent for beginners); another booklet titled, "Questions All About Radio Control Fun" and a neat little wallet size full color chart showing all the currently available new and old R/C channels for easy reference. If you couldn't make the show, Airtronics will mail these items to you free of charge. Simply write to Mr. Tim Renaud, Airtronics Inc., 16191 Construction Circle West, Irvine, CA 92714.

Finally, a word or two must be said about the AMA District II meeting that was held during the WRAM Show. Kraft Systems Inc. did not attend the show this year, but a big item for open discussion was the general acceptance and handling of the new Kraft synthesized transmitter module and dual conversion receiver. With this new system a modeler can simply dial any one of the new R/C aircraft channels from 1 to 49 at both the Rx and Tx. You do this by rotating a pair of numbered dials. No plug-in crystals are necessary. The big point of contention is the possible mis-use of this new type system. If the AMA Phase-In Plan isn't followed, it is possible that we might experience what some have dubbed the "dial-a-crash" concept. A lot will be said about this in coming months. It is wonderful to think such technical progress has been made only a little over a year into the new rules and frequencies. One would not want to "stiffle" this technical progress. However, modelers will have to be both careful and responsible people when it comes to using this new frequency synthesized equipment. One of these new Kraft units will be reviewed shortly and, of course, a lot more will be said on this subject. In the mean time, please don't over-react. It doesn't have to be a problem.

A lot of good new things were displayed at the show, prices still seemed quite low, and it is said that sales are on the rise. 1984 looks like a good year in the making for both the R/C modeler and the industry.—BOB ABERLE.

Kits, Engine and Accessories

In my experience, February has been a bit too early for most manufacturers to unveil all their new products. So it was a little surprising to count about a dozen new model airplane designs being displayed at this year's WRAM show. I'm going to interpret this as a sign of a growth period ahead for 1984. Let's see what I found.

Two new airplanes were on display at Airtronics. One was the *New Era .40* which is an enlarged version of the *New Era III* design that is several years old. The *New Era .40* is a low wing sport model with pleasing lines and a bubble canopy. The other model, called the *Jetfire*, is also .40 size. In fact they both have 52 inch wing spans with 500 square inches in area. The *Jetfire* has a shoulder mounted wing and a very streamlined nose section that makes it look rather like a modern jet fighter. Both airplanes are of built-up balsa wood construction. The *Jetfire* won't be released until later on this season.

This year Byron Originals has yet another super scale giant model, the P-47 *Thunderbolt* in the "razorback" configuration. In typical Byron fashion the model is fabricated from molded foam flying surfaces and an epoxy glass fuselage. As usual, a large array of mechanical accessories is available from Byron to turn this beast into a lifelike machine. For example the retracts were custom made just for the *Thunderbolt* and bolt right in.

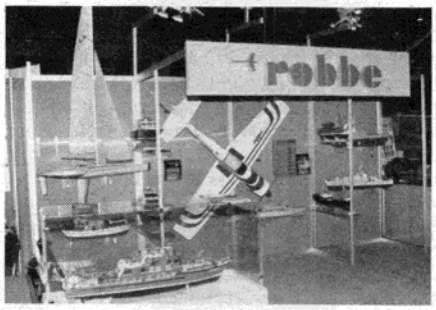
Over at the Johnnie Casburn booth there was a beautiful *LFX IV* pattern ship hanging up to get people's attention. While this is not a new kit, Johnnie did have a new *CAP-21* kit to show us. The *CAP* has a 66 inch span and is for engines from .60, two stroke, up to 1.2 cubic inch, four stroke. Like most Casburn kits, it has a partially completed jig-built fuselage and foam wing cores already sheeted with 1/64" plywood. It looked like it should go together fast.

Champion Model Aeroplane Co. has just come out with a kit of the famous Sal Taibi *Powerhouse*. This one is said to be true to the original dimensions but has stronger construction for the stress of R/C flying. It is ideal for a .60 ignition or four stroke engine.

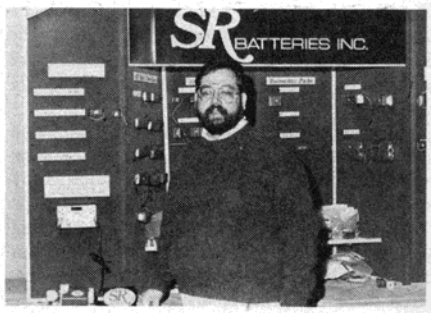
Craft-Air has added a hot sport/pattern airplane to their fine line of gliders and trainers. The new .40 to .50 size *Firebird* is designed for advanced pilots to do pattern training. Wing span is around 58 inches. It's a simple-to-build, all-wood kit.

Following the success of the *Sky Tiger*, Carl Goldberg Models has introduced a smaller size called the *Jr. Tiger*. Like its big

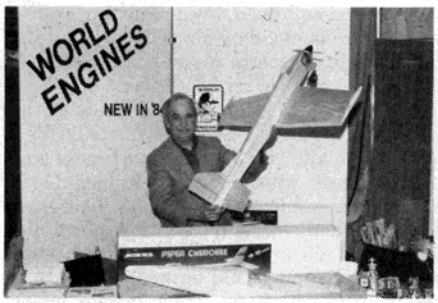
FUTABA CORP. OF AMERICA, 555 West Victoria St., Compton, CA 90220. Glen Toma emphasizing new Futaba top-of-the-line PCM system. A totally new concept in R/C. Bob Aberle took this system home for a review which is coming up.



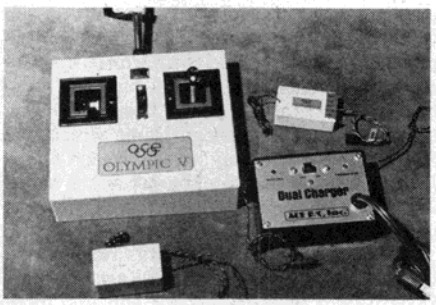
ROBBE MODELLSPORT, Suite 2D, The Office Center, Princeton Meadows, Plainsboro, NJ 08536. This W. Germany company makes a variety of ARF planes and boats. Construction is mostly molded plastic materials.



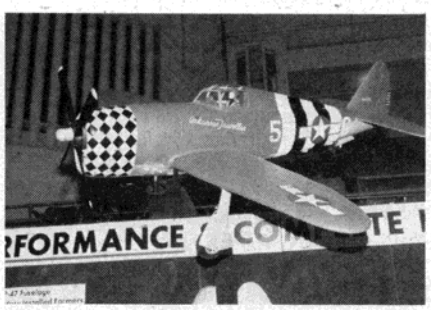
SR BATTERIES, INC., P.O. Box 287, Bellport, NY 11713. Our friend from Long Island, Larry Sribnick, standing in front of his very professional display. This year SR is offering a special ACE Digipace for H/D batteries.



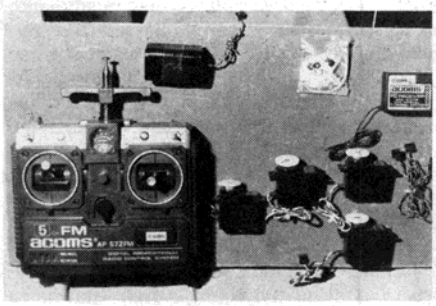
WORLD ENGINES, 8960 Rossash Ave., Cincinnati, OH 45236. Bill Hensley holds one of the new imported ARF Kits from Model Tech. This one is the .25 size *Thunderbird.* Pre-built fuse and pre-sheeted foam wings.



ACE R/C Inc., 116 W. 19th St., Higginsville, MO 64037. New Olympic V system is an assembled, economy version of Silver-Seven line. Tx, Rx, full nickel-cad batteries, charger, and mating servo connectors/ $139.00. You supply servos.

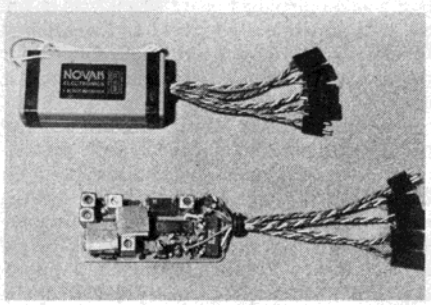


BYRON ORIGINALS, P.O. Box 279, Ida Grove, IA 51445. This magnificent P-47 *Thunderbolt* is the latest super size, super scale Byron kit. Has glass fuselage and molded foam flying surfaces. Retracts are an available option.



ALTECH MARKETING INC., P.O. Box 286, Fords, NJ 08863. Shown here is the economy priced ACOMS 5 channel FM R/C system which was just reviewed in the March 1984 FLYING MODELS. Excellent adjacent channel performance. Four servos.

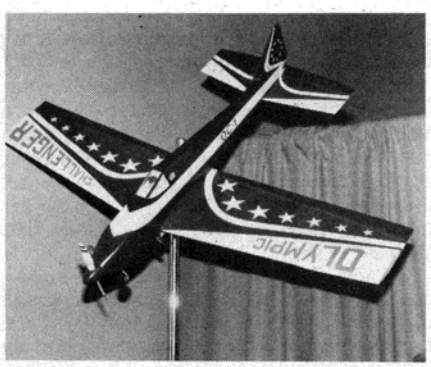
AMERICAN R/C HELICOPTERS, INC., 635-11 N. Twin Oaks Valley Rd., San Marcos, CA 92069. Well known for their *Mantis* helicopter, this year an all new *American Eagle* model coming soon. *Blue Thunder* from movie in background.



NOVAK ELECTRONICS, 2709-C Orange Ave., Santa Ana, CA 92707. The new Novak NER-'91AM dual conversion, narrow-band receiver. A true "1991" design weighing only 1.5 ounces. Introductory price of $99.00. Works with any AM Tx.

MODEL RECTIFIER CORP., 2500 Woodbridge Ave., Edison, NJ 08817. Fred Fischer displays new almost-ready-to-fly Cessna *Skyhawk.* Model is made totally of expanded bead foam. Comes complete with installed .35 engine.

DAVE BROWN PRODUCTS, 4560 Layhigh, Hamilton, OH 45013. Dave Brown shown demonstrating new flight simulator. Resembles video game concept. Special software operates Apple computer. Pattern model in flight depicted on screen.



STERLING MODELS, INC., Philadelphia, PA 19134. The new **Olympic Challenger** is a sharp looking sport model. All wood kit is for .19 to .35 engines, span of 48 inches. Military and civilian decals included.

brother, the *Jr. Tiger* has stamped lite-ply fuselage components for ease of building. The wing span is 50 inches and area is 450 squares. A .25 size engine is a good choice for this one.

Another popular model came out in a new size this year. It was only a matter of time before Midwest Products Corp. would blow up the *Sweet'N Low Stik* to giant proportions. This one takes a two cubic inch gas engine and the kit makes extensive use of lite-ply parts. Most of the *Stik* series of airplanes have been updated to utilize this construction material.

Sterling Models is a company that has been around for a long time, and this year they introduced a new model called the *Olympic Challenger.* This is a moderate size jet-like design for .19 to .35 engines and all balsa construction. Aerobatic capabilities are claimed for this one and, based upon its appearance, it sure looks aerobatic to me.

For just making lazy circles in the sky Top Flite Models has introduced the *Elder* which has been designed to look and fly like an antique airplane, with open fuselage framework and simulated flying wires. This all wood kit has a wing span of 53¾ inches and is designed for a .15 to .30 displacement engines or the new HB .21 four stroke.

Another design that is well suited to four stroke power is the new *Deweyville Jr.* from Orline Models. The *Deweyville* is a parasol configuration reminiscent of a golden age home built. The *Jr* is a new smaller size, with a 55 inch span, for engines in the .20 to .40 range. It is a pretty airplane.

At the House of Balsa booth, Rich Uravitch's new .15 size razorback P-47 *Thunderbolt* was on display. For its size it was splendid with its simulated rivets and weathered finish. Watch Rich's Sport Scale column for how to do it. Anyway, HOB will probably kit the P-47 later this year.

Our friends from World Engines are importing a selection of Model Tech almost-ready-to-fly airplanes. These have pre-built balsa fuselages and tails and balsa sheeted foam wing cores. They only require final assembly and covering by the builder. The selection includes a couple of trainers, a *Cherokee* and a sport/pattern style called the *Thunderbird.* Most are designed for .25 size engines.

OK, enough about airplanes, how about new engines? Well, engines don't have the glamour appeal of airplanes so it takes a little research to find out what is new. For example when four strokes hit the market it was big news, but now that they are becoming accepted, the new models are generally just different sizes of existing designs.

Such is the case with the Enya 1.2 cubic inch four stroke engine, imported by Altech Marketing. Here is an engine in a much needed size class for scale builders. Enya four strokers are coming on strong in the market even though they were not the first to get into production. I can personally say that their .60 is great.

By now there are lots of gasoline engines out there for giant scale models. Yet still more come out each year and they keep getting better. World Engines is now importing the Zenoah Quartz G38. This 2.3 cubic inch beauty is made in Japan by a company that specializes in small displacement engines for the ultralight industry. The Zenoah is claimed to be one of the smoothest running engines of its size.

Fox Manufacturing is one of the very few American engine makers. Another distinction is that their engines look totally different from all others. Without close scrutiny, one would not have noticed some new models. One in particular is the Compact .40 R/C which is compatible in dimensions to other common engines of this displacement. Fox's ball bearing .40 remains in the line as well. A new .36 is also available in an R/C version, built around the crankcase of the Combat Special. All are schneurle ported.

Over at Midwest Model Supply Co. There was a complete assortment of the British Irvine engines. This year there are a couple of new rear exhaust pattern engines. One is a .60 of course and also a .40 to cover the two most popular sizes. Side exhaust Irvine engines can be fitted with their Super Silencer for a tuned pipe effect.

Since I'm a budding chopper pilot, I can't pass up the opportunity to comment on the three booths devoted to helicopters. American R/C Helicopters had their *Mantis* and *Super Mantis* models on display, but they have been in production for years. There was much talk of the new American Eagle which will probably be on display at the Toledo show. But for me, the real blockbuster at the booth was the actual *Blue Thunder* model that was used in the filming of the movie.

Gorham Model Products was represented by the fellows from Helicenter East. The new GMP *Cobra* was on display and got more than a fair share of glances. This is a full feature aerobatic helicopter for .40 to .50 engines and is in the $300 price class. Much of the mechanics are common to the Japanese Hirobo line. It should be very attractive to flyers who are upgrading from their training machines.

Miniature Aircraft Supply (Walt Schoonard), well known for being the importer of Schluter helicopters, had the *Superior* on display. These are starting to become a common sight at flying fields already. The big news, however, is that Walt is importing the superb Heim *Star Ranger.* This is a super deluxe system that Ewald Heim has used to win the European championships for five consecutive years. Bodies will be available for the *Jet Ranger, Hughes 500,* and *Bell 222.*

Well folks, I had a grand time at the WRAM show this year. It is a shame that more west coast companies don't attend. I think that the size of the crowds gives sufficient exposure to justify the trip. But, even without some of those big manufacturers the show is one of the best.—RON FARKAS

Giant Scale

The WRAM Show from the giant scale eye was a feast to behold. It seemed everyone had a product or two with a nod toward our jumbo birds.

First stop was at Aeromarine Enterprises where Gary Rheault assured me that not only was Aeromarine back, they never left! Aeromarine has in stock now a complete line of heavy duty retracts for our big birds (even a retractable tail wheel) with special set-ups for that special giant. Gary also showed me his new Big Bird 100 engine, a six cubic inch monster that puts out over nine horsepower. Very impressive! Aeromarine's twin Quadra is also still available.

Next stop was RC Kits booth with Bob Campbell of B-29 fame in attendance. Bob was displaying his new 1/5 scale *Sea Fury.* It's a good size at seven foot span and should be a sure winner in any scale event. Bob's quarter scale *Chipmunk* and *Maxi Acro Trainer* are also fine kits in his ever growing line.

A glance at the Roush Mfg. booth showed a mob around Dick Roush's new Sachs-Dolmar engines. At 3.1 and 3.6 cubic inches respectively, these beautiful hunks of machinery will be welcomed by those flyers with the overweight underpowered turkeys. Dick's Kioritz and Cobra engines have already become standards in our field. His *Laser 200* is a new venture though into the kit business. An impressive 90 inch bird, it should do well with the aerobatic enthusiasts. Dick also showed his new oil package and hot spark plug. Check this month's Giant Scale column for more on these items.

Next to Roush was Eastcraft with Fred Eastman at the controls showing off his on-board engine starter systems. If you haven't seen one of these babies turn over a Quadra yet, you haven't lived. Fred really puts out a superior product (all by himself, too!) and the quality is just superb. An on-board starter is really safe, too. No broken fingers.

One of the nicest jumbo kits I saw at the show was the M & H Balsa Products DH82C *Tiger Moth* kit. This 88 inch span bipe is true quarter scale with many pre-formed parts such as aluminum cabane struts, fiberglass fuel tank, and cowl and a pre-assembled motor mount set up for a Quadra. Many precision cut wood parts and formed plastic parts complete the package. Their display plane was extraordinary in its detail and a look at their plans showed all instructions necessary for this. What a beauty!

Of course, no show would be complete without Byron Originals and their ultra-high display of beautifully colorful airplanes. Their new *Thunderbolt* is now ready and, along with their already released *Staggerwing,* makes a welcome addition to their line of superkits. A *Corsair* next year? We hope!

Nick Ziroli's line of giant scale kits has been well known for years. The WW II P-40, AT-6 *Texan,* and *Corsair* are seen at many giant scale fun flys. This year, Nick went back a little further in time and has produced an excellent looking quarter scale *Taube* for you WW I fans. Looks like a real winner.

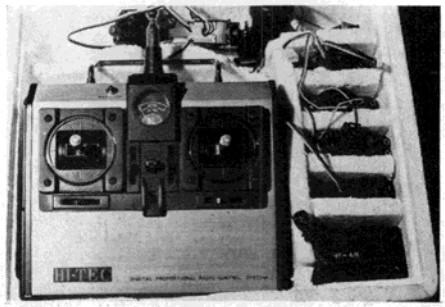
Robart displayed their 1/5 and 1/4 scale retracts. A beautifully light system that has a positive up and down lock, they are available in either rotating or non-rotating versions. Their new, improved Model Incidence Meter (can't build a plane without one) now has a jeweled movement needle and pivoting vee block. It seems they never stop improving this one. I hope they don't.

EMS (Electronic Model Systems) has more stuff for us jumbo modelers than you can imagine. Their Eagle II servo and heavy duty batteries are already well known. Their new 1/4 and 1/3 scale instrument panel kits and giant scale control cable systems are not but should be! Check out their glitch stop, too.—FRANK COSTELLO

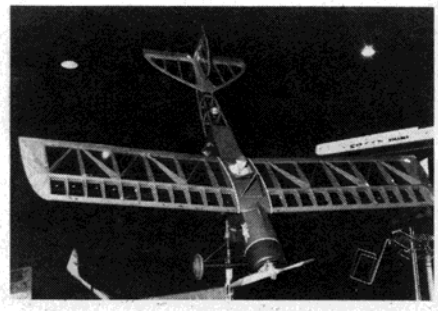
Sailplanes and accessories

The soaring community was not represented very well at this year's WRAM show. Three major sailplane people were on hand. Robbe, Craft-Air, and Top Flite. Robbe was the new kid on the block, with a fine line of sailplanes, powered aircraft, boats, and accessories. The top of the booth featured their powered sailplane, the *SF-36.* This powered glider will be a forthcoming product review. All of their models are of the "ARF" class. As I will be reviewing the *SF-36,* I can attest to the high quality of their kits. A $3.00 in-

DAVEY SYSTEMS CORPORATION, One Wood Lane, Malvern, PA 19355, displayed their new Pow'rzoom winch designed for F3B, scale, and cross country sailplanes. Also shown is the companion Retriever.

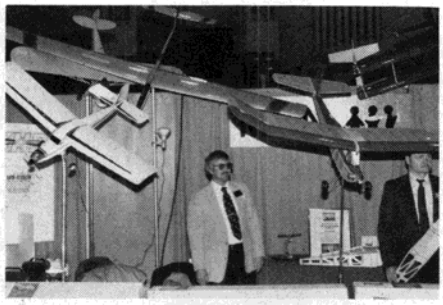


POLK'S MODEL CRAFT HOBBIES, 346 Bergen Ave., Jersey City, NJ 07304. A true economy priced 4 channel R/C system. Tx with servo reversing and dual rates, includes 3 servos, lists for $75.00. Additional $20.00 gets you batteries.



TOP FLITE MODELS, INC., 2635 S. Wabash Ave., Chicago, IL 60616. Scott Christensen's new *Elder* R/C model intended for a .20 four cycle engine. A great sport flyer. This model was covered with transparent red Super Monokote.

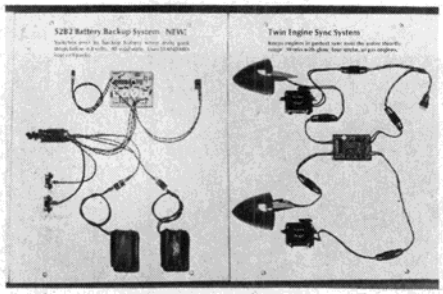
CANNON ELECTRONICS, 13400-26 Saticoy St., No. Hollywood, CA 91605. Another year, another tiny R/C pattern model. Bill Cannon holds 4 channel model using his micro sized R/C system and Cannon .03 throttle/engine.



MODEL ENGINEERING OF NORWALK, 54 Chestnut Hill Rd., Norwalk, CT 06851. Jerry Jarvis gets ready to answer one of the many questions about MEN products. The *Buzzard Bombshell* (r) is a reproduction with all modern construction.

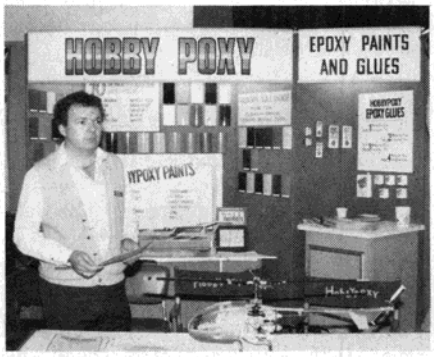
NORTHEAST ENGINEERING, P.O. Box 6201, Bridgeport, CT 06606. Bill McCauley still offering the ever popular driver panel. A top quality, high performance unit. Bill indicated that new products are in the planning stages.

K & S ENGINEERING, 6917 W. 59th St., Chicago, IL 60638. This is the familiar display found in so many hobby shops. K & S makes all sorts of brass and aluminum tubing and sheet stock plus music wire in many diameters.



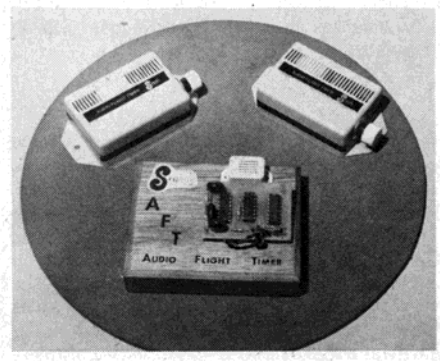
JOMAR PRODUCTS, 2028 Knightsbridge Dr., Cincinnati OH 45244. Joe Utasi made WRAM Show for first time. Rapidly expanding line includes new back-up battery system (left) which operates on 4 cell packs. Lists for $44.00.

AIRTRONICS, INC., 16191 Construction Circle W., Irvine, CA 92714. Here is the *New Era .40* for sport flying and pattern training. New larger size and updated construction from the *New Era III* of several years ago. All wood kit.

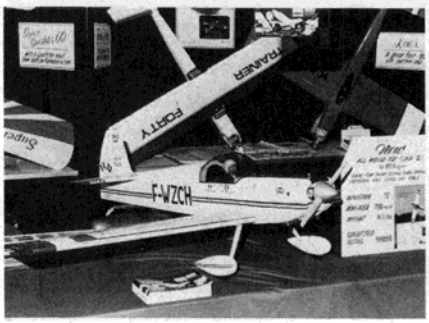


HOBBYPOXY PRODUCTS, 36 Pine St., Rockaway, NJ 07866. If you love to paint, they offer just about all your finishing needs. Ken Williams is always happy to answer questions about their glues, fillers, and many color selections.

SIG MANUFACTURING CO., Montezuma, IA 50171. The Sig booth had the usual sample of kits for the sport and scale builder. The quarter scale *Cubs* are always popular. *Astro Hog* with four stroke engine was a hit.



SCANDE RESEARCH INC., P.O. Box 133, Villa Park, IL 60181. Audio Flight Timer sells for $30.00. Can be attached to most R/C Tx. Will beep once after one minute and 15 times after 15 minutes before it automatically resets to zero.

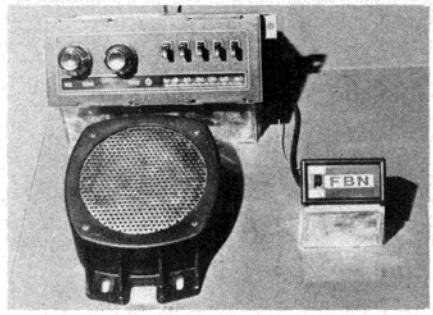


GREAT PLANES MODEL MFG. CO., P.O. Box 721, Urbana, IL 61801. New *CAP-21* R/C kit has 756 sq. in. wing, intended for .60-1.20 (4 cycle) power. Kit lists for $139.95. Bob Aberle has one set to fly. Look for review in this issue.

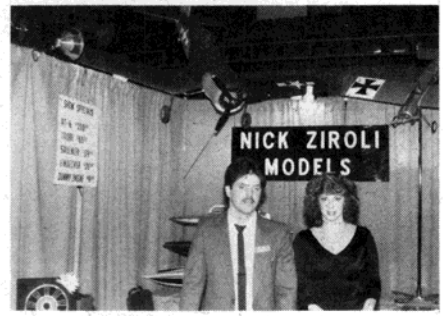
CRAFT-AIR, 20115 Nordhoff St., Chatsworth, CA 91311. Still available is their inexpensive and very popular dual range expanded scale voltmeter (ESV). Intended for quick field checking of remaining battery capacity.

CHAMPION MODEL AEROPLANE CO., INC. PO Box 891, Woodbridge, NJ 07095. Low wing *Hammer* and *Pepper* are selling well. *BT* trainer has updated construction. New *Powerhouse* kit is a reproduction of the old timer design.

WOLFF-PAK, 4517 Morning Wind Pl., Fort Wayne, IN 46804. The *Shrike* and its low wing brother the *Thrush* are .40 sized all wood kits with many pre-shaped parts and a complete hardware assortment. Good flyers too.

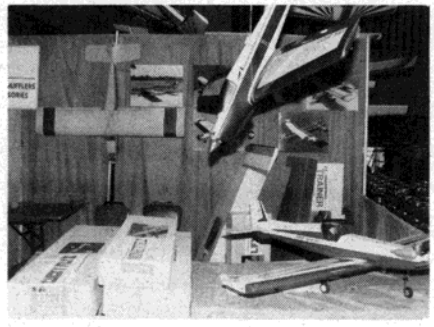


FBN INC., RD-1, Honesdale, PA 18431. Bill Shire introduced a neat, inexpensive converter which attaches to ordinary car radio. Flip a switch and you can listen in on 72 to 73 MHz R/C. Fits under dashboard. Fully assembled for $19.99.



NICK ZIROLI MODELS, 29 Edgar Jr., Smithtown, NY 11787. Here is Nick Jr. with one of the new models . . . the *Corsair,* that is. Glass and wood kit should be available this season. Meanwhile a .60 size *Taube* kit is in the works.

BAVARIAN PRECISION PRODUCTS CO., 22 East Ave., New Canaan, CT 06840. The many sizes of HB engines were being displayed and described by John Amarilios (l) and Durwood Hendee. The .21 schneurle is a hot item this year.



JOHNNIE CASBURN MFG CO., 5821 E. Rosedale, Fort Worth, TX 76112. Large variety of ARF kits here featuring jig-built fuselages and either pre-assembled or sheeted foam wings. *CAP-21* is coming soon for large 4-strokers.

SEMCO, 125 Manor Ave., Oaklyn, NJ 08107. The growing line of Semco mufflers and accessories now includes tuned pipes called Super Tuner. Some new mufflers have downward facing stacks for fully cowled engine installations.

vestment will bring their full color catalog to your door. Robbe Model Sport, Suite 345/55, The Office Center, Princeton Meadows, Plainsboro, NJ 08536.

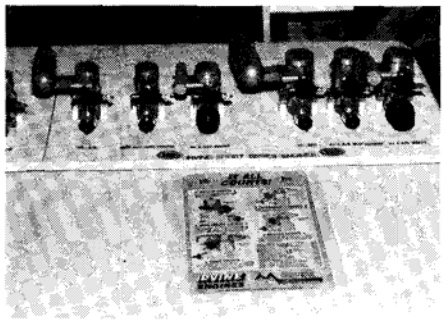
Craft-Air, 20115 Nordhoff St., Chatsworth, CA 91311 featured a very sleek new *Freedom X-Cel.* The *X-Cel* is the 1984 version of the very successful *Freedom.* An epoxy – glass fuselage coupled with foam wings and all the hardware makes the *X-Cel* a very complete kit. Lou Nelli, owner of Craft-Air, said that the *X-Cel* will do 100 MPH easily, with 16 ounces of ballast. Craft-Air also has their fine line of sailplanes which includes, the *Windrifter, Drifter 2, SD 100, Viking, Golden Eagle,* and *Sailaire.* Lou also has hi-starts, parapods, and parachutes. Coming soon will be a new pattern ship.

Top Flite Models Inc., 2635 S. Wabash Ave., Chicago, IL 60616. Scott Christensen has come up with another winning design in the *Antares* sailplane. The *Antares* is a high-tech, flat wing, multi-task sailplane. Aerodynamically, the *Antares* is state of the art. The airfoil design is a unique marriage of the Eppler 193/205 airfoils to provide excellent slow speed/high speed characteristics. On radio command, the variable camber airfoil varies at the trailing edge to produce the characteristics of several airfoils at will. The *Antares* incorporates ailerons, flaps, rudder, and stabilator. Wing span is 99.75 inches.

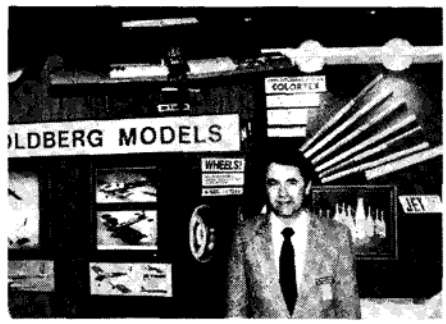
Top Flite also had their two meter, *Metrick.* I can personally say that the *Metrick* is one fine two meter ship.

California Slope Designs, 31932 Calle Winona, San Juan Capistrano, CA 92675. Mark Rebeck, president, had his *Son of Savage* mini sailplane on display at the Novak Electronics' booth. At this time, there is not much information available. Wingspan I would estimate to be around 48 inches. This plane would be great for small slope sites or just a small two meter hi-start.

Airtronics, 16191 Construction Circle West, Irvine, CA 92714. The line of *Sagitta's* needs no introduction to the sailplane pilot. I was talking to one of the people at Airtronics



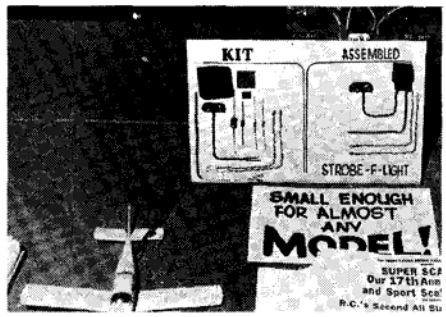
MIDWEST MODEL SUPPLY CO., PO Box 518R, Romeoville, IL 60441. Some new Irvine engines were on display, including .40 and .60 rear exhaust pattern engines and a couple of marine versions. Imported from England.



CARL GOLDBERG MODELS, INC., 4734 W. Chicago Ave., Chicago, IL 60651. Dan Lieberman pauses from his Colortex covering demo to say a few words about the new *Sky Tiger Jr.* and new line of quality wheels.

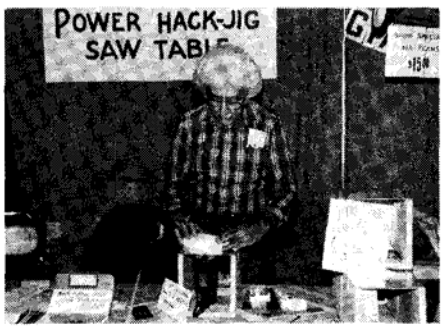
DaCa PRODUCTS INC., 14573 Grover St., Omaha, NB 68144. Truman Berkland shown displaying very sophisticated power panel, ESV monitor, and field fast charger all in one package. High quality unit at $150.00.

MIDWEST PRODUCTS CO., INC., 400 S. Indiana St., Hobart, IN 46342. Ed Rogala shows us the giant *Sweet'N Low Stik* to be kitted soon. This one is for a Quadra or similar engine. All *Stiks* have upgraded construction.



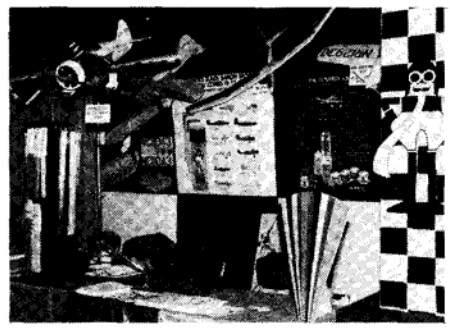
STROBE-F-LIGHT, 8405 Ave."N", Brooklyn, NY 11236. Kit and assembled versions available for scale appearance model strobe lights. Can fit in smallest models. Works off a separate 9 volt battery with minimum current drain.

GEE BEE PRODUCTS, PO Box 18, East Longmeadow, MA 01028. *Dreamer* biplane and *Islander* flying boat have been around for quite a while. The only change in their popular floats is that they now come in silver color plastic.



JOE BESHAR, 198 Merritt Dr., Oradell, NJ 07649. Joe's latest invention is a stand to hold a conventional power jig saw. Saw mounts upside down under table. Assembles from a few pre-cut wood parts and metal table top.

RAMCO LTD, N. Attleboro, MA 02760. Here is a nice selection of sport and trainer type airplanes with simple construction and quality parts. This year the plywood skinned foam float cores drew a lot of attention.



COVERITE, 420 Babylon Rd., Horsham, PA 19044. All typical Coverite products were on display, including several *GeeBee* kits, Black Baron epoxy paints, and various covering materials. Pre-primed Micafilm is new.

who said that they will be coming out with a new sailplane, that will be better than the *Sagitta*. I can't wait to see what they come up with.

Davey Systems Corporation, One Wood Lane, Malvern, PA 19355. Ted Davey, alias "the Winch Man" is at it again with his new Pow'rzoom winch. This winch has been designed for the serious sailplane flyer who demands extraordinary launching power for F3B, scale, or cross country designs. The Pow'rzoom features a heavy duty, welded, painted steel frame construction with an adjustable motor mount plate to insure that proper drive tension is maintained on the belt drive. A complete line of sailplane launching equipment is available from Ted in addition to "Multiplex" spoilers and accessories.

Fab-Tek Inc., 68 Morgan Ave., Danbury, CT 06810. Winches for sailplanes is the name of the game at Fab-Tek. The sport winch is a lightweight (34 pounds with battery, string, and foot switch), durable, and easy to operate. The high performance motor has been chosen specifically for the job of towing model sailplanes. It has an electrodynamic brake, along with a lightweight drum to cut down on inertia that causes backlash. The sport winch can launch any sailplane from an 18 ounce Craft-Air *Drifter* to an 80 ounce Dodgson *Maestro Mk II*.

Ace R/C Inc., Box 511B, Higginsville, MO 64037. Ace R/C is now the exclusive manufacturer of the famous Thermic Sniffler. After talking to Don Clark, he informed me that Ace has the exclusive on the Sniffler. No design changes have been made, and it will not be offered in kit form. Contact Ace for further information.

M.E.N., Model Engineering of Norwalk, 54 Chestnut Hill, Norwalk, CT 06851. Dwight Holley and Fritz Being designed the *Gobbler* for F3B world competition and won. The $149.95 sailplane features a fully sheeted Eppler 205 wing, which incorporates ballast tubes and spoilers. A minimum of three to seven servos are required for the radio installation. —BOB CRANE

An FM How-To Special:

MonoKoting:

The Complete Story

By Bob Lobozzo

A comprehensive and informative article which details iron-on technique from A to Z. Something for novice and expert alike.

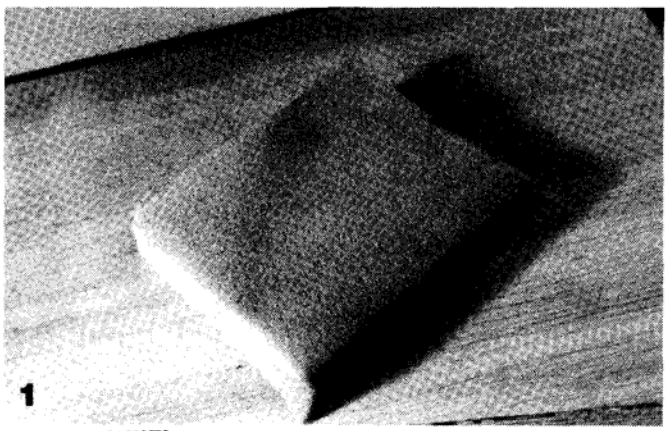
The following article is primarily aimed at the beginner and those inexperienced in iron-on techniques. Although this article is on MonoKote™, all iron-on's can be applied pretty much the same way.

I claim to be no expert in heat shrinkable mylars; however, I am presenting methods and ideas which work, and some, while I think they are original, have probably been done before. I will give opinions based on personal experience. Please remember these are opinions, they do not come from the "burning bush." These procedures work for me; if you have better methods, then use them. I also urge you to experiment and develop new and better ideas.

Two contradictory statements which have been repeated over and over are: "I just don't like the look of a MonoKote finish"; and, "If I could MonoKote that well, I would never paint again." The interesting thing is that, in many cases, it is uttered by the same person, although usually at different times and when viewing different models.

The only conclusion that I can draw from this is that if done properly, an iron-on covering is accepted as a good finish, and, if we are willing to expend some time and energy, the results can be outstanding. If we think about it, the primary function of a finish is to seal the wood, protecting it from fuel and the elements. To accomplish the above, we could simply paint on a couple of coats of clear and be done with it, and in some cases this is exactly what is done.

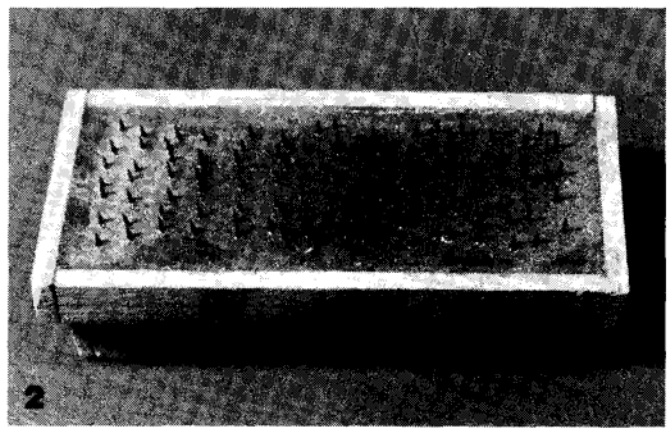
In R/C, however, one primary consideration is visibility. It is imperative that we be able to determine attitude and position of our aircraft at all times. A personal observation is that a finish seems extremely important until the aircraft has been flown a while, then its importance diminishes rather quickly. MonoKote can seal the model and provide the necessary colors to afford visibility while offering the advantages of light weight, reduced finishing time, lower cost and negligible odors. While I do not honestly believe it is the complete answer for all models, its advantages make it desirable to use on a wide variety of them. Therefore, an attempt should be made to master its application. Disadvantages of the iron-ons are seams, fuel seepage in certain areas, and, in many cases,



1

PHOTOGRAPHY: BOB LOBOZZO

A piece of open cell foam (**above**) serves to remove both sanding dust and tiny raised balsa fibers. The text lists and explains the basic tools necessary (**below**) for an excellent covering job.



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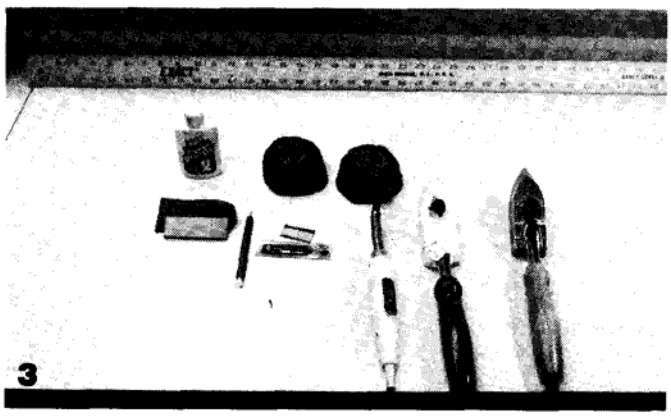
This tool, with pins embedded in epoxy (**above**), punches small holes in the balsa to allow moisture escape. When shrinking the tacked-on MonoKote, a cloth covered iron (**below**) prevents scratching the plastic's surface.



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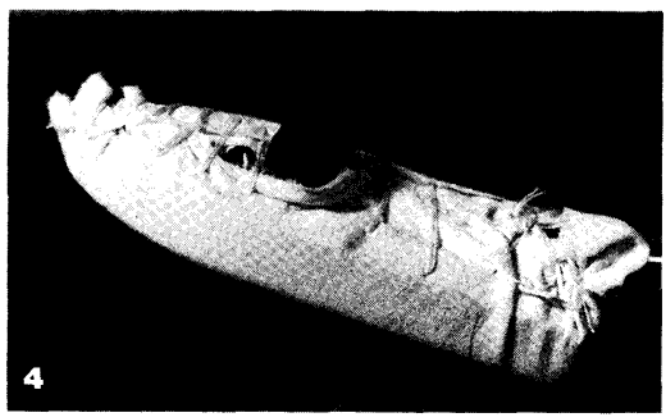


4

wrinkling after a period of time. As a brief footnote to our discussion, a seam is defined as any two, separate pieces of MonoKote which are joined or butted together. Wrinkling, while annoying, can usually be reworked satisfactorily. The seams cannot be eliminated, but they can be camouflaged. A seam with a different color on each side will appear as a normal color separation. A seam with the same color on either side will appear as just that, a seam. These must be hidden, if possible, or they will detract from the overall appearance.

Crooked or ragged seams will stand out and the glue on the edge of the covering will attract dirt and magnify their presence even more. If the seams are straight and on the bottom of the aircraft, they will usually go unnoticed. Seams on an edge, such as the trailing edge of an elevator can be made almost invisible (See **Figure A**). Another problem when trying to hide seams is shown in **Figure B.** The drawing is exaggerated, but it does show what the end result will be when using pin stripes. If the pieces are butted properly, and then pin-striped, it will be impossible to see the butt joint under the pinstripe. On the other hand, if the butt line has gaps or overlaps in areas, it will show through the pin-stripe.

Tail assemblies present further problems which can be dealt with in several ways. We can MonoKote the fuselage and tail assembly as separate pieces and then, being careful to cut the covering away from the glue area only (**Figure C**), finally assemble them. If fillets are desired, they can be handled at least two different ways. In the first instance (**Figure D**), the tail assembly is glued on prior to covering. Electrical tape is applied defining the outer edges of the fillet line. The fillet is then formed with the desired material, such as Epoxolite and the fillet is completely sanded and painted. The tape is then removed, which will leave an edge, the covering is then butted to this line. The joint line must then be sealed. In **Figure E**, the tail assembly and fuselage are covered separately and then glued together leaving an exposed area on either side of the joint. The fillet is then applied as in the manner previously described, except that the edge of the fillet will overlap the MonoKote. If this method is tried, use low tack tape to attach to the model. In this way, we can avoid pulling up the MonoKote when the tape is removed.

Consider painting parts of the aircraft that are troublesome to MonoKote, such as nose, center section of wing, wing tips, etc. Painting can also eliminate problems in areas where fuel exhaust and seepage may be a concern. While on this subject, EconoKote, while great to work with, is not fuel proof. The clear facing will separate from the color after exposure to exhaust residue or oil. If used, it must be sealed thoroughly at all seams that are exposed to exhaust gases.

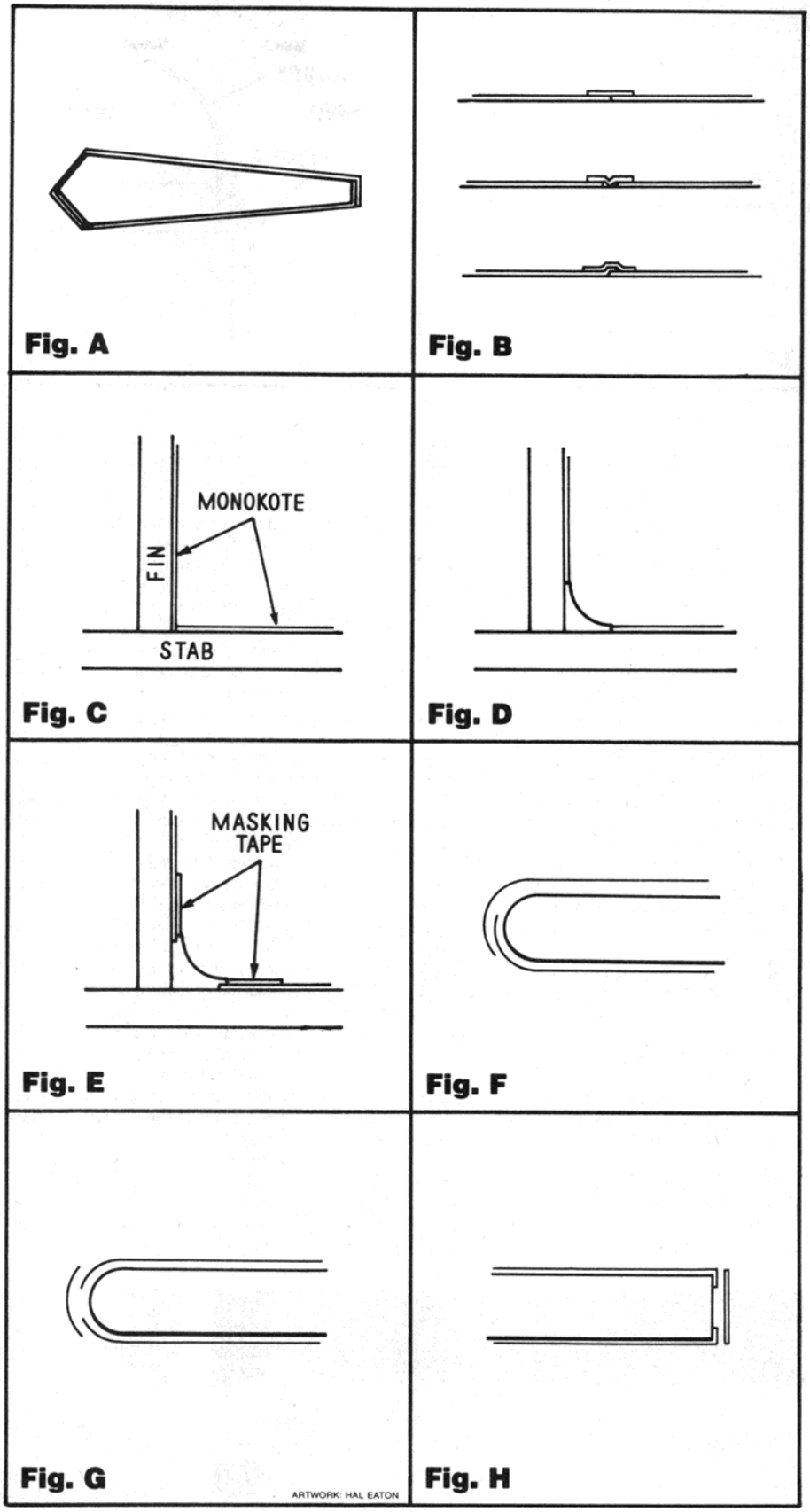


Fig. A

Fig. B

Fig. C

Fig. D

Fig. E

Fig. F

Fig. G

Fig. H

Airframe preparation

One of the differences between a good finish and a poor one is about two dollars worth of sandpaper and some extra labor. If the framework or base is not properly prepared, the finish cannot compensate for poor workmanship. The base must be level and smooth – no nicks, dents, valleys, high spots, or waviness should be tolerated.

A helpful suggestion in this area would include using the correct length sanding block. If you are sanding a 30 inch wing panel, you should ideally be using a 36 inch long sanding block. This can get a little impractical admittedly, but at the other extreme a two inch square piece of sandpaper held by the tips of your fingers will never do the job. We want to bridge the high spots, not follow the valleys up and down. Use coarse paper, around 80 grit at first, and let the paper do the cutting. You will sand down the high spots and glue seams easier. What we are trying to accomplish is to bring the high spots to meet all the low spots, which will result in a perfectly flat surface. This cannot be done if the low spots are too low or you will run out of wood.

Usually the tips of your fingers, slid across the surface, will detect high and low spots; a straight edge can also be employed for this purpose.

If inexperienced, ask someone whom you

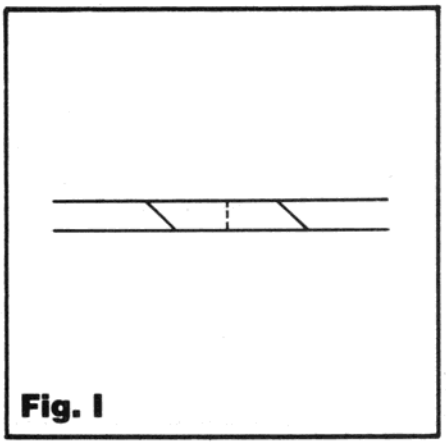


Fig. I

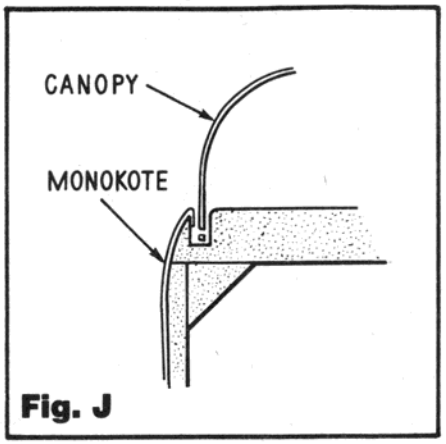


Fig. J

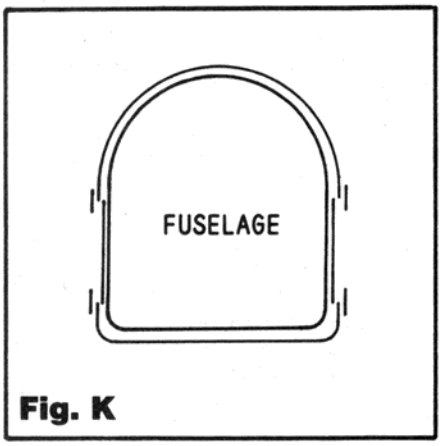


Fig. K

feel does a good job of building to show you his work prior to covering, or, bring him your model and ask for help or suggestions. A few hours spent with a modeler who knows how to sand and shape will afford you a wealth of information.

After rough shaping, and prior to final sanding, the radio installation, engine, tank, etc. should all be fitted. All the various holes should be made now. Hinge slots should be cut, the hinges test fitted and then removed. Mistakes can be corrected now, prior to final sanding and covering. All end grain such as aileron ends, wing tip, trailing edges, etc., should be sealed with a cyanoacrylate or epoxy. Included in this area would be any holes drilled for switches, charging jacks, and such. The advantage of this is that during sanding we can hold the shape of parts better as the extra hardness of the glue prevents rounding off of edges.

At this point, we can go to 100 grit paper for our final shaping and leveling. Any nicks or dents can be filled now and final sanding is done with 220 grit. By now the main sanding is done. Finishing up with 400 grit used lightly will smooth the surfaces further and is recommended if MonoKoting.

Glue seams may give you a problem during sanding as they are harder than the surrounding wood. Regular sanding will not always leave them flush. During the sanding process, we sand or file across the glue line leaving a small flat spot. Final sanding will bring the glue seam level with the wood surface. Scraping the glue line with a razor blade is helpful when working on an epoxy joint.

When satisfied that we can no longer accomplish anything by sanding, we are ready for the "foam treatments". Take a piece of open cell foam rubber about four inches by six inches (see **Photo 1**) and rub the wood with the grain and across the end grain. This will tear off all the tiny wood fibers that the sandpaper merely lays down and will also remove a lot of sanding dust from the model. You will have to change to a fresh piece of foam, or vacuum the one you're using, periodically. The model should be as smooth as glass at this point. An air gun and/or vacuum cleaner should be used to remove all sanding dust from the model.

Decide now if you are going to punch holes in your structure with a pin. This is done to let out moisture in the wood. If the wood is dry, this seems to be of no particular value. I use a block, with an array of pins expoxied in (see **Photo 2**), to put holes in the wood if I feel it is necessary. You only have to push them in about 1/16 of an inch. The holes will not show through the MonoKote. Don't be misled by the widespread belief that the holes allow trapped, heated air to escape. To prove the point try MonoKoting a fiberglassed piece. Done correctly, you will not have any air bubbles and you can be certain that the air did not go through the glass surface.

Now that the structure is complete, it must be protected. You will handle it a lot during covering and you don't want to dent it. Cover your work bench with a section of foam padding, old blanket, even a stack of newspapers to prevent damage.

Another decision you are faced with is whether to use Balsarite (an heat activated adhesive, made by Coverite, which can be sprayed/brushed on wood surfaces) to seal the wood prior to covering. I personally think it creates more problems that it is supposed to eliminate, but you be the judge. Try it on some test section first if you are considering using it.

Tools for application

Basic tools required (see **Photo 3**) are as follows:

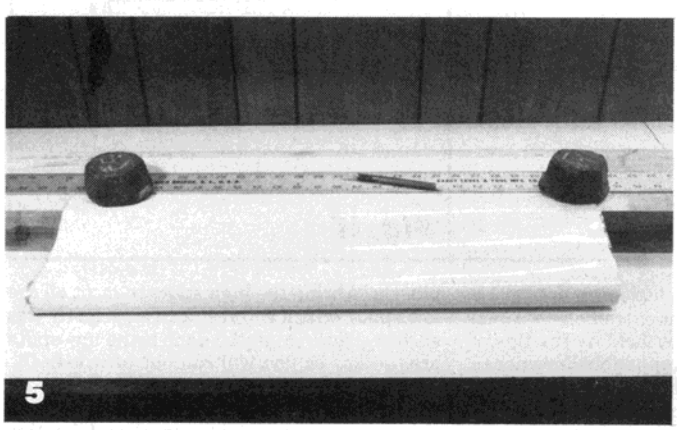
1. *MonoKote iron.* Top Flite MonoKote iron or similar type is desired. In addition, the Top Flite Trim Seal tool is handy although not absolutely necessary. If desired, you can cover the shoe of the iron with cloth (see **Photo 4**). A double layer of old bedsheet material is best and it must be tightly sewn to the iron. If the cloth is not tightly attached, it will slip back and forth as you iron. This will accelerate wearing through of the cloth and, in general, is aggravating to work with when loose. While covering with cloth eliminates scratches, it is not the best for sealing edges as the necessary heat used will start to melt the adhesive and this will be impossible to remove from the cloth.

2. *Straight edge.* This should be four to five feet long, preferably, or at least slightly longer than the longest piece of material you will have to cut.

3. *Weights.* At least two weights, approximately five pounds each, are used in conjunction with the straight edge (see **Photo 5**), to prevent the MonoKote from slipping during cutting.

4. *Cutting board.* This should be smooth, preferably a hard, wooden surface long enough to cut the longest piece of material. A width of six inches should be sufficient. Birch wood is an excellent choice if available.

5. *Knife and sharpening stone.* An X-Acto



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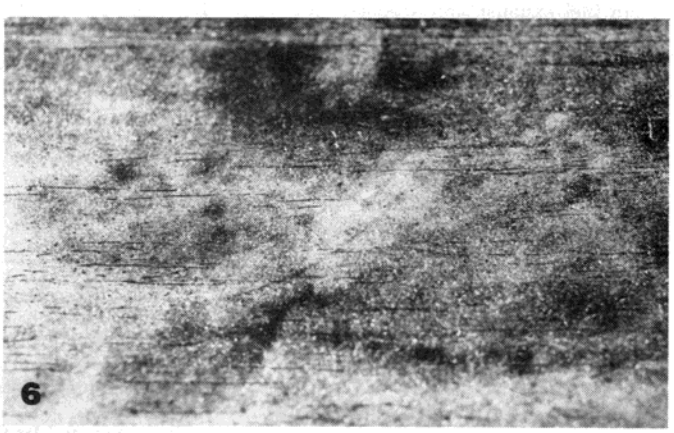
Good heavy weights, positioned on the ruler, help keep the straight edge from slipping while cutting the MonoKote on the cutting board.



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If the application heat is correct, the back of the MonoKote, after removing it from the test section, should look like this.

knife with a #11 blade is good, with the Uber brand knife and #11 blade preferred. A hard Arkansas stone and light oil will be used to keep the blade sharp. One blade is sufficient for an entire job if properly sharpened periodically.

6. *Razor blades.* A few of these are handy for trimming. They will not last long during use, as they dull quickly. Use the industrial grade, single edge blades available in local hardware stores.

7. *Tack rag.* This should be considered a necessity and is used just prior to setting MonoKote sections in place.

8. *Scratch remover.* As the name implies, this will remove scratches and, in general, level out the shine. A good choice here is Novus Plastic Polish 2, item No. PC-22, Novus Inc., Minneapolis, Minnesota 55435. Creme silver polish also seems to work well. Top Flite, the maker of MonoKote, has recently added a MonoKote Polish to their line which works well.

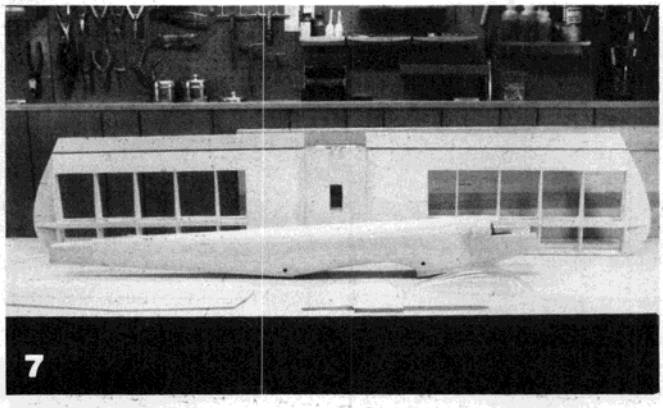
9. *Clear plastic flexible ruler.* No. B-85, C – Thru Ruler Co., 6 Britton Drive, Bloomfield, Connecticut. This is handy for laying out lines on the model and cutting pin stripes.

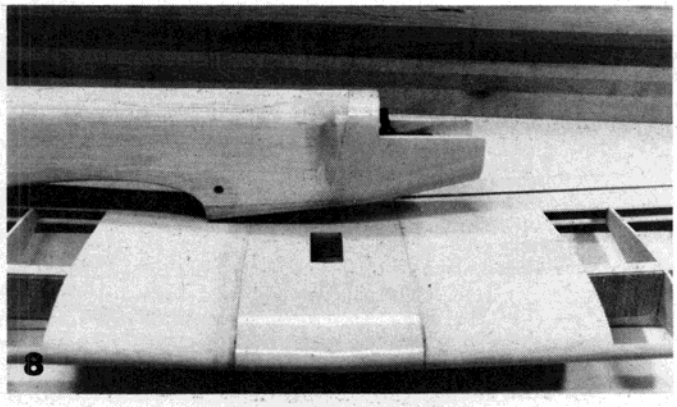
10. *Felt tip marker.* Purchase the nonpermanent type. This will be used for positioning trim detail.

Technique

At this point, we are going to develop our iron-on techniques. I suggest you fabricate a test section of balsa wood. This can be part of an old foam wing section, a stab or whatever that's left over from a crash. It should be a decent size, at least 18 by 10 inches. Small sections of MonoKote are easy to apply and will fool you into thinking it's easy. The larger sections are more difficult. Prepare the test piece as you would an airframe and leave part of it a little rough. In this way you can see how the preparation of the surface influences the finished product.

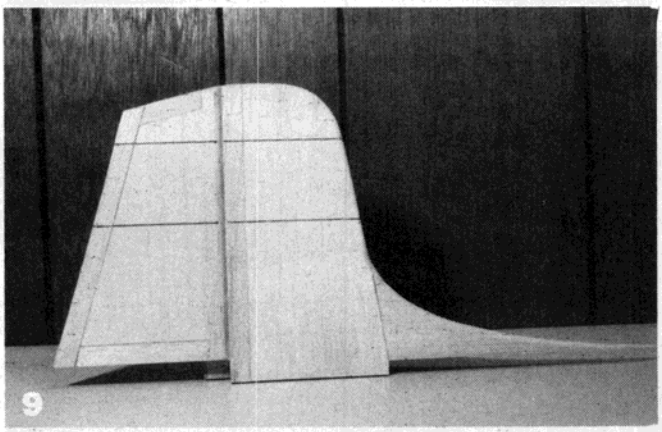
The two areas in which we are trying to develop our expertise are establishing the correct iron temperature and applying the MonoKote without denting the wood. These two items can affect the finish more than anything except a poorly constructed airframe. A MonoKote finish that uses different colors butted together over solid or sheeted surfaces relies on the fact that the MonoKote

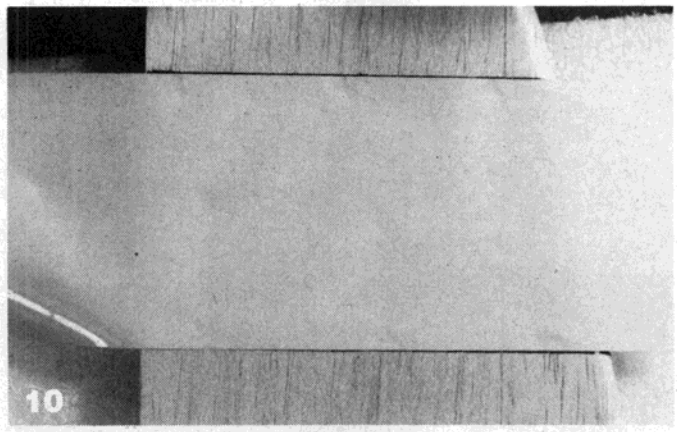


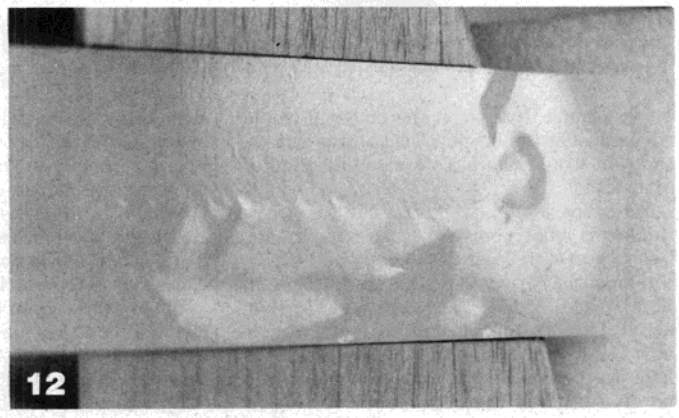


Surface preparation for a good MonoKote job is almost as demanding as for a paint finish. The parts (**above**) ready to be covered. The vertical stab and rudder (**below**) have been marked for trim application.

For reinforcement purposes, the nose and the wing center section (**above**) have been fiberglassed and painted. The yellow trim on the stab (**below**) has been cut and positioned between the trim line marks.

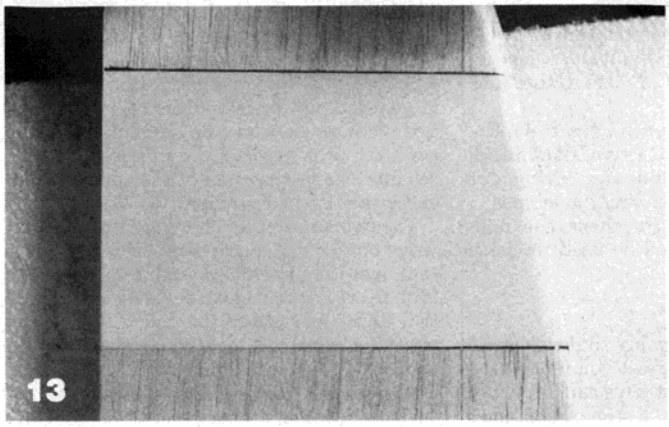


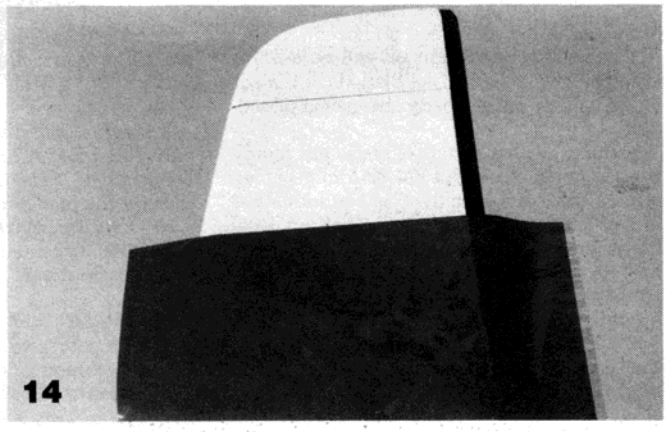




After the trim has been positioned, it is tacked lightly in place along its edge and the center section then ironed. Tacks are then broken.

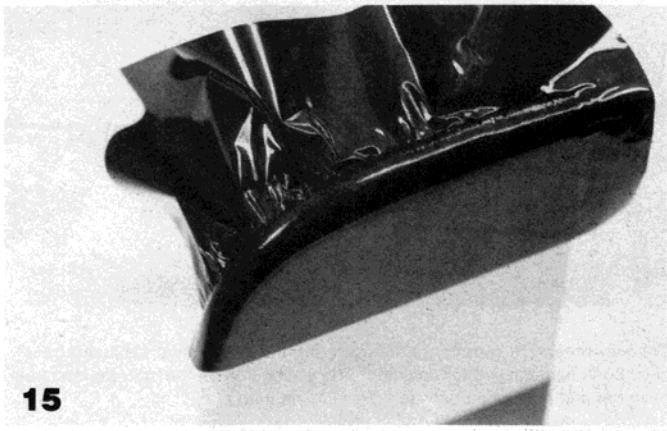
When ironing the trim down, work outwards from center to one edge. Once that has been done, repeat the process from center to other side.

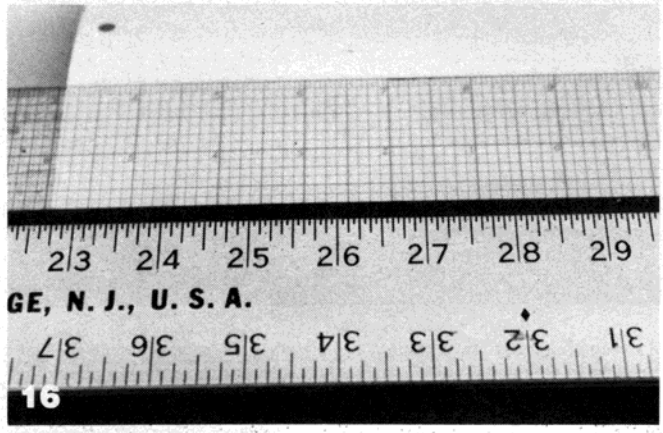


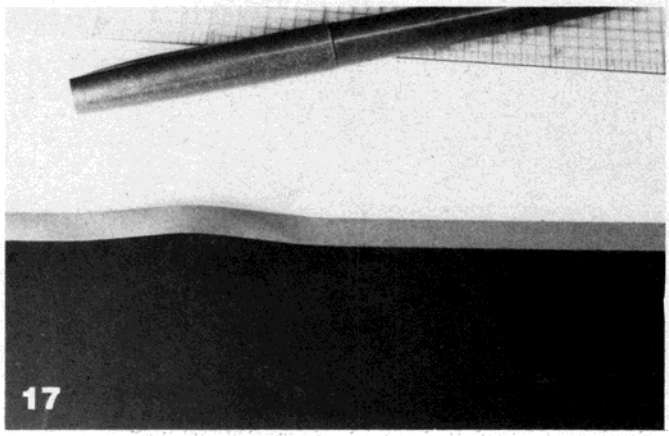


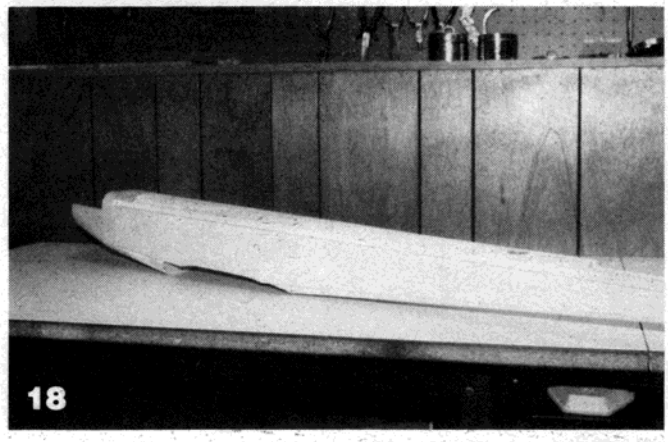
Completed yellow trim on the vertical stab (**above**). Applying the top blue trim (**below**) to the stab requires positioning it and ironing it around the tip of the stab, past the center line. Excess is then trimmed away.

The lower blue trim section for the vertical stab is now butted (**above**) to the yellow section. The clear see-thru ruler (**below**) with its gradations is used to establish the width of the pin stripes.









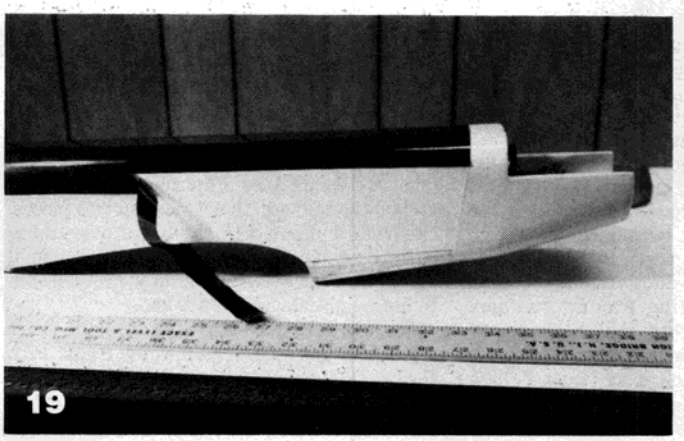
The gold pin stripe being applied to cover the blue/yellow seam. The guide line drawn with the felt tip marker barely visible on the yellow section.

The center, yellow trim panel for the fuselage side has been cut to shape and tacked in place between the trim lines.

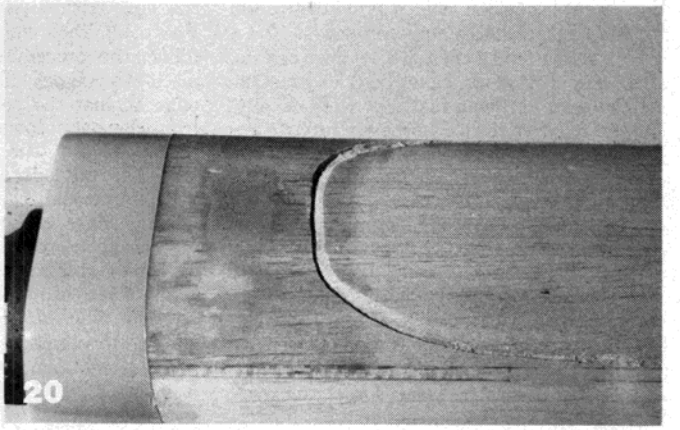
is not shrunk. If it were, the material would not maintain the original size it was cut to, and you would not have a straight edge or seam line.

Mark out a trim design on the test piece similar to what you might use on a model. Before you start laying it down, you have to establish the correct temperature of the iron. Small pieces of MonoKote are best for this, about two by four inches. Simply iron it down and when cool, peel it off and see if the glue was activated. You should be pulling up part of the wood when you remove the MonoKote and should note resistance to peeling (see **Photo 6**). The correct iron temperature is one that will activate the glue without shrinking the material on sheeted surfaces and is not so hot as to create air bubbles. As you are ironing down the material, you will be going over areas that have already been attached. If you start to notice bubbling occurring in these areas, it is due to the iron being too hot. The only other thing that will cause this is too much moisture in the wood.

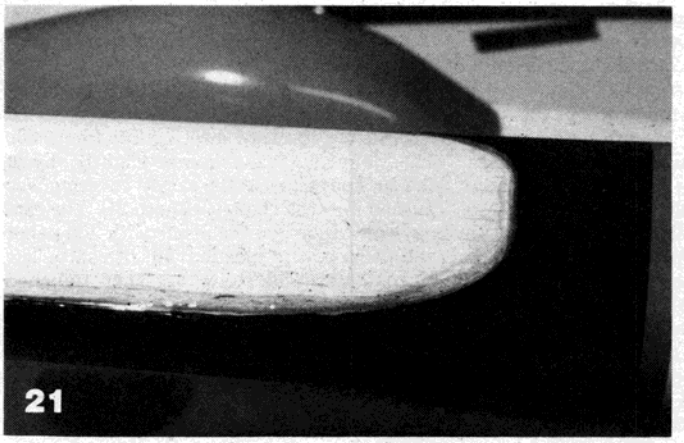
When you feel you have arrived at the correct temperature, mark that position on the iron for all future reference. If available, lay the iron on a meat thermometer and record the temperature for further use. Coverite has a simple thermometer which is excellent for checking iron temperatures. Consider one complication; the irons we use will not generally hold a constant temperature for any length of time. If you're still skeptical, lay the iron across an accurate thermometer and observe the temperature variations. One solution involves the use of a Dremel motor speed control to maintain the temperature. Set the thermostat on the iron to maximum and use the control on the Dremel to set temperatures. This will hold them fairly constant. One problem is that once you arrive at the correct setting and unplug the iron, the next time you use it you will have to set the controller to a much higher position and then back down to the pre-set position. If this is not done, it will take forever for the iron to come up to temperature. I simply unplug the

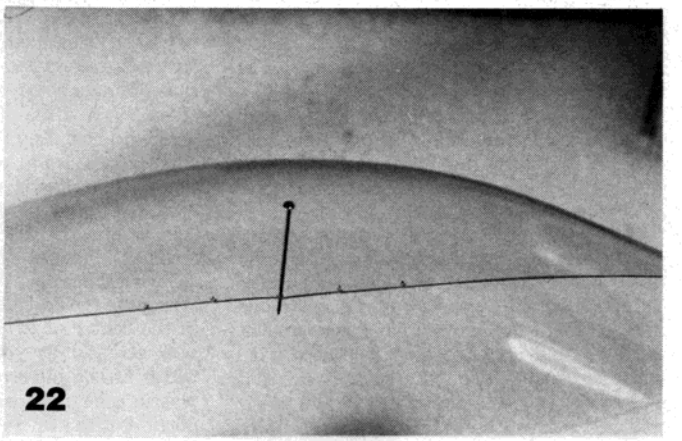


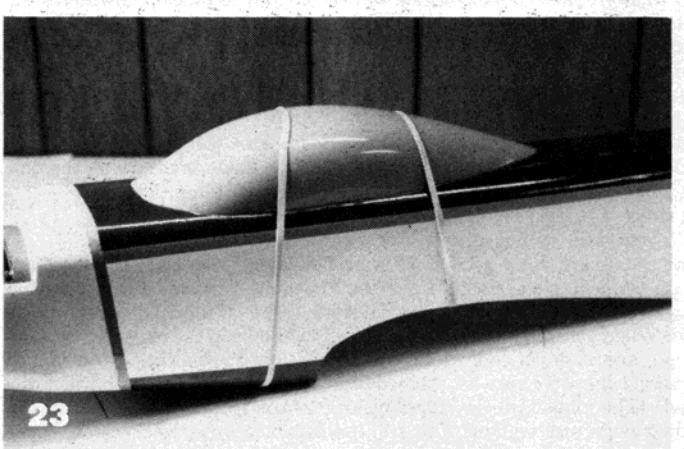
The top, blue fuselage trim has been applied and the excess (**above**) is being trimmed. Top section must butt against side piece. MonoKote (**below**) trimmed from canopy area and the canopy channel filled with Hobbypoxy 2.



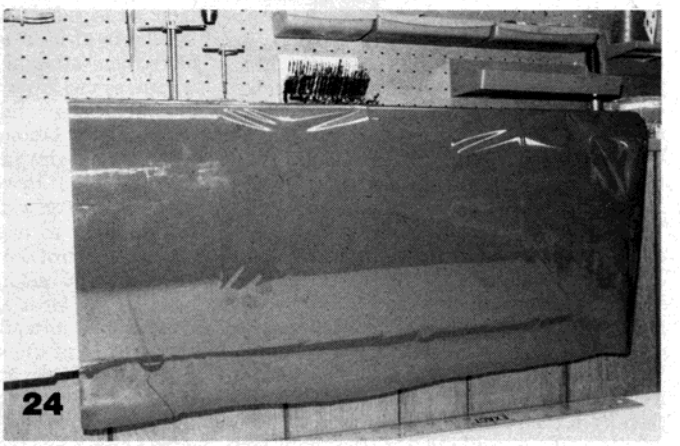
For installation of the canopy a channel is cut (**above**) to receive it. Epoxy glue will fill it after MonoKote application. Canopy is pierced (**below**) around its perimeter with a pin to help anchor it in the epoxy fill.







The plastic canopy is pushed down into the epoxy filled channel where the epoxy seeps into the holes, anchoring it in place.



View of the wing's bottom shows the yellow MonoKote trim already in place and the larger blue section being applied.

iron if it gets too hot and causes bubbles. After about five minutes, plug it back in after reducing the thermostat slightly.

Utilizing the test piece, iron down your color scheme. Also, try ironing down small sections of MonoKote over existing MonoKote. If not satisfied, tear it off and do it over again. Check the back of the MonoKote after removal to see how well it was attached. Don't be frugal at this point, it is better to burn up some or all of a roll to learn how to use it before attempting to cover a model.

The model utilized for this article is a *Super Duper Joy Stick* by Mile High Models (see **Photo 7**). It represents a sport model of the type that many would MonoKote. The color scheme chosen, blue and yellow, is fairly simple and, hopefully, not unattractive. It was decided to paint the nose area and wing center section. The center section was glassed with Hobbypoxy Formula 2 and a six inch width of cloth. The front of the nose section was glassed with 3/4 ounce glass cloth and Formula 2. The glass cloth was sanded after curing to remove the tacky residue and to level it out. The light brown areas seen in the photo (see **Photo 8**) are Hobbypoxy Stuff used to feather out the edges of the glass. After masking, the areas were primed with Rustoleum #2081 light gray auto primer in a spray can and then painted with Perfect paint (now known as Chevron paint—Ed.). We could have just as easily MonoKoted these areas, so decide which method you prefer. Remember to sand and remove residue after glassing, with either method. MonoKote is easy over glass cloth if prepared as described, and the iron is not too hot. If iron temperature is high you will soften the epoxy holding the cloth, and it will blister.

The model pictured has the control surfaces hinged prior to covering. The wing employs Cooney Gapless Hinges and the tail assembly has gapless hinges of my own design. I decided it was simpler with the style of hinge to MonoKote the control surfaces in place. An extra vertical fin was cut out and used for some of the pictures as a demonstra-

tion piece. I mention this to avoid confusion for anyone that may compare photos.

We will start with the tail assembly, as it is small and easy to work on giving us practice for the more difficult fuselage. It is usually simpler to cover the tail assembly prior to attaching it to the fuselage. All hinge slots should be completed and test fitted. The hinges are glued after the tail components are individually covered. If you shape your movable surfaces with a "V" leading edge and set up the hinge line for a tight fit, you may run into a problem. During application of the covering, it is easy to deform the "V" leading edge especially if the wood is soft. This can destroy the alignment you had prior to covering. To prevent this, I coat the leading edge of the elevator, rudder, and ailerons with Hobbypoxy Formula 2 or a cyanoacrylate prior to covering. This will maintain the shape of the leading edge, provided you don't lean too heavy on the iron.

It is helpful to draw the trim lines directly on the wood; a flexible ruler is desirable here. While you're at it, use the ruler to measure; don't "eyeball" the trim line locations. The lines need only be dark enough to see (see **Photo 9**). Don't draw the lines unless you are sure of their location. Once drawn, the lines will show through the MonoKote, due to the color or the indentation they leave. This will not be noticeable at the trim line.

As a dust free shop is difficult to achieve and maintain, I lightly run a tack rag over the area to be covered, and the glue side to the MonoKote if necessary, just prior to laying the MonoKote in place. This picks up normal dust and dirt and any generated from static electricity when the clear backing is pulled off. Once the piece is tacked in place, the tack rag can be used to wipe the finish side prior to ironing. This will remove dust which will scratch the surface as you iron.

Starting with the vertical fin, we will lay in the center yellow trim piece first. Cut this piece with a straight edge, sizing it to fall between the trim lines (see **Photo 10**). Lightly tack the MonoKote around the perimeter of the piece to prevent it from shifting. Start at the center of the trim piece and iron the MonoKote, along its entire length, to the fin. You should now have a strip MonoKoted approximately one inch wide from the leading edge of the fin to the trailing edge. The MonoKote is now in place and the tacks will have to be broken loose (see **Photo 11**) as you proceed to attach the rest of the covering. Working from the center, iron the MonoKote from the center to the lower trim line and then from the center to the upper trim lines or vice versa (see **Photo 12**). The piece you ironed down should be between the trim lines in the exact position it was when originally tacked (see **Photo 13**). If you have trouble keeping the trim straight, you probably have the iron too hot. The above procedure is used for all sections that must fall between two opposite lines, regardless of the size of the section. Overlap the leading edge per **Figure F** and the trailing edge fully. Trim the excess and re-seal the trimmed edge. Flip the fin over and repeat the covering procedure. Overlap the MonoKote at the leading and trailing edge as per **Figure F** for a distance of approximately 1/4 inch. Concave curves can be a problem on leading edges, and you may have to resort to a cap piece of MonoKote similar to that shown in **Figure G.**

With the yellow in place, we can start the blue. The blue is cut straight and butted to the yellow. You can cut this piece oversize as the only critical part is the seam line (see **Photo 14**). Tack the blue in place and again follow the procedure outlined for the trim piece. As you only have to maintain the blue edge against the yellow edge, you can iron from the seam down as opposed to starting in the middle. The remaining pieces to be placed are obvious, and the only problem will be going around the curved portions of the leading edges without wrinkling. It will be advantageous to raise the iron temperature (or use two irons - one on normal and one on high) when MonoKoting around complex shapes. The MonoKote will have to be shrunk to eliminate wrinkles and you will have to pull and stretch it as you go along (see **Photo 15**). Use an iron temperature just below that which will melt the material and work the iron slowly. If not satisfied with the way the section came out, peel it off and start over again. The rudder is done the same way as the fin and the bottom of the rudder is overlapped per **Figure H.**

The blue/yellow seam is not fuel proof and must be pin-striped. Decide on the width of stripe desired, with 1/8 inch being considered the minimum to cover a joint. The pin-stripes are cut from a roll of MonoKote; in this case gold was used. Lay the MonoKote down on a cutting board and place a straight edge on top. I use a plastic see-through ruler, graduated in 1/8 inch increments in a grid pattern (see **Photo 16**). By sliding this along the straight edge you can quickly establish an accurate pin-stripe. Weight each end of the straight edge down and place your free hand in the center of it. The MonoKote will now stay straight as you cut it. Assuming the width of the pin-stripe is 1/4 inch, take the plastic ruler and draw a line on the yellow portion of the fin 1/8 inch from the butt line. Use a fine line felt tip marker; the line can later be wiped off with a wet rag. This line will be used as a guide to keep the stripe aligned and straight (see **Photo 17**). It may be helpful to use lower heat to apply the stripe, although I don't find this necessary, to prevent bubbles. Maintain the edge of the stripe along the line drawn. Don't pull on the stripe as you apply it or you will stretch it, resulting in an uneven width stripe. I find it best to use a finger to align about two inches of stripe in front of the iron as you are ironing it down. Lightly tacking the stripe down as you go is helpful for it allows you to pull up and re-position it if required. When satisfied with the position of the stripe, iron it down completely, going over it several times to insure it is completely attached. (The pin-stripe is overlapped at the leading edge and trailing edge in the same fashion as the trim pieces.) The stab and elevator are covered in the same manner as the fin and rudder.

Fuselage

The fuselage, without tail attached, is fairly easy to handle. With a straight edge, lay down the trim lines on the fuselage sides. A strip of yellow is cut to proper size and MonoKoted between the trim lines on the left and right sides (see **Photo 18**). The blue is started at the center of the top of the fuselage and worked towards the yellow trim. We (refer to **Figure K**) stop ironing approximately 1/16 to 1/8 inch short of the yellow. Drag out the straight edge again, take two pins and locate the yellow edge underneath the blue overlap and push pins into the fuselage at the joint line, one at the front of the fuselage and one at the rear. Lay the straight edge against the pins and cut off the excess blue material (see **Photo 19**). Be careful not to cut into the wood more than slightly. The smaller portion of the blue which is not ironed down should butt against the yellow. If areas overlap they should carefully be cut off. Major gaps can be filled in with Hobbypoxy Stuff. The other side of the fuselage is done the same way. Flip the fuselage over and do the bottom, this is done in two pieces, one front and one rear. If you cut everything with a straight edge and exercise normal care, you should not have any problem obtaining a satisfactory butt line.

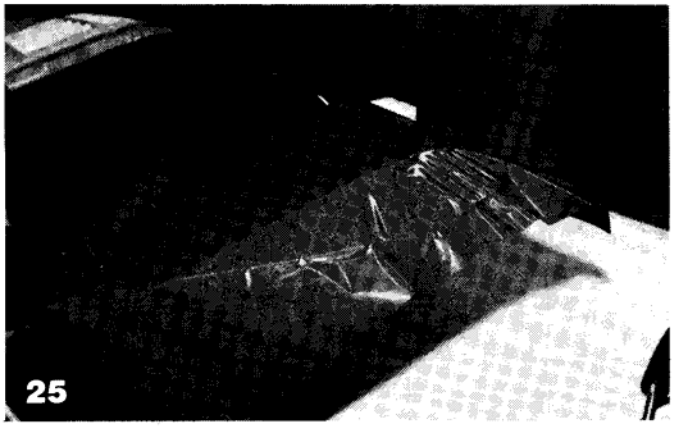
You can now pin-stripe the fuselage (refer again to **Figure K**). Again, draw a line with the felt tip marker on the yellow, 1/8 inch from the seam, and iron the stripe along this line. If you run into a problem with the trim being too short to cover the length of the fuselage, butt the pin stripe together and cover with a contrasting patch (see **Figure I**). The pin-stripe at the front paint line is on the MonoKote and butted to the paint line. This must be sealed with a cyanoacrylate or polyurethane clear, such as Coverite's Glass Kote.

I mounted the canopy as follows (refer to **Figure J**): a channel was cut prior to covering, which allowed the canopy to be recessed into the top fuselage sheeting (see **Photo 20**). The MonoKote was trimmed slightly shy of the outside edge and the excess covering was pushed into the channel (**Photo 21**). The canopy was sanded on the inside with 400 paper and painted with plastic paint (it can be left clear, if desired). Holes are then punched through the canopy with a pin as close to the bottom as possible (see **Photo 22**). It helps to lay the edge of the canopy over a soft block when making holes. Holes are spaced around the perimeter of the canopy every 1/2 inch to one inch. The channel is filled with Formula 2 glue and the canopy is pushed down into the slot (see **Photo 22**). Some glue will be forced out and this will seal the MonoKote. If things get messy, wipe off excess glue with a rag dipped in alcohol. Be sure to drill a hole under the canopy, into the radio compartment, as a vent. This will keep the air inside the canopy at the same pressure as the outside air, regardless of temperature.

Wing

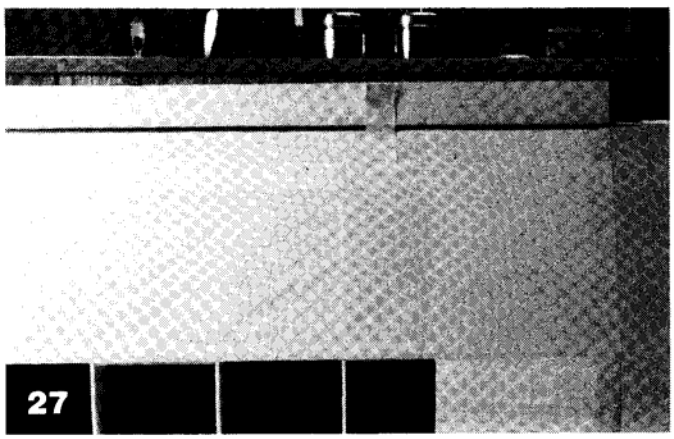
It is best to start with the bottom of the wing (see **Photo 24**). Cut a piece oversize and tack it every three or four inches along the perimeter. Try and keep the covering as wrinkle free as possible at this time. Now attach the covering to the center section, next the trailing edge, then leading edge, and finally tip rib. It will be necessary to break the tacks loose as you go along. Again, try and maintain the covering as wrinkle free as possible. The covering can now be shrunk in the open bay areas. It may be necessary to raise the temperature of the iron to a point where the MonoKote starts changing color, to shrink it down tight. After it's tight, iron it down to ribs and spar. The tip is tacked best with high heat, pulling and shrinking as you go (see **Photo 25**). When you first start it will seem impossible but it can be done wrinkle free (see **Photo 26**). Trim excess MonoKote.

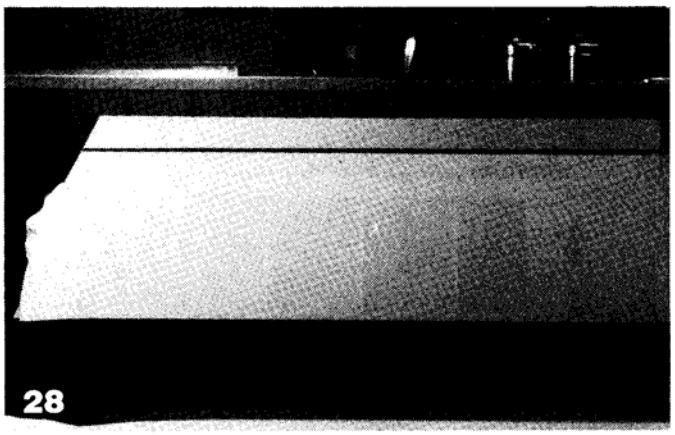
The yellow trim on the top of the wing is attached first. This is a little tricky on open structures. It is attached the same as the bottom covering except the area is smaller. I find it helpful to use a piece of masking tape to grab the edge of the MonoKote, if necessary, during covering (see **Photo 27**). When the center is completely attached and shrunk, butt the blue to the front and rear of

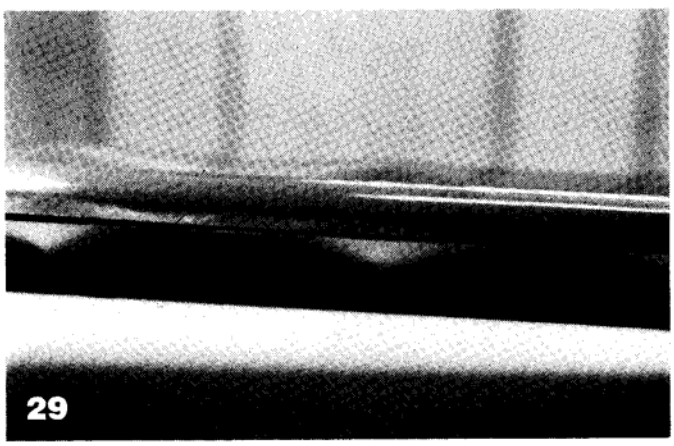


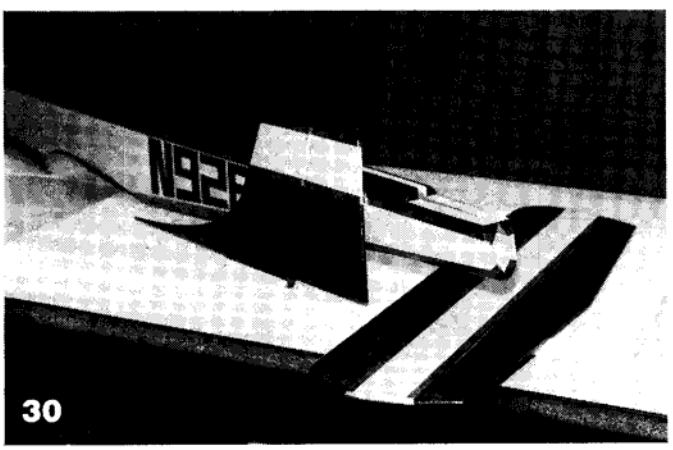
When going around the wing tip (**above**), a high iron temperature plus pulling and shrinking required to remove wrinkles. The top, yellow trim on the wing (**below**) has been positioned and attached. Note masking tape.

With a little patience, all the wrinkles at the wing tip will disappear (**above**). The center yellow trim has been applied and the blue leading edge section is then butted and tacked in place (**below**).



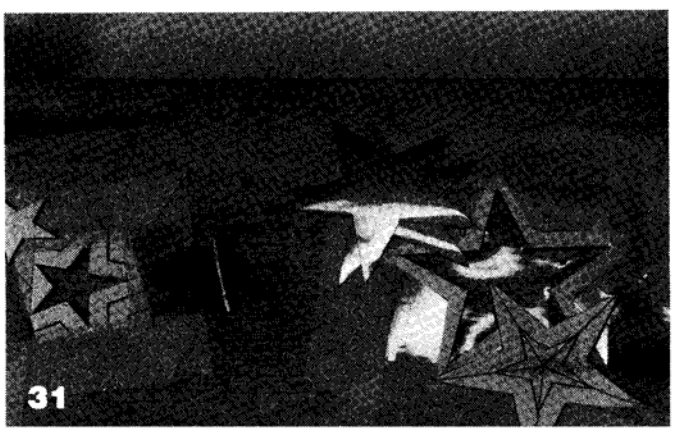


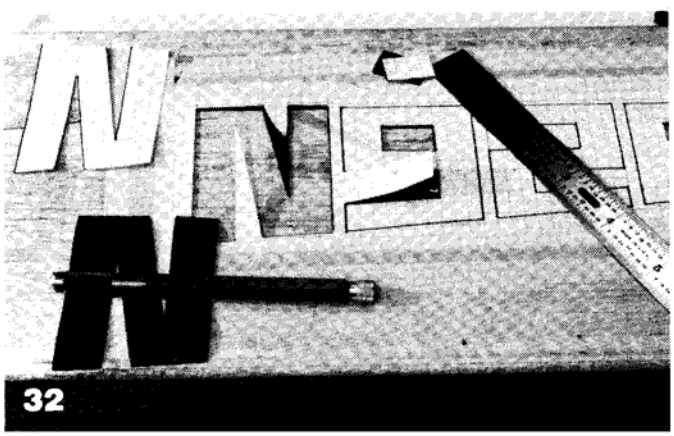


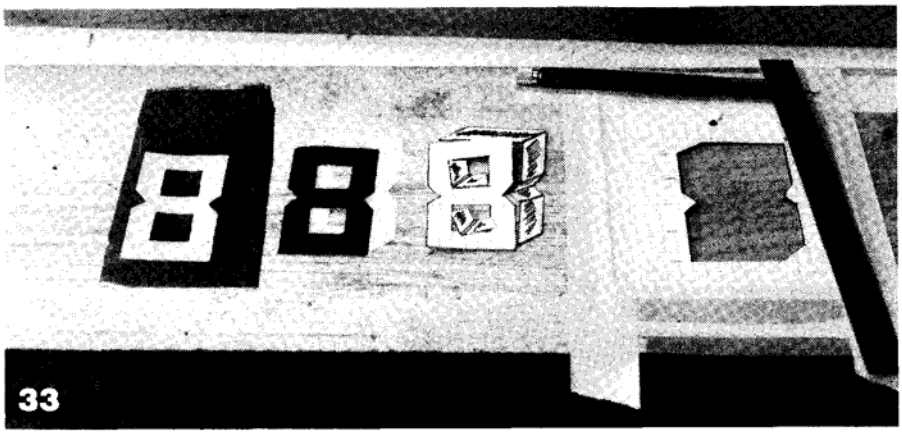


Overlap of the leading edge (**above**). The top piece of MonoKote has been cut to correct width prior to starting. When the smaller blue stars are ironed over the larger gold ones (**below**) a gold border occurs.

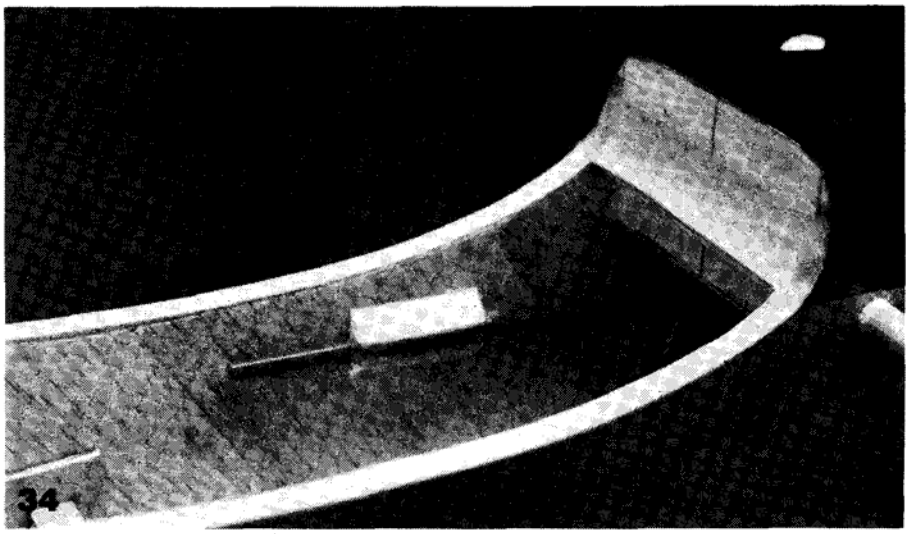
Before gluing covered tail pieces (**above**) to fuselage, make sure each glue joint area is wood-to-wood. MonoKote trim sheet numbers (**below**) being cut out. Center of the numbers are cut out first.



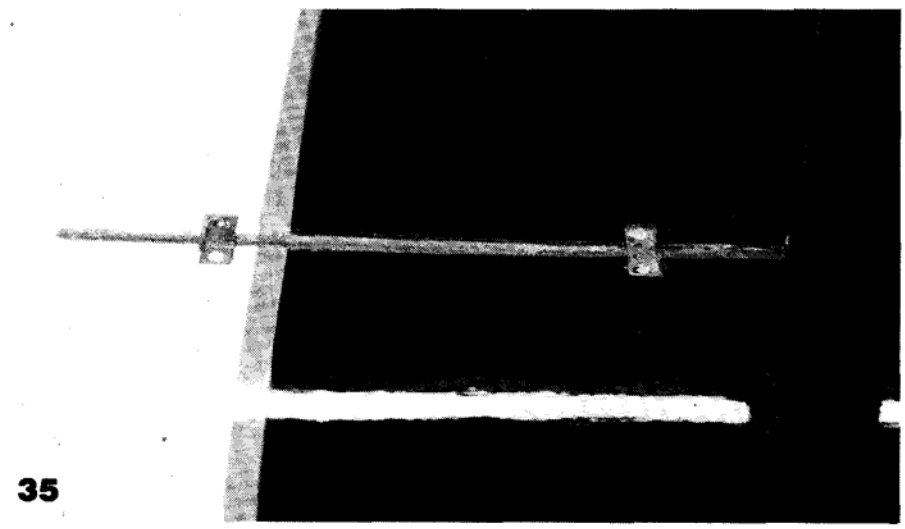




Yellow and blue pieces of MonoKote are cut out and pieced together at the same time when making these block numbers. Picture also illustrates the graph paper template method used.



In the wing saddle area (**above**), the edge of the MonoKote must be sealed or it will lift. Lightly peel it back from the edge, put down some cyanoacrylate glue, and press it back into place. Sealing the groove in the landing gear block can easily be done by bedding the gear in silicone (**below**).



the yellow (see **Photo 28**). The leading edge section is going to require an exposed seam at the bottom of the leading edge. These are difficult to cut straight after covering, so we measure the width of covering needed and cut it straight prior to attaching (see **Photo 29**). Test fit the pieces in place and wrap it around the leading edge. If you have 1/4 to 3/8 inch overlap, fine. If too wide, cut it off now. Iron on the leading edge piece maintaining the butt edge on the main spar. The leading edge is simply overlapped with the available material. The pin stripe can now be added, so be sure to use a pin stripe 1/4 inch wide on the top of the butt joint along the spar and make certain it is tight and well secured.

The center section of the wing was painted. However, going over the center section glass cloth with MonoKote is no problem provided that not too high a heat is used and the resin or epoxy sanded to remove wax or oils. The MonoKote will really stick to Formula 2 and glass cloth and is relatively easy to attach.

The tail assembly can now be glued to the fuselage. Test fit the stab and, when aligned, mark it with a felt tip marker along the edge where it will attach to the fuselage (see **Photo 30**). Trim the MonoKote from the center of the stab slightly inside of the pen line. Glue it on with epoxy. If done properly, there should be no wood showing.

Special trim

Stars, checkerboards, numbers, letters, etc. are easy to create. Newspapers and magazines can provide a wide variety of useful patterns. You can also make them up as needed, being limited only by your imagination.

For stars, I make up templates of several different sizes, each 1/4 inch larger than the previous one, on a sheet of paper, and then, photocopy each as needed. By laying a smaller star over a larger one, we create a pin-stripe or border around the star (see **Photo 31**).

The numbers on the model pictured required tapering to fit correctly and also required left and right patterns. Cross hatch paper was placed on the fuselage side in the area that the numbers were to be located. The vertical size of the figures was established by the area between the pin-stripes with some room for a space. Letters and numbers were designed and spaced to fit within the area selected (see **Photo 32**). These were penciled at random until they looked about right, and then, the lines were drawn dark to aid in cutting.

Books are available on the correct construction and spacing of numbers and letters and should be utilized for best results.

On the numbers and letters, all lines were kept straight to ease cutting chores. Rubber cement a strip of sandpaper to the back of a ruler to prevent slipping during cutting. Be sure to keep the MonoKote slightly larger than the pattern allowing the masking tape to hold it and the pattern to the cutting board. With a sharp knife blade, several layers can be cut at once giving multiple copies of the same size and design.

When applying numbers, stars, and other small trim, position and lightly tack the center of the trim detail. If satisfied with their alignment, iron across the center. The trim piece will tend to curl after this and we can now work it from the center out to one edge and then from the center out to the other edge. Surprisingly, bubbles are usually not a problem, especially if we use slightly lower heat. If bubbles occur, prick them with a sharp needle. Try to go through the trim only.

The block number eight pictured, is easy to do, and the photo should be self-explanatory (see **Photo 33**). Complicated designs can be fabricated using four layers of different colored covering cutting out designs and piecing together the desired color scheme. It is easy to get carried away with these, so try and remember, we are making an airplane and not a bill board.

When working with trim sheets of MonoKote, it is best to spray the area you are going to position the piece on with water, alcohol, or Glass Plus. After laying down the piece, work out the excess liquid and air bub-

bles as if it were a decal.

Another suggestion when ironing trim; touch the iron to wax paper. This will lubricate the iron allowing the iron to slide across the MonoKote more easily. After all the trim is completed, you can polish out scratches with plastic polish if desired. If any epoxy or cyanoacrylate spots have gotten on the MonoKote, they can be easily removed by using Pacer Technologies Debonder.

Fuel seepage

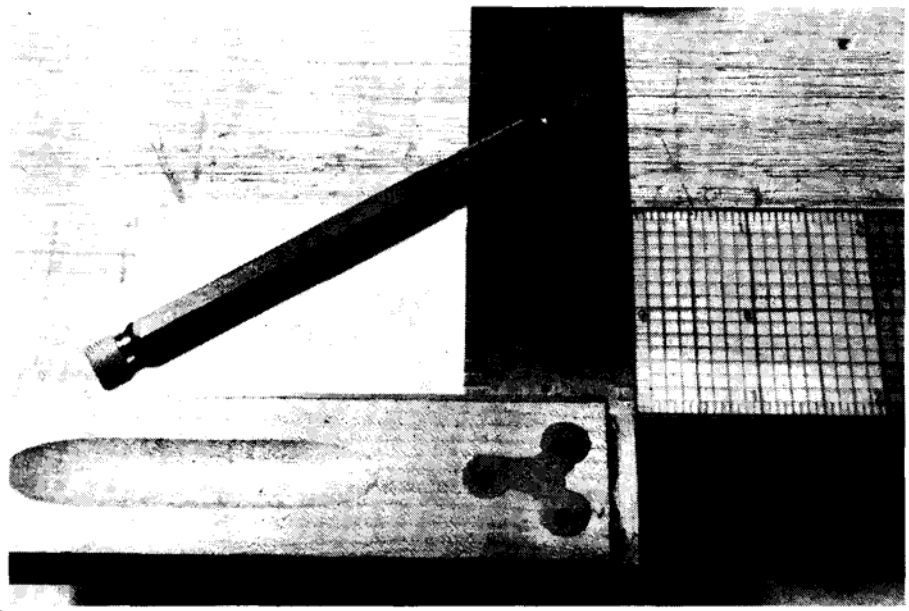
This is more of a problem on MonoKote models than painted models. This is especially true with synthetic oils as they will creep into the slightest crevice. Problems common to any type of finish center around the motor mount. A thin layer of silicone around the back of the motor mount and Loctite on the bolts holding it to the fire wall will usually seal this off. If it's not done, the fuel will seep around the bolts. Also, the tubing which passes through the fire wall should be siliconed. If that's not enough, you should also coat the bolt holes with a cyanoacrylate or Hobbypoxy Formula 2.

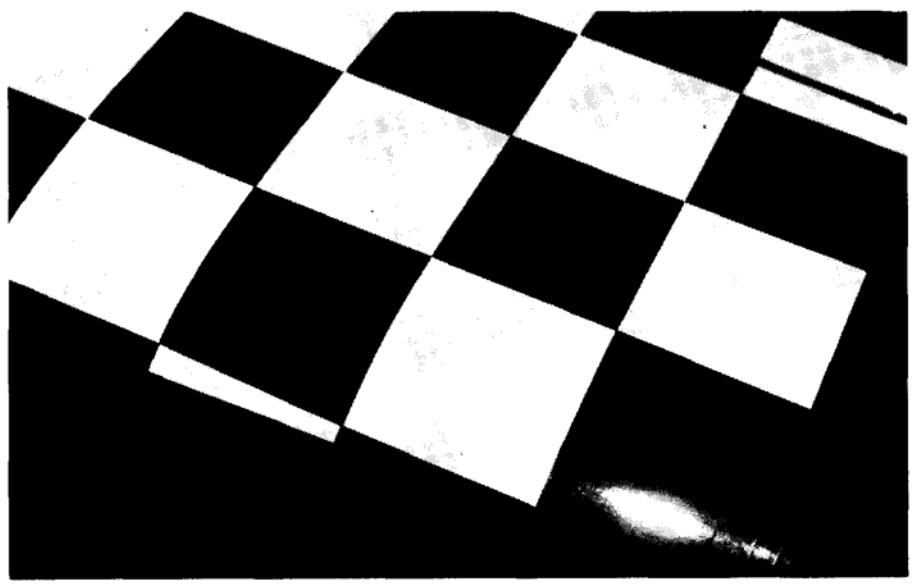
Assuming you use silicone to seal the wing-to-fuselage area, use the clear MonoKote backing scraps on the wing surface instead of Saran Wrap when you mate the fuselage and wing with the silicone sealant. Also, don't use one piece, use two pieces overlapped at the center of wing. In this way, you will get less bunching up, as you can pull the pieces individually across the left and right saddles. If you cut the MonoKote off at the fuselage wing joint instead of wrapping it around, you will have to seal this area (see **Photo 34**). What helps here is to pull the MonoKote away from the saddle a 1/4 inch all the way around. Apply some cyanoacrylate to the wood and re-iron; ditto for the covering ending around the engine area. Holes cut for switches, charging jacks, etc. should also be sealed in a similar manner. Don't neglect the holes drilled in the rudder and the elevator for control horns. The fuel can seep around the screws or under the nylon base, and be absorbed by the end grain of the balsa wood.

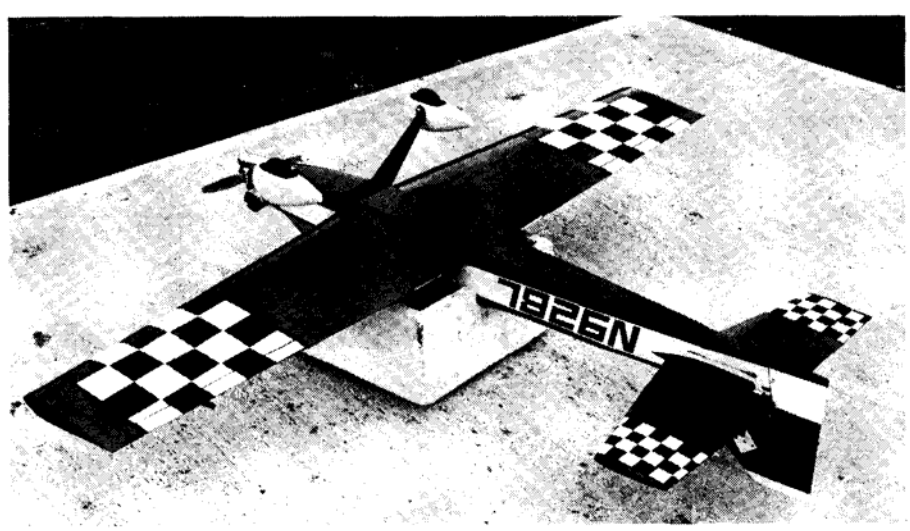
MonoKote trim sheets are not fuel proof. They must be sealed with polyurethane if in the area of exhaust gases. Clear polyurethane can be used to seal most areas that are going to be a problem. If used over white, polyurethane will yellow. Thinning it 50 percent with a recommended thinner helps. Remember to seal the entire engine compartment and also the fuel tank area with epoxy or polyurethane.

Landing gear wires in the wing are sealed with silicone (see **Photo 35**). After everything is test fitted, smear some silicone in the cavity in the landing gear block. Push the wire gear in place and add silicone to bring it flush to the wing sheeting. A finger dipped in alcohol will help smooth it out. Be sure to clean up the adjacent areas with some alcohol also. The MonoKote is trimmed to approximately 1/16 inch into the cavity and pushed down and held with the silicone. All this sealing may sound like overkill, but I find the effort is worth it. It does take a little time to seal properly; however, once fuel gets into the wood, it takes a lot more time to get it out.

I hope the foregoing article has been of some help in your covering chores or at least has sparked an interest to develop better techniques. Finally, there are good MonoKote finishes and bad MonoKote finishes just as there are good and bad paint finishes. The choice is yours.







Checkerboards can be accomplished (**above**) with MonoKote by first cutting a nominal width and then using a square to cut the strip into squares. In this case, the strip is yellow and the resulting yellow squares will be positioned on a solid blue surface. The completed checkerboard (**below**).

The author's *Gambler,* a design published by him in the January 1983 FLYING MODELS is illustrative of the various techniques discussed in this comprehensive article. Now it's your turn!

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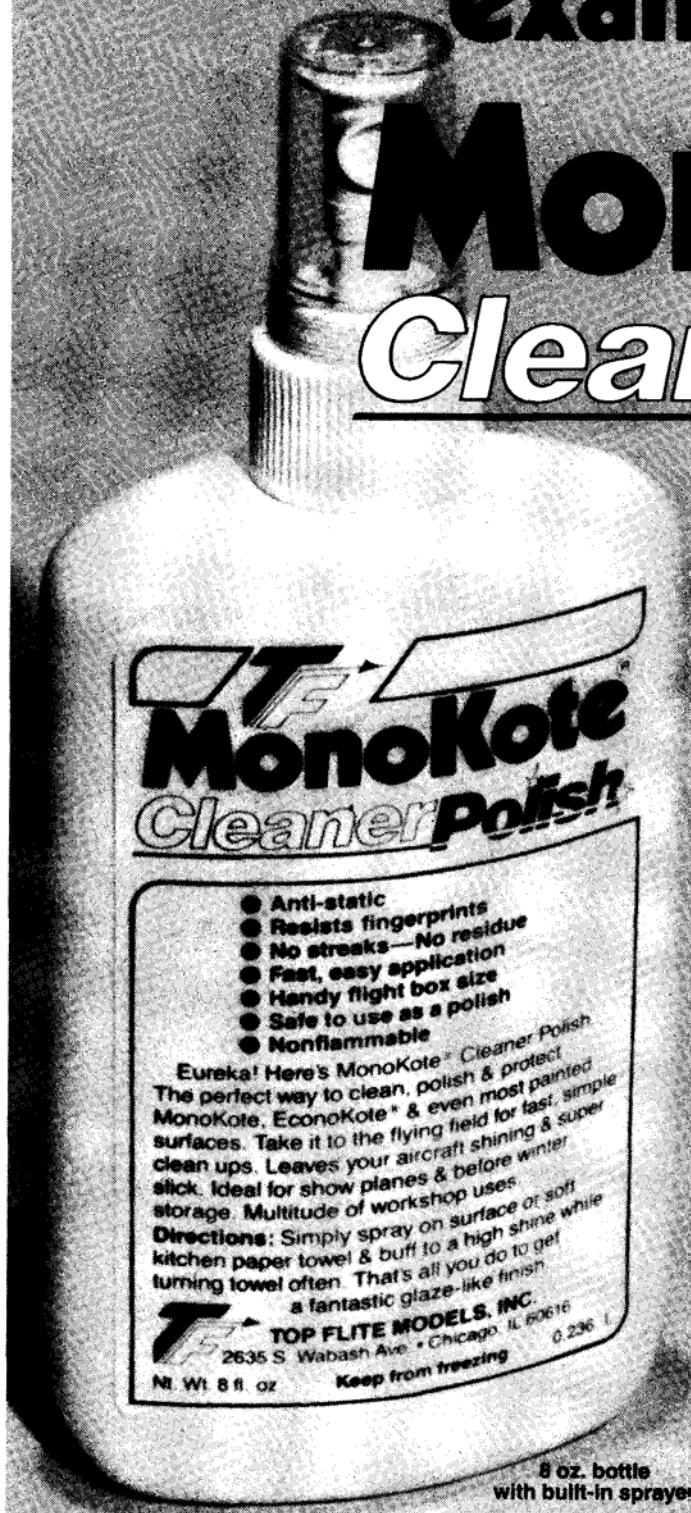

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PHOTOGRAPHY: BOB ABERLE

FM Technical Editor, Bob Aberle, posing with his new pride and joy, the Great Planes *CAP-21* model powered by an Enya 1.2 cubic inch four cycle engine. Engine and airframe proved a great match.

An FM Product Review:

Great Planes' Cap 21 with Enya's 1.2 4-Cycle

By Bob Aberle

Great combination of a classic stand-off scale model in conjunction with new 1.2 4-cycle mill.

Let me begin by saying that this will be essentially a double review comprised of the new Great Planes *CAP-21* model kit along with the equally new Enya 1.2 cubic inch four cycle engine. To give you a brief summary of this review let me indicate that this model was built to a weight close to 9 pounds (complete) including the Enya 1.2 engine. The engine did, in fact, fit into the stock *CAP-21* cowl with a minimum of difficulty. Performance was near perfect, indicating that both plane and engine *are* definitely a good match. A spectacular match might be a better description. Best of all, the *CAP-21* was easy to build, requiring only six weeks of effort to get from kit box to the flying field. There is much detail and many good tips in this article for those who would like to consider this pair for their next R/C project.

Enya 1.2 four cycle engine

This new addition to the Enya four cycle line is available from their U.S. distributor, Altech Marketing Inc., P.O. Box 286, Fords, New Jersey 08863. The Enya 1.2 engine is essentially the .90 with an increased bore. Weight, overall size, and mounting dimensions are identical for both engines (.90 and 1.20 four cycles). Included in the selling price is a small muffler, several Allen type metric hex wrenches, a special prop drive washer, several open end wrenches, a feeler gauge for valve clearance adjustments, screwdriver, and extensions for both the needle valve and the manual choke.

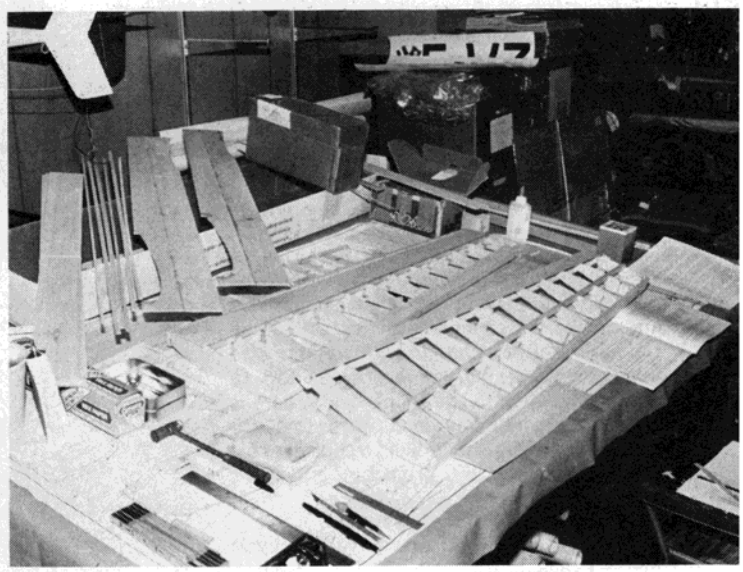
For those interested, a complete dimensional and metallurgical report on the companion Enya .90 four cycle engine, prepared by Peter Chinn, appeared in the March 1984 issue of *Model Airplane News* (p. 50). Peter's comments on the .90 should just about equally apply to the new 1.20 as well. He does such a fine job in this particular area that it isn't worth attempting to repeat it.

John Tatone's aluminum radial engine mount (no. 31995) was selected for this application (list price $12.95). This mount will fit both the Enya .90 and 1.20. It comes with pre-drilled and tapped holes for 6-32 hardware (which is plenty strong for this application). This mount can be purchased from Tatone Products Inc., 1209 Geneva Ave., San Francisco, CA 94112.

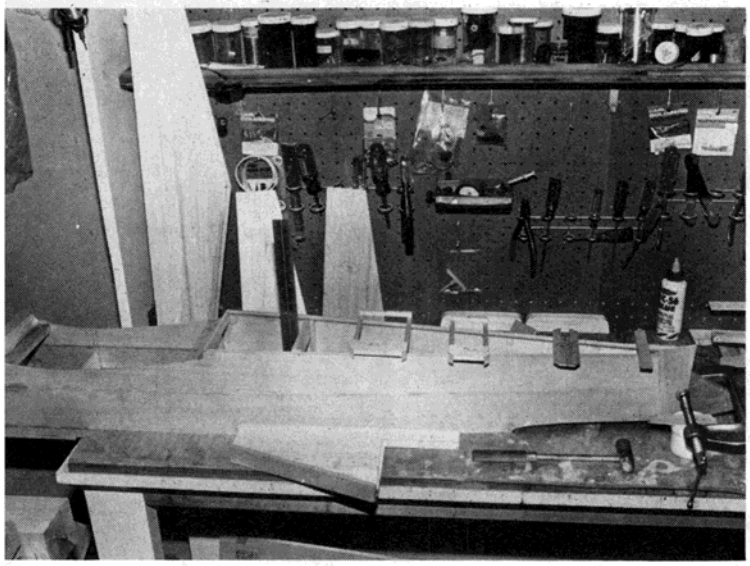
Four cycle operation does require some new engine techniques. Generally speaking the four cycle engine can operate with less oil than a counterpart two cycle glow engine. As such, fuel manufacturers are offering special blends for the four cycle glow engine enthusiast. Most blends are offered in 10 and 15% nitro levels. Since a lot of residual oil remains in a four cycle engine (after running) it is best to use a natural oil (like castor) to prevent rust formation. However, several of the popular hobby fuel manufacturers are now offering four cycle glow fuel using synthetic oils which include excellent anti-rust additives. I corresponded with Clarence Lee (*RC Modeler* engine columnist) at the start of this project. His recommendation was to break in the engine on 10% nitro, regular two cycle fuel (higher oil content), then switch to a four cycle fuel using less oil. My final choice was the Red Max brand fuel which is available from FHS Supply Inc., RT 5 Box 68, Clover, SC 29710. Fred Wilson of FHS supplied me initially with 10% nitro regular fuel along with 10 and 15% nitro four cycle fuel. With the 10% regular fuel I did notice a tendency for the engine to break up somewhat when the glow plug power was disconnected during high speed operation. Switching to the 15% four cycle fuel, per Clarence Lee's suggestion, corrected this problem. So for now I have settled on Red Max 15% nitro four cycle fuel.

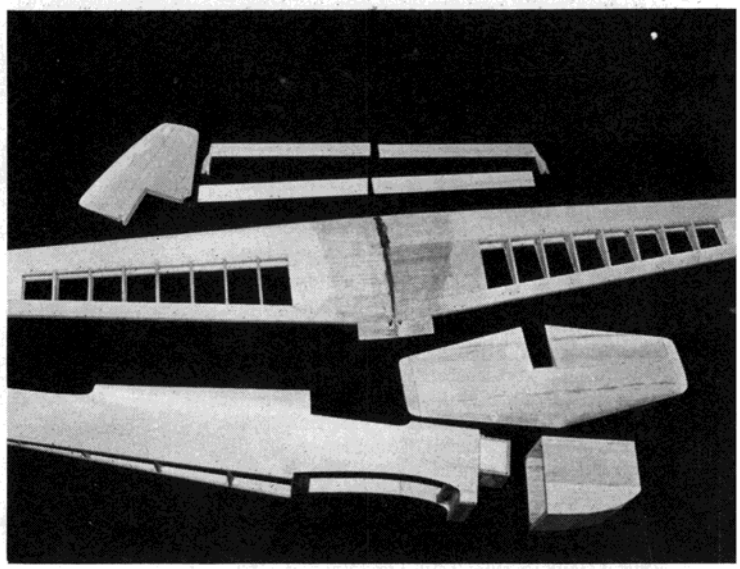
When starting a four cycle engine, always set the throttle at idle (or close to it). Most modelers do that normally. A four cycle will simply die if you attempt to start it much above the idle position. A standard Sullivan Hi-Tork starting operating on 12 volts was more than enough to turn over the big Enya 1.20 engine. I must admit I never once hand started this particular engine, so just call me a "chicken". The manual choke was never used nor is it necessary to use it when employing an electric starter. I found it easy during the first run-up of the day to put a little prime into the cylinder by going through the muffler (one crank on the hand fuel pump was enough). After that, no other priming was necessary during the remainder of the flying session. When adjusting the needle valve, go slowly. You don't get the same characteristic "feeling" of operation as you do with a two cycle engine. Generally, if the four cycle is over leaned, it will simply stop running. If that happens, back off sufficiently to prevent a recurrence. I started with the needle valve opened 3½ turns (from a fully closed position). My final setting was approximately two turns out. Choice of glow plug, however, is somewhat critical. As a rule don't use an idle bar plug. My best results to

Complete Great Planes *CAP-21* kit (catalog No. CP-60) is all balsa construction (**above**) and includes most hardware. The fuselage being framed up on the building board (**below**). "C" clamp joins tail post while glue sets.



The wings under construction (**above**). Wood selection is good quality with correct densities used in specific applications. All sub-assemblies ready for joining and finishing (**below**). Wing center section fiberglassed.





date have been with an Enya No. 3 standard glow plug. Installation of the glow plug is best done with a nut driver (Xcelite $10^{5}/_{16}$). After about 30 minutes of break-in, I obtained the following tach readings, using 15% nitro four cycle Red Max fuel and a Top Flite Super-M 15×6 prop, 8800 RPM (high) and 2900 RPM (idle). I suspect this will continue to improve until the engine is fully broken in. Prop balancing is very important. Since the large props are generally way out of balance. Treat yourself to a High-Point balancer and take the extra effort to get each prop right before placing it in service. After one hour of running time I did my first valve adjustment as recommended by Enya. Local modeler and engine expert, Tom Fiocco, gave me the following instructions: 1. remove the glow plug (to relieve the compression); 2. use the small hex wrench to remove the black valve cover (on top of the cylinder); 3. rotate the crankshaft until the cylinder is at top dead center in the firing stroke (insert the end of a small drill into the top of the cylinder to determine when the top position is reached); 4. use the feeler gauge supplied with the engine to establish the correct clearance between the top of each valve and the bottom of the respective rocker arms; 5. to make the adjustment, loosen the locking nut on the other end of the rocker arm, rotate the set screw with the small screwdriver (provided) until the feeler gauge just grabs and then retighten the locking nut (also using the small open end wrench provided). It sounds complicated but takes only about a minute or two. Failure to adjust the valves will prompt gradual loss of power and generally poor performance. All in all, the Enya 1.20 four cycle proved a smooth performer and was always an "instant" starter even in very cold winter weather.

Great Planes *CAP-21* kit

Just as a starter, let me make it clear that this particular *CAP-21* kit (designated as their catalog no. CP-60) is intended for .60 to 1.20 four cycle power and is not to be confused with the giant scale *CAP-21* which is also offered by Great Planes. (Great Planes announced a new .40 powered *CAP-21* at the '84 Toledo Show—ED). The manufacturer's address is as follows: Great Planes Model Manufacturing Co., P.O. Box 721, Urbana, IL 61801. Specification wise, this particular *CAP-21* has a 72 inch wing span, a wing area of 756 square inches, overall length of 57 inches (tip of the spinner to end of rudder) and a planned weight of $8^{1}/_{2}$ to 9 pounds. The model was designed by Don Anderson. The kit itself is basically of all balsa construction with machine cut and sanded parts. Included with the kit are: molded ABS plastic cheek cowls and wheel pants; a very durable clear molded canopy; aluminum main landing gear struts (actually two separate struts); foam turtle deck (aft fuselage top); essentially all the hardware you would need with the exception of hinges (which most modelers prefer to select on their own anyway) and a full set of scale decals.

Best of all, Great Planes supplies two large (rolled) sheets of full size plans (nothing to paste together) and an instruction booklet consisting of 34 pages ($8^{1}/_{2}$ × 11 size). This booklet contains a complete check list sequence of construction details which I followed exactly for this review and believe me

it's accurate! Also included is scale detail information, engine/prop selection info and a pattern maneuver guide supplement. All future kits will contain a special photo illustration booklet. Existing kit owners can obtain a copy by writing to Great Planes and including $2.00 to cover the cost of handling and postage.

Wing construction is all balsa (built-up) with some open area requiring covering. The stab, elevators, fin, and rudder are all built-up and sheeted. Fuselage is full sheet balsa construction with a top, aft, foam turtle deck that finally gets covered with balsa sheeting.

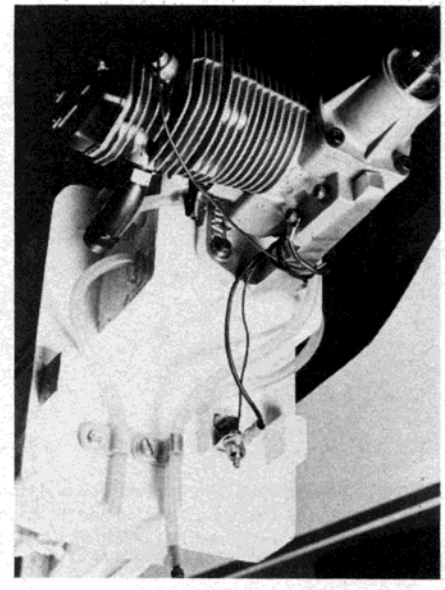
It is emphasized in the instructions (and I fully agree) that the tail surfaces and aft fuselage *must be built as light as possible.* This is especially true if you choose the lighter .60 size engines. Remember, you have a very long tail moment arm here so plan ahead. Definitely hollow out the underside of the foam turtle deck after it has been fully sheeted. Sand all the tail surfaces as completely as possible. Use cyanoacrylate type glue primarily aft of the CG to keep that tail weight down to a minimum.

I won't go into a step by step analysis of the construction but let me pass on a couple of tips that you might want to consider. Substitute 6-32 hardware and "T" nuts for the landing gear strut attachments. The sheet metal screws are bound to come loose after a time. If you add the "T" nuts during construction you won't have to "operate" on the wing later on. Run an outer Sullivan Gold N' Rod tube inside the fuselage out to the tail to accept an "internal" radio receiver antenna. You don't want an antenna hanging off a scale aerobatic plane such as this. Solder the tops of the aileron torque rods in place *before* installing in the wing. Install the shear webs *after* the leading edge sheeting has been installed but *before* the center and tip sheeting is added. The shear webs should be placed to the rear of the main spars, not in front of them as shown on the plans. By doing this you will be able to glue the leading edge sheeting in place from underneath. That prevents the sheeting from "popping up" during final sanding which can be very frustrating.

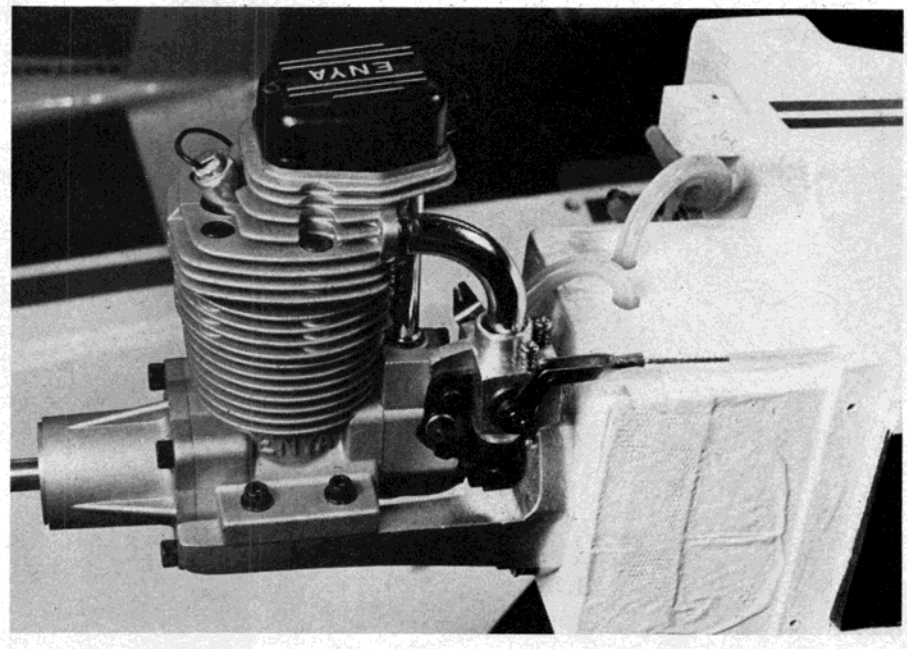
To keep the weight down the only possible choice of covering is an iron-on type that requires no extra finishing. My *CAP-21* was covered completely with white Top Flite Super MonoKote™ (using approximately 2½, six foot long rolls). The scale trim was mainly red and dark blue Super MonoKote. Fuselage side stripes were ¼ inch wide Great Planes *Kwik-Strype* tape (I found this tape to be considerably less expensive than the automotive store variety!). The cowl, firewall area, landing gear, and wheel pants were all painted with Hobbypoxy white. A complete set of scale decals are provided. They are of the pressure sensitive variety which is ideal for application on the Super MonoKote surface.

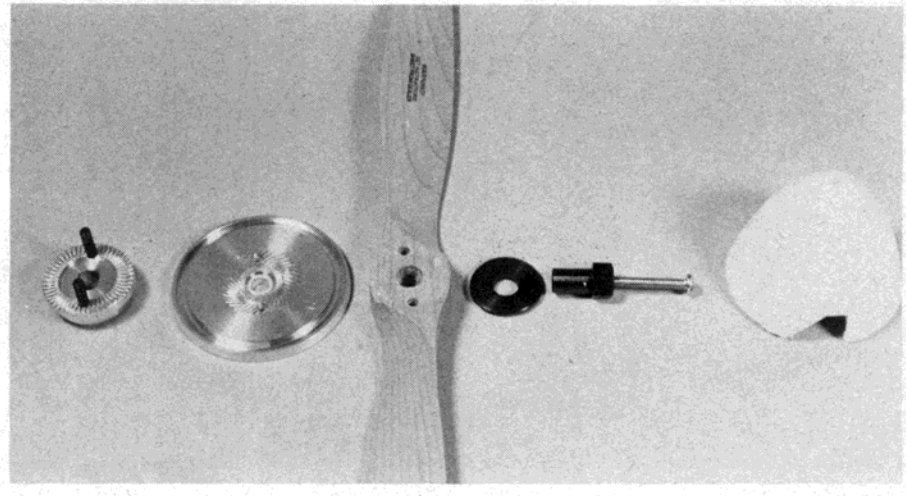
A Williams Brothers 2¾ inch standard pilot bust was placed in the cockpit. Fellow Grumman engineer and modeler, Nick Dannenhoffer, reshaped the pilots facial expression into a "Bob Aberle" for added realism. Nick is a great plastic scale modeler with a flare for sculpting. The big canopy is cemented in place using Wilhold R/C-56 glue. That glue really does a great job for that specific application, make sure you try it!

The stock, all balsa cowl, did accept the bigger Enya 1.2 four cycle engine without much difficulty. I chose to mount the Enya on its side which possibly made the cowling

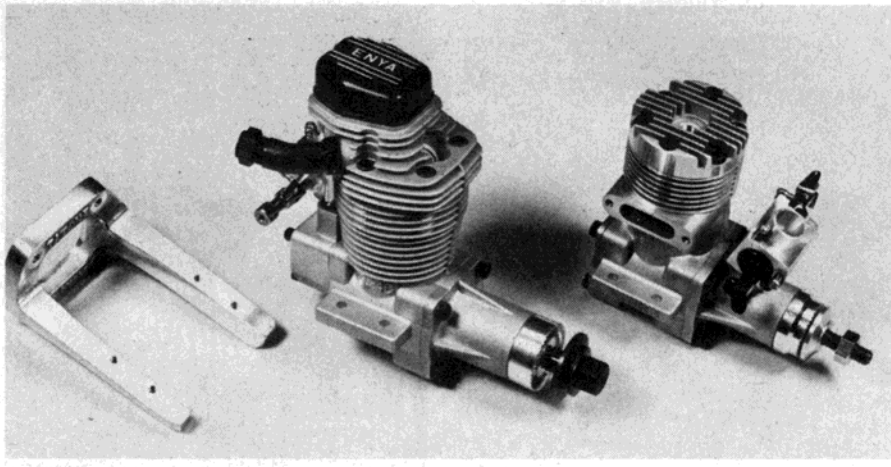


The Enya 1.2 four stroke comes with these tools and a muffler (**above left**). Engine was side mounted and with cowl removed (**above right**), you can also see the jack for the Remote Headlock. Throttle hook-up uses a Sullivan Products brass cable (**below**). To facilitate hook-up, throttle arm was rotated 180°.

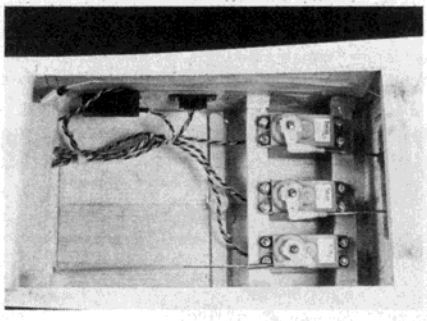


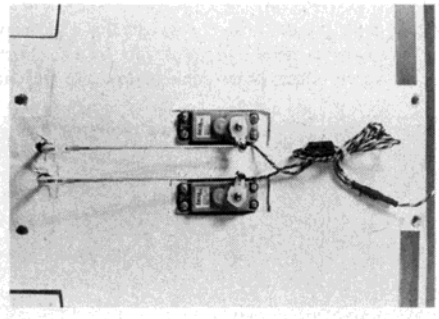


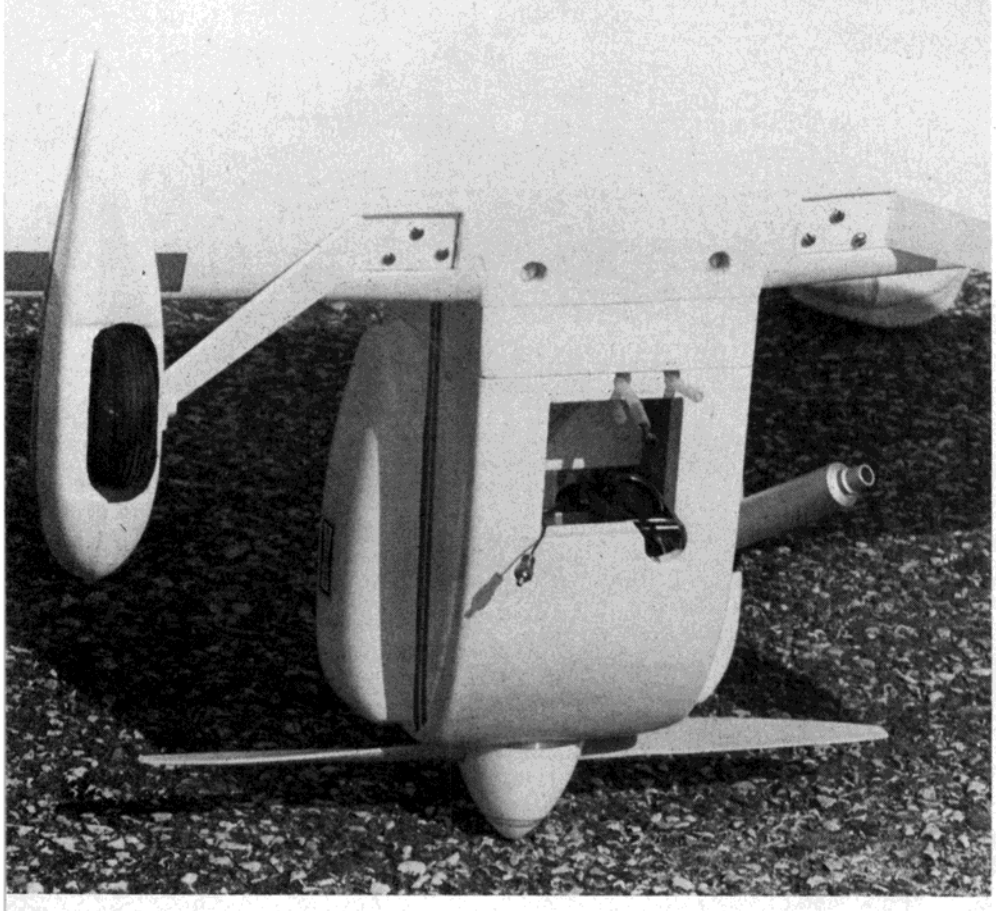
Four stroke engines, in some cases, throw props. The modification to the prop drive washer and Enya prop bolt shown above to accommodate the CB Associates' 2¾ inch spinner is explained in the text.



Tatone engine mount (l) comes pre-drilled and tapped for the Enya 1.2 (c) (**above**). An Enya .60 XF-III (r) gives a size comparison. Servos mounted in aft section (**below left**) of radio compartment. Keep them forward if you use the lighter .60 engine. Individual KPS-24 servos, joined by a Kraft "Y" harness (**below right**), drive each strip aileron. Harness ties both servos to a single receiver channel.







Bottom view of cowl shows three inch square hot air exit for engine cooling. Headlock jack (hanging loose here), fuel lines, and needle valve are accessible through here without removing cowl.

job a little more difficult. If you mount the Enya inverted, the cowl job would appear to be easier. The Enya will definitely run in the inverted position so you might consider that approach. The plywood engine mounting box that attaches to the firewall must be shortened by 1 1/4 inches to accommodate the Enya 1.20 engine on the Tatone radial mount (the same applies to the Enya .90 as well). Cooling wise, I made the front opening exactly as shown on the plans. A three inch square hole at the bottom of the cowl, close to the firewall, acted as an air exit opening and also permitted access to both the needle valve and the remote Headlock™ glow plug connector. When using this connector with an Enya No. 3 glow plug, you will have to file away a small part of the plug's tip to make it fit. The right side cheek cowl was cut away considerably to clear the Enya cylinder head valve cover and the muffler. The big nuisance with this set-up is that the muffler must be removed and the exhaust elbow rotated 90 degrees, each time you want to remove the cowl. Changing a glow plug, therefore, could prove a 15 minute job at the flying field.

To make the throttle hook-up easier, I loosened the screw holding the plastic arm to the carb barrel and rotated it around to the opposite side. By doing this the brass Sullivan brand control cable (from the throttle servo) was able to pass *outside* of the plywood engine mount box.

The only 2 3/4 inch diameter white spinner I could get my hands on was a CB Associates type (stock No. 5053). I was told that four cycle engines in particular like to throw props loose on start-up. The special prop drive hub supplied contains two small hex screws which penetrate into the prop for extra gripping. Another Grumman modeler friend, John Tenke, helped me out with a quick and easy modification. John drilled out the prop hub for longer 8-32 hex screws which are more easily obtained at hardware stores than the metric variety used by Enya. the longer screws pass through clearance holes drilled into the CB aluminum spinner backplate allowing an additional amount to still penetrate into the prop. The Enya prop nut, as supplied, is hollowed out, making it possible to drill a center hole (on the end) and tap it to accept an 8-32 screw. This screw, in turn, holds the plastic spinner cone in place. By doing this I have never had a prop come loose to date.

Fuel tank selected was the Sullivan SS-14 (#442) 14 ounce slant type set up with three connections (fill, vent, and engine). Place a small 6-32 screw into the fill line to prevent the fuel from siphoning out of the tank. A fourth line is required on this four cycle engine to bring residual crankcase oil outside of the cowl. Don't forget to do this or you will have a real mess! All fuel tubing employed was the Aerotrend *standard* No. 1003. You can figure on approximately one ounce per minute of fuel consumption for the engine. By the way, my fuel system was not pressurized, nor did there seem to be any need for it. Enya does not recommend it either.

R/C installation

This model used a complete Kraft R/C system including: a Signature transmitter on 6 meter FM; KPR-7F six meter FM receiver (black case); two KPS-24 servos on the ailerons (one connected to each strip aileron with a Kraft "Y" harness, P/N 200-037, joining the servos to a single output); additional KPS-24's on the rudder and throttle; KPS-28

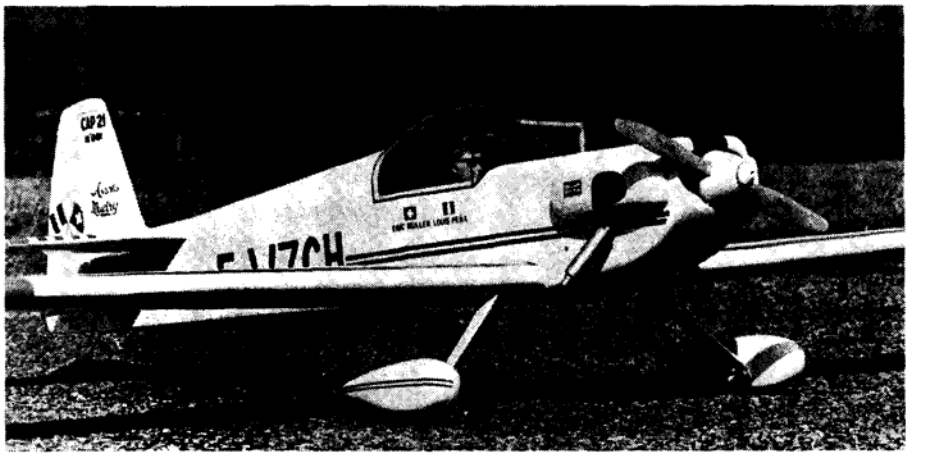
on the elevator and finally an SR-900 battery pack. With this set-up, I experienced no in-flight flutter nor lack of servo power. Remember to keep your R/C equipment as far forward as possible, especially when using a smaller and lighter weight .60 size engine. For information, DuBro standard size hinges were employed on all control surfaces (six on *each* aileron, eight on the elevators, and four on the rudder in addition to the tail wheel installation).

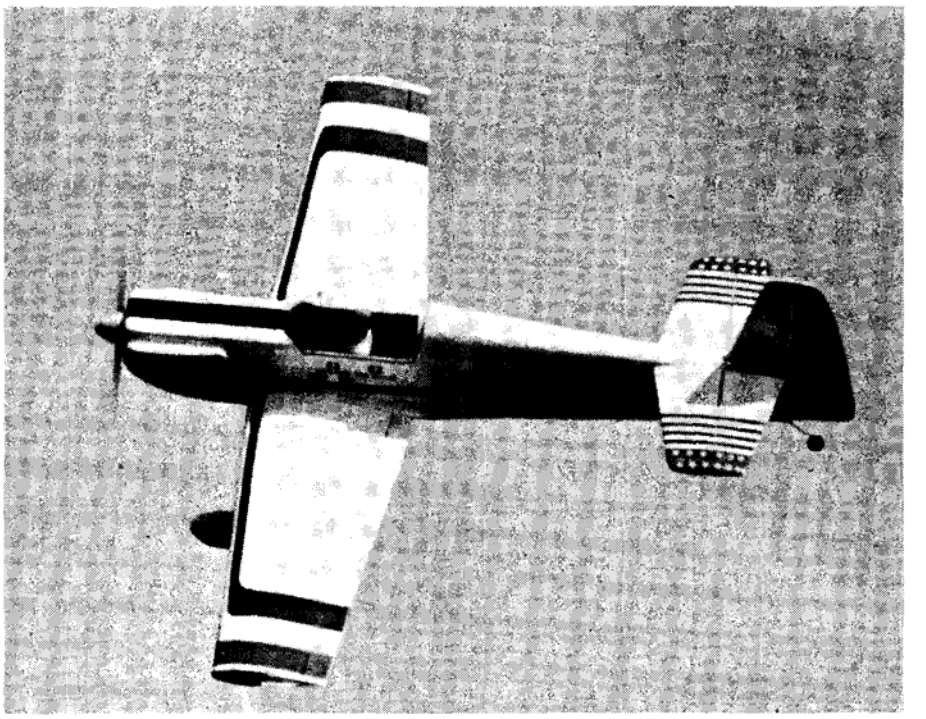
Final weight and balancing

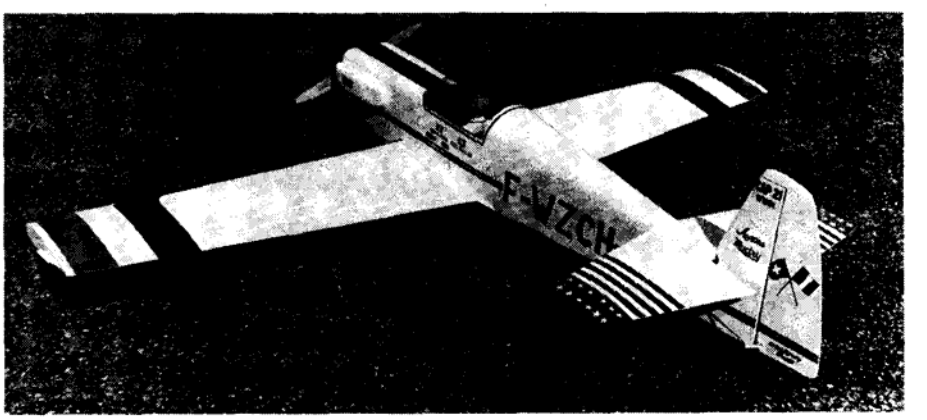
My Great Planes *CAP-21* weighed exactly 9 pounds, 3 ounces ready to fly (less fuel) with the Enya 1.20 four cycle engine. That works out to 28 ounces/square foot wing loading or about the same as you would expect on any average pattern model, except that this one has a 1.20 in it! The model balanced exactly as indicated on the plans, using the 32 ounce Enya engine. No additional nose weight was needed, but the battery pack was located directly behind the firewall. My tail surfaces were admittedly built on the heavy side knowing that I was going to install an engine that weighs some 10 ounces more than a popular .60 size engine. Using some care in the construction phase, you could easily get away with a .60 size engine. The possibility may still exist, however, that some 4-8 ounces of ballast might be necessary. In any case that shouldn't affect the performance at all. You might also want to consider a .60 engine with a gear reduction prop drive.

Flying

The *CAP-21* was flown in our usually bad March weather on a grass field that had a touch of the "mud factor". Still in all, the *CAP-21* was in the air after about a 40 foot roll. Flying to date has been strictly on the 15×6 Top Flite Super-M prop with good results. I expect to experiment with both 15×8 and 14×8 props (and of different brands as well). This is more than enough prop clearance for a 15 inch arc using the standard landing gear struts and wheels. It is a good idea to take a tachometer reading when trying each new prop. Don't fly if the rpm indicates much above 9,000. When the engine unloads in the air you may get over 10,000 rpm at which point it is possible that the valves might tend to "float". This will produce a loud knocking sound which is obviously not good for the engine. The *CAP-21* was just beautiful in the air. A 1.20 four cycle is an excellent choice of power plant. Speed is fast, but still not anywhere near a "hot bomb" variety. Making large diameter loops from level flight, at constant speed, is a sight to behold. Slow rolls are easy and another show stopper. Knife edge flying is possible with a minimum of rudder required to maintain level flight. Best of all is that real airplane sound that you have to hear in person to really appreciate. Final control surface movement ended up as follows: ailerons 3/8 inch either side of neutral; elevator 5/8 inch either side of neutral; and, rudder 1 3/4 inch on each side. I must admit that I did manage to botch up several landings, one of which bent up the landing gear strut, broke a wheel pant and loosened the tail wheel bracket. Part of the problem was our muddy flying field. Keep the speed up on landing. If you plan on flying off rough fields or grass I would definitely recommend that you substitute three inch diameter wheels (instead of 2 3/4 inch as called for) and make sure that you get as much of that wheel projecting out of the pant as is possible. You might also consider a metal tail wheel bracket, but be cautious of the added weight in the tail.







With the exception of the engine valve cover and muffler **(above)**, it could almost be taken for a real plane. The all-up weight was 9 pounds, 3 ounces. In the air **(below)** the sense of realism is even greater.

Final comments

I'm thoroughly convinced that I selected a perfect engine/kit combination. A fast building model that is relatively inexpensive (with everything considered) along with an engine that is built like and operates like a fine watch. I can see more and more pattern models using this type of power in the future, no question about it! My thanks to all my friends who helped with this real fun project.

for Rubber Scale . . .

a Miles M.5 Sparrowhawk

By Larry Kruse

Sleek and graceful lines of a prestigious race plane helped capture 2nd place at the 83' Nats.

PHOTOGRAPHY: LARRY KRUSE

You don't have to look at the Miles M.5 *Sparrowhawk* very long to realize that someone with excellent aesthetic taste was involved in the overall design process. From its sleekly cowled engine to its gracefully tapered rudder to the wrap-around wheel fairings that give it such a unique appearance, the plane exudes class and style. The arbiter of the *Sparrowhawk's* class and style was none other than Blossom Miles, the wife of aircraft manufacturer F. G. Miles, who undertook to prepare the necessary drawings that would produce the aircraft just eight weeks before it was needed for the prestigious King's Cup race in 1935.

Altogether six *Sparrowhawks* were built. Subsequently, Blossom Miles' beautiful design enjoyed racing success from its inception through 1957, when the prototype G-ADNL, presented here, was converted to the M.77 *Sparrowjet*. The 22 year old aircraft, then powered by two Turbomeca Palas turbojets, became the first jet powered aircraft to win the King's Cup at a speed of 228 MPH. Sadly enough, after a long and useful career, the ship was ultimately destroyed in a hangar fire in 1964.

Its timeless beauty is still with us though, and it was this visual appeal that prompted me to select it as a rubber scale project for the 1983 Nats. With the good and timely help of Allan Schanzel, the maestro of "Max-Fax", I was able to obtain the necessary documentation for the aircraft. Only the stabilizer area and a slightly increased dihedral deviate from the 3-view presented in Don Brown's *Miles Aircraft Since 1925*.

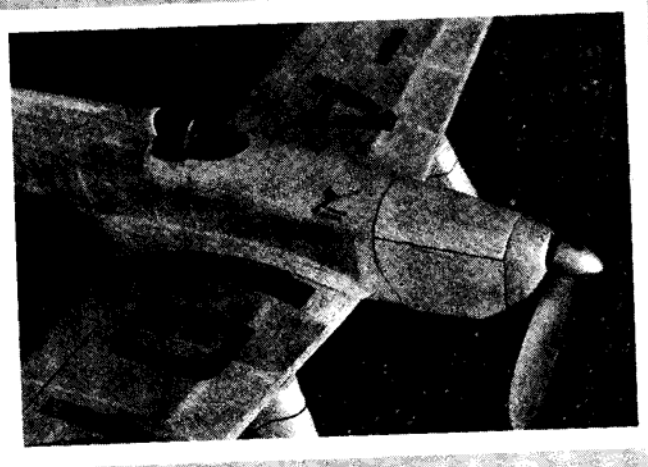
Construction notes

While construction is much as you would expect of a scale freeflight design, I did elect to make the wings removable in order to ease packing problems during our Nats trek from Kansas to Massachusetts and back. The removable wing is shown, but you're certainly not committed to build it that way. Just omit all the 1/16" fastening cross members in the wing center section and the fuselage bottom, substitute 1/16" square cross pieces for them and glue the wing into the fuselage saddle after both wing and top of the fuselage are covered. You'll probably even save a bit of weight by omitting the removable feature.

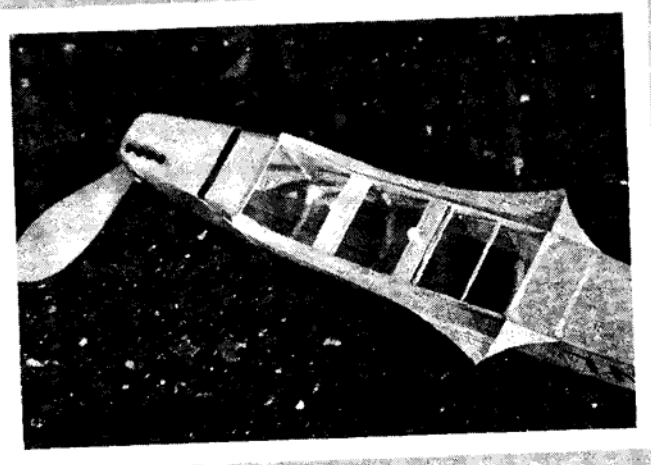
Cutting wood begins with pre-forming the wing tips and rudder outline prior to gluing anything to anything. Although the prototype used built-up wing tips and rudder outline, laminated tips could be used. A minimum of three layers of 1/32 x 1/8 inch balsa will be needed to allow enough material to sand to contour prior to the finishing stages.

Fuselage and flying surfaces

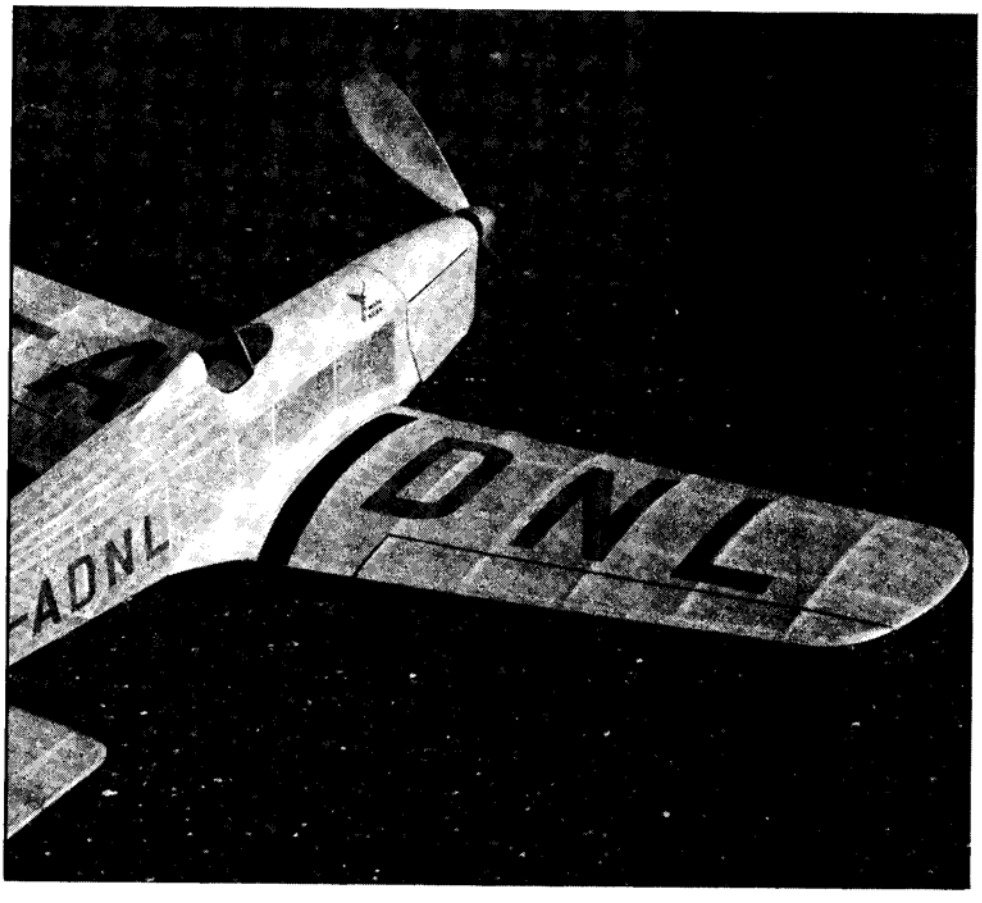
As the wing and rudder pieces dry, you can frame up the fuselage. Obtain four evenly matched pieces of 1/16 inch, square basswood from your local model railroad supplier to be used for fuselage longerons. If basswood in various sizes is not part of your wood bin, it certainly should be. It offers tremendous strength to weight advantages over balsa in certain applications such as this. An equivalent size balsa longeron on this plane simply



Hand lettering and tissue trim dress up the model and make it come alive. Cowl is of 1/32 balsa sheet, wrapped around structure.



Prototype was built to have removable wings to minimize transportation damage. View shows nylon bolts and hold-down crosspieces.



would not have sufficient strength to handle either motor requirements or the shrunken tissue covering.

Fuselage sides can be built one on top of the other. Notice that all fuselage pieces other than the longerons are "C" grain balsa. Make everything light, aft of the wing saddle to avoid unnecessary clay ballast in the nose later. After the fuselage "box" is formed, add formers 1 through 10, sheet the cowl/cockpit area, and glue the aft stringers in place. Go slowly at this process, starting with the center stringer and then alternating stringers on each side. Be very conscious of any twisting that might occur during the procedure and correct it by removing the errant stringer. If you're a Hot Stuff™ fan, this is a good place to set it aside and use Ambroid or a similar cement which allows some adjustment and alignment time.

The noseblock can be laminated as shown. Hollow out the air intake for realism, install the small aluminum tube that's just visible inside the intake and drill the noseblock to accept the prop bearing assembly. That two piece assembly is of .040 aluminum shaped with jeweler's files. Drill out the holes for the shaft in both pieces and bend the front plate as shown. The hole for the set screw should be carefully drilled with a bit smaller than the screw size you're using. The screw is then turned into the hole as far as it will go, backed out, and the hole filled with Hot Stuff. The Hot Stuff will solidify the screw threads set into the wood and keep you from stripping the thing out later. Be sure the Hot Stuff is *dry* before replacing the set screw in the hole. Properly set up, this assembly offers precise thrust adjustments without the use of thrust wedges or shims of any kind. Check it periodically to make sure it hasn't been jarred out of position by a hard downwind landing.

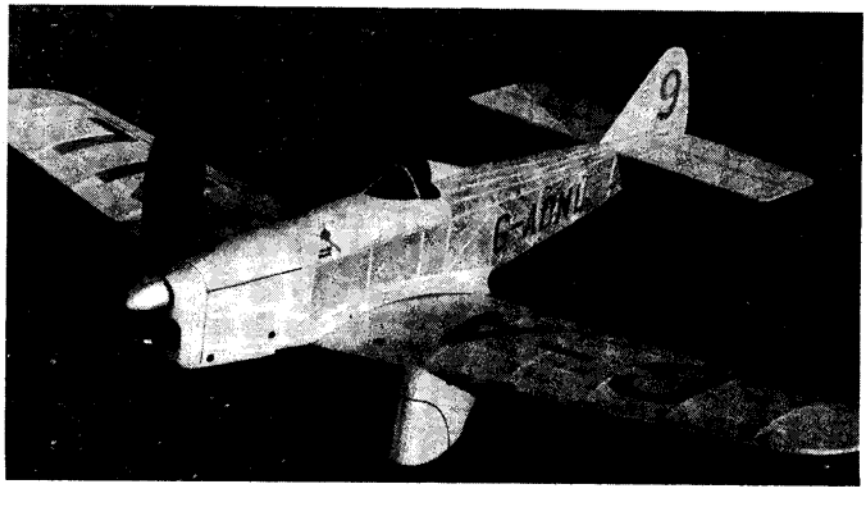
The wing is built around two pre-cut spars, one panel at a time. Pin down the 1/16 inch, square bottom rib pieces, the leading and trailing edges, and the wing tip pieces of either wing. Shim the tip pieces to the appropriate height to allow for the tip taper. Pin the front and rear spars into their respective locations and secure them with a small drop of Hot Stuff at each rib location. The solid ribs can then be added as per the plan, and then the strip ribs should be cut to length and glued in place. Cut off the back of each rib in order to get it to length. This procedure will provide automatic tip wash-out for each panel.

Unpin the finished panel when it's dry, lift it up, and repeat the above procedures for the second panel. Build the center section when both main panels are complete. Carefully sand the leading and trailing edges to shape. Use a template for the leading edge, if necessary. The resultant structure is both light and strong and is now ready for covering as soon as the landing gear wires are installed. Do not install the wheel fairings until the wing panels are covered and doped. The exact installation procedure will be explained later in the text.

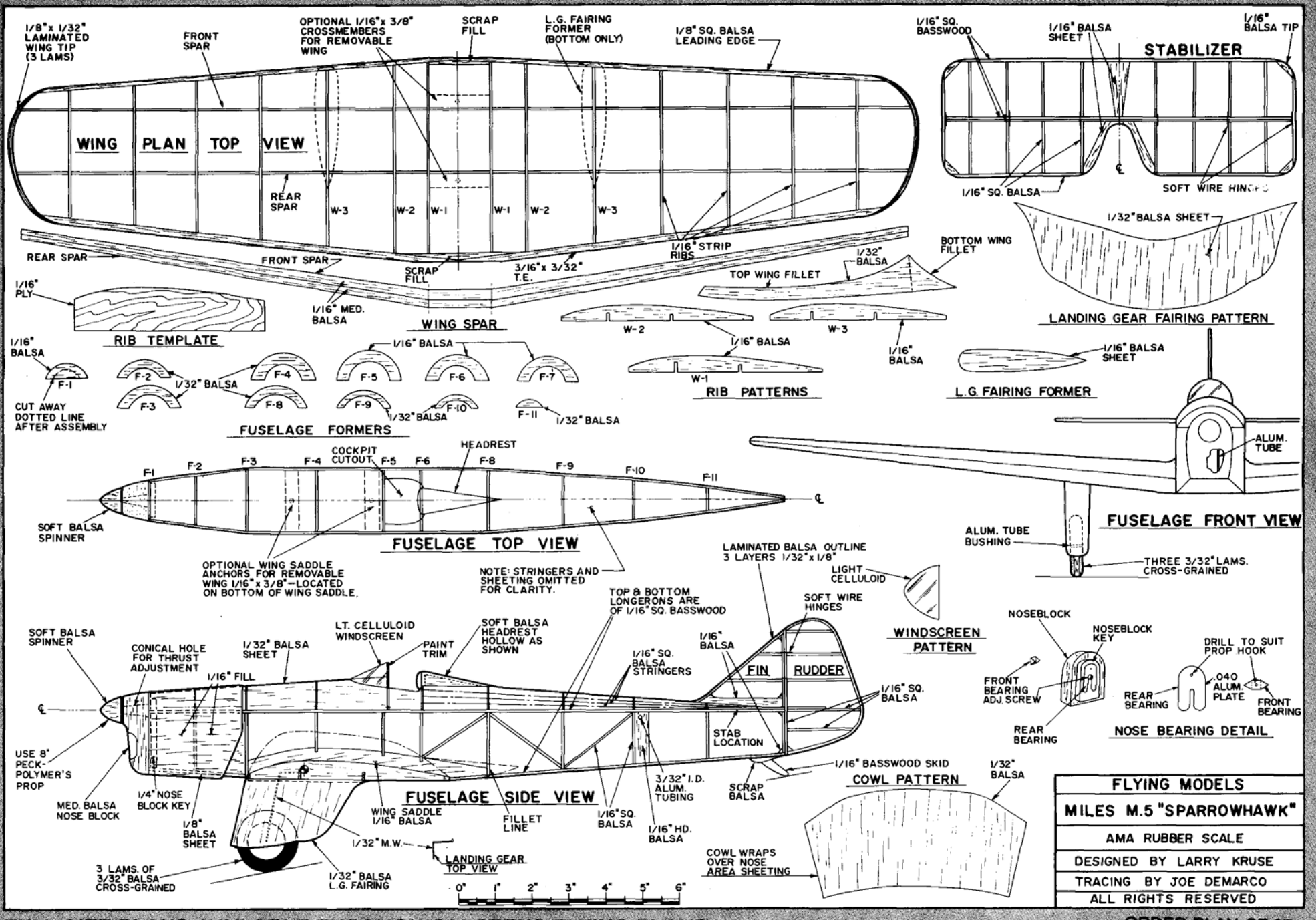
The rudder and stabilizer are built flat on the plan. With such a long tail moment, the *Sparrowhawk* must be kept light, in these areas, so choose some of your best light "C" grain. While hinging the tail surfaces with soft copper wire is not mandatory, it is certainly recommended for ease of adjustment. Using the thrust bearing shown and hinged tail surfaces, there should be no need for shimming or warping any of the surfaces. The only add-on element on the prototype was a small bond paper tab glued to the bottom of the left wing panel to keep it up during the left-hand power pattern.

All structures should now be sanded carefully and thoroughly with 320 grit paper to eliminate glue bumps and any other trash collected during the construction process. Brush three coats of full strength dope onto the bare wood framework and allow each coat to dry completely. Lightly sand the framework again after the third coat of dope is dry to remove all the balsa fuzz.

A 50-50 mixture of white glue and water is the best covering adhesive I've found, but you may want to use the more traditional thinner and dope method. Cover all surfaces with light weight tissue. I used an off-white from Peck-Polymers. To me, off-white is just as close to the cream color of the original G-ADNL as is the yellow used by some modelers on their Peanut scale versions of the *Sparrowhawk*. I suppose it's academic whether you miss accurate color replication from one end of the color spectrum or the



Three quarter front view shows the light, well-stressed construction. Markings are simple but effective and the hollowed-out spinner and the landing gear fairings serve to help the aesthetic appeal.



FLYING MODELS
MILES M.5 "SPARROWHAWK"
AMA RUBBER SCALE
DESIGNED BY LARRY KRUSE
TRACING BY JOE DEMARCO
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other.

Shrink the tissue by misting rubbing alcohol through an atomizer of some type, not directly onto the covered surfaces, but across them, letting the spray fallout do the actual wetting of the surface. Three coats of nitrate dope thinned 60-40 will seal the tissue and give it some sheen.

Wheels are laminated from 3/32 inch balsa laid up cross-grained with cardstock circles used to simulate the metal wheel itself. Testor's "Rubber" was brushed on to simulate the rubber tire portion. Wheel fairings are of 1/32 inch balsa. Cut out two blanks as shown and let them soak in hot tap water for about 20 minutes. Glue the 1/16 inch fairing formers in place on the bottom of the wing, install the wheels, and then carefully wrap the fairings around the fairing formers, spot gluing as you go. When you've come full circle, so to speak, the trailing edges of the fairings should be glued together, trimmed to shape, and sanded lightly. For the sake of strength and flexibility, I did cover the fairings with tissue since they do take considerable abuse in landing. While I've had no real problems with the fairings, I have thought several times that they might have been more attractive and less trouble made of light cardstock. Choose your own method.

If you want to be perfect in the color department, lightly airbrush an almost dry coat or two of thinned Aero-Gloss cream dope over all surfaces at this point. Registration numbers, the tiny logo *Sparrowhawk*, and the wing walk were all done with tissue. Panel lines were done with a steel straight edge and a black "Sharpie" pen.

The remaining items include the windshield, cockpit coaming, headrest, and all control horns. Make up and/or install each as per the plan and your *Sparrowhawk* is complete.

Flight trimming

Make up a motor of four strands of 3/32 inch FAI rubber approximately one and one half times the length of the fuselage and braid it to keep it from flopping around as it unwinds. After the motor is installed, balance the model at the point shown by adding clay to the inside of the lower cowl. Test glide the ship over as soft and forgiving a surface as you can find. The glide should exhibit no tendency to dive or stall after you launch it, but should settle gracefully on its wheels 25 to 30 feet from you after a shoulder high launch. If it does dive, bend the elevator up slightly; if it stalls and you've balanced it correctly, bend the elevator down a bit.

Begin power flights by setting the thrust bearing for about 3° down and 3° right thrust. Bend in no more than 1/16 inch left rudder and wind in about 200 turns by hand. Follow the same process you did in glide trimming. Release the model with the nose slightly down. It should climb slightly and turn to the left a bit. Add another 100 turns and try it again. The only thing you have to watch for is a tendency of the left wing to drop as the number of turns are increased. If it does, add a bond paper tab to the bottom of the left wing as I did with the prototype.

I've had many positive comments from fellow modelers about the *Sparrowhawk's* flat turns and stable flight characteristics. The secret is all in the trimming. Go at it slowly and methodically, making one change at a time. I have been able to obtain reliably repetitive dead air flights of over 75 seconds ROG with a four strand motor of 1/8 inch FAI rubber cranking in 1400 turns. By all means, use a winding tube as you build turns, even if you don't plan on winding to the max. I've had many a motor let go just barely half wound.

I hope the *Sparrowhawk* pleases you as much as it has me. Aesthetically and in performance terms, Blossom Mile's little airplane will be a fine addition to your stable.

Author's wife Cel, pretties up the *Sparrowhawk*. The full scale plane had a long and impressive life and was ultimately converted to a jet powered racing plane. It met an ignominious end in a 1964 hangar fire.

References:

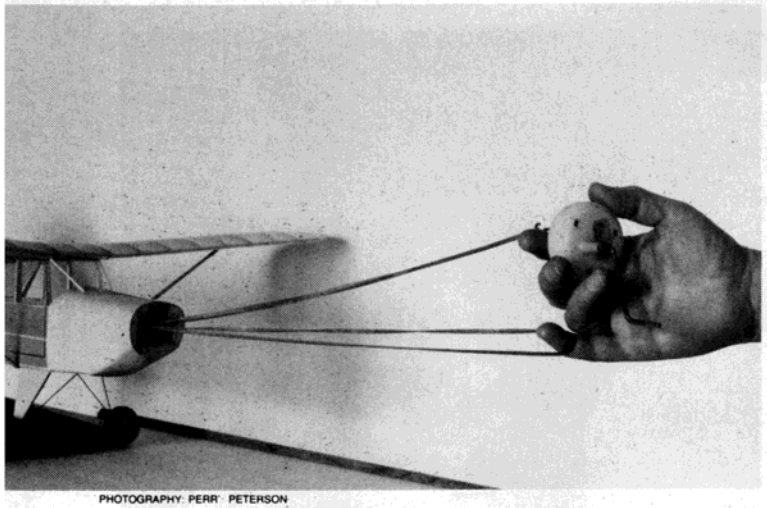
Don L. Brown, *Miles Aircraft Since 1925*, Putnam and Co., London, n.d., pp. 89-94.

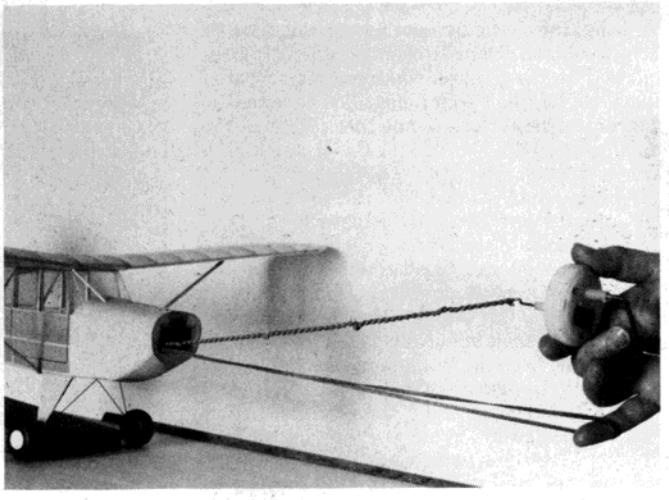
D. M. Collin, "Miles M.5 Sparrowhawk", *Aeromodeler*, Jan., 1971, pp. 16-17.

H. J. Robinson, "Miles M.13 Hobby", *Aeromodeler*, April, 1970, p. 211.

Smithsonian photo files courtesy of Allan Schanzle.

The *Sparrowhawk*'s planform is perfect for rubber power. Ample wing and stabilizer area assure rewarding and enduring flights. The secret is all in the trimming. Do it methodically, one change at a time.





PHOTOGRAPHY: PERR PETERSON

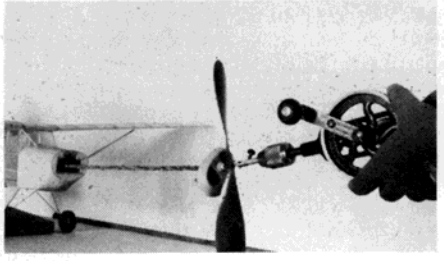
Back to . . . Square One

Braiding Rubber Motors

By Perry Peterson

Simple procedure eliminates expended rubber motor problems for optimum glide trim.

Braiding a rubber motor greatly eliminates the bunched up knots which affect glide trim. The three photos (**above left and right, below**) show the basic procedure. One loop is held as the other is wound. Then hold the other and wind the former. Finally wind both backwards and let go.



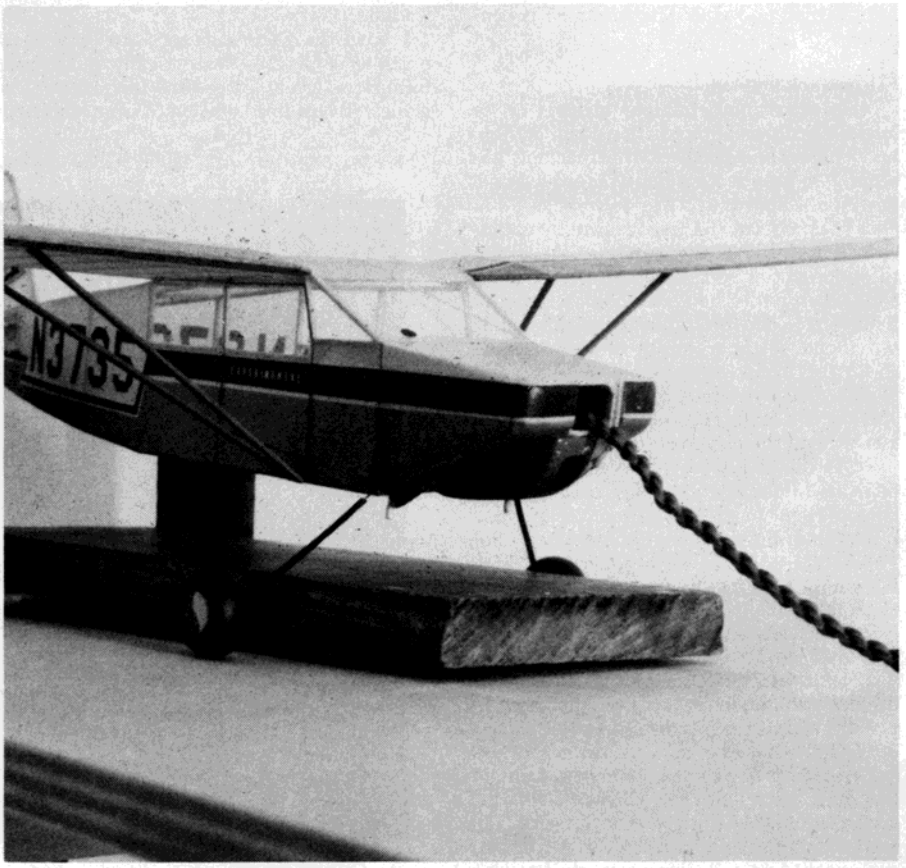
Nothing will ruin the glide of a perfectly trimmed rubber model faster than an expended motor bunched up in the aft portion of the fuselage. This article will show a simple way to rid your planes of the dreaded roller coaster glide caused by relaxed rubber motors shifting their weight aft. This method will work on any multi strand motor as long as it has an even number of strands such as 4, 6, 8, etc.

The plane illustrated is a well worn (167 flights) *Interstate Cadet* built to the 30 inch Earl Stahl plans. For this plane, we are pretensioning a four strand motor using FAI 3/16 rubber, 29 inches long.

Load the motor in the usual manner but put only one loop on the winder and crank in about 90 turns while holding the other loop with your little finger. Now hold the partly wound loop with your pinkie while turning the other loop 90 turns. Put both loops on the winder and crank in 90 turns *backwards*. Now attach motor to prop hook and wind as if to fly — then let it unwind. Your motor will suddenly appear to be braided and will not bunch up in your model to ruin the glide.

Experiment with the motor you are using to see how many turns it will need. Some may need more or less than the 90 pretension winds required for the Stahl *Cadet*. If you get too much tension the free-wheeler (see September, 1983 *FM*, Square One project) may not work and you will need to retension by starting over using less winds in each loop.

When pre-tensioning motors with more loops, enlist the help of another modeller or a bystander to hold the extra loops during the pre-tension process.



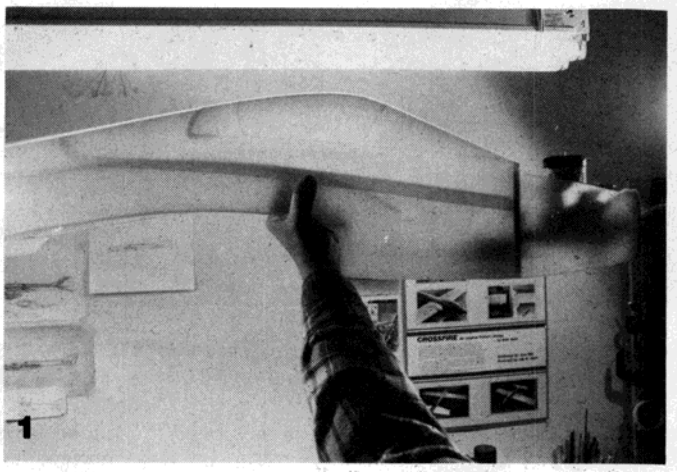
This is not a true braiding process but the pretensioning described here sure looks like it. The method works only on motors with an even number of strands, four strands or more.

PROJECT PATTERN

By Dean Pappas and Bob Hunt

Last month's installment of this series saw the firewall prepared (the nosewheel retract and engine mount drilled) and installed. This month's task is the installment of the pipe tunnel floor, and a word, or two, about the maintenance of buried tuned pipe installations.

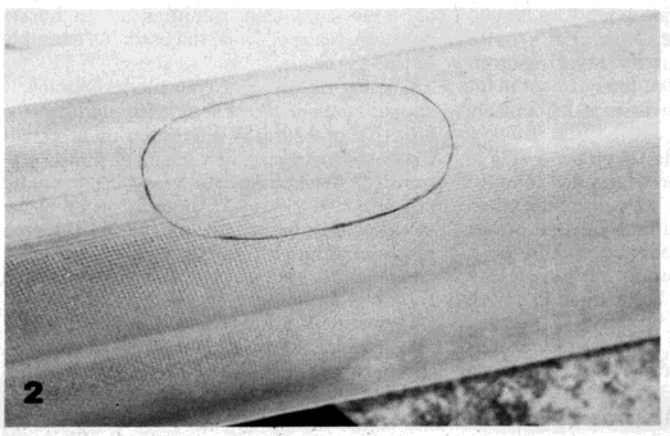
The Aero Composites *EU-IA* is in many was a beautifully engineered and executed kit, the pipe tunnel floor is molded to fit so nicely that I felt like I was cheating! **Picture #1** shows the floor held in place. Most of the work will be done "surgeon style" through the



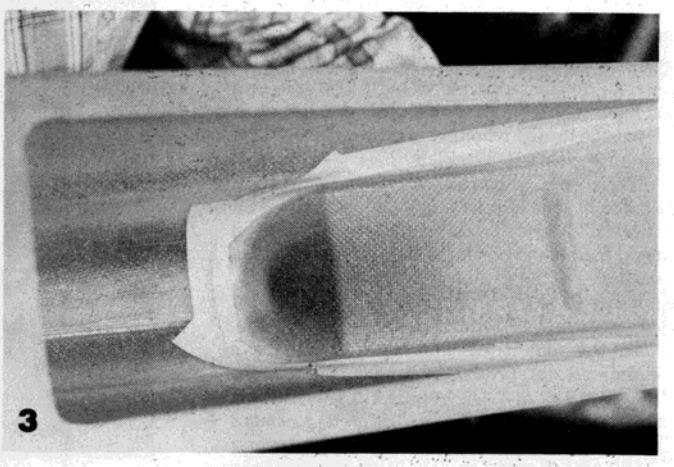
hot-air/exhaust exit. In order to locate where this should be, install the engine, header (cut to proper length), and pipe in the fuselage without the floor. At this point, it should be easy to mark the fuselage with a grease pencil from the outside. Using the technique described last month for making symmetrical templates, find a pleasing shape for the exhaust hole. Be sure to make the hole big enough to slip the pipe and header into the airplane after the floor is in place!

A brief digression is in order here, as cooling for the pipe is important to engine performance. Pipe couplers tend to melt if the cooling is insufficient, and this represents a considerable replacement job with a buried pipe. My rule of thumb is to make the exhaust about 150% of the area of the inlet. The impact of insufficient cooling in the pipe tunnel is that the engine will behave as if the pipe were set too short, after flying for a few minutes. This results in the engine leaning out excessively when the nose is pulled up even when a ground check shows the needle setting to be okay.

Picture #2 shows the outline chosen for the exhaust. Cut the glass as described last month, and remember the dust mask please! The seam in the fuselage makes a good guide for getting the hole centered.



Now, you are ready to glue the floor into the airplane. **Picture #3** shows the floor in place, and the edges sealed with tape from the inside, with no leaks. What is not obvious from the picture is that the



glass on both the fuselage and the floor are sanded and cleaned off with epoxy thinner in the areas to be glued. Without this, the vibration will cause leaks that will allow oil into the radio compartment. Actually, this procedure is good anytime fiberglass is glued. Mix about an ounce of slow drying epoxy, and, using a tin can that is "kinked" in order to make a pouring spout, pour the glue into the pipe compartment through the outlet. It is sometimes helpful to warm the epoxy, after is is poured, with a hot air gun to get it to flow into the entire gluing area. **See picture #4.** When this is done, the gluing area should look "wet" from the outside.

That is all there is to gluing the floor in, but the problem of making an accessible rear pipe mount remains. The instructions provided by Aero Composites offer one method; I would like to suggest another. I made a "V" shaped saddle of soft balsa and Hot Stuffed a layer of asbestos material cut from a kitchen hot plate into the saddle. Yes, I got into trouble for cutting up the hot plate! This was glued onto the floor about an inch in front of the exit hole. A small hardwood block was then epoxied into the top of the fuselage, above the saddle. Drilled and tapped for a 1/4-20 nylon set screw, this upper hardwood block becomes an easy-to-loosen pipe clamp. Unfortunately, a picture of this does not exist. I made a set screw from a 1/4-20 bolt that was cut to length, and had a heated allen wrench plunged into it.

Next month, the installation of retracts in the foam wing will be covered: Bob came up with a novel technique for this that is so neat that I wish I'd thought of it.

Motor Matters.

By Mike Billinton

Slow-speed 2-stroke

Newly arrived is this "new concept" machine, aimed like an arrow straight to the heart of the 4 versus 2-stroke battle of RPM levels. OPS has, with their new Maxi 30cc 2-stroke, chosen to modify the prevailing 2-stroke design principle of high RPM levels to achieve those high powers at the low RPM levels desirable when turning large propellers on large scale R/C models.

Their soon-to-be-released .90 cubic inch 4-stroke overhead cam engine shows, however, that OPS doesn't see this whole question in rigid terms and seems to have the confidence to provide the public with either approach, and it will be for us, the users, to debate and experience their relative merits.

In the meantime, the Maxi 30 2-stroke claims an outstanding low RPM of 5,500 for its max BHP of 2.45. Where that would put the maximum torque is not stated, so that's one test eagerly anticipated. Could be around 3,500 RPM though, and that will be one of the lowest levels seen for many years. Operating "ungeared", the likely noise level should be quite low and surely competitive with the highly acclaimed low sound levels of the low RPM 4-stroke. It all seems odd to have seen such fierce competition upwards in both RPM's and power since the war and now to witness an increasing trend reversal to low RPM competition! At least one has a clearer idea where *that* route leads.

The long-stroke, front-inducted Maxi 30 is "old" in RPM levels only—having a modern five-port AAN liner/piston, needle roller and pump type carburetor. Recommended propellers are satisfyingly large at 22×10 and 20×12.

BHP and torque

As a corollary to the discussion of the OPS Maxi, it might be the time to discuss the continuing uncertainty over the relationship between power and torque. After all, they seem somehow very similar things. I used to have doubts on this score, though with so many model engine operators also being familiar with their own automobile engines it should have been a simple matter to physically sense the difference. The act of changing gears to keep the engine RPM within adequate horsepower range and the much lower RPM punch (torque) available when the throttle is wide open, are both indications of an internal combustion engine's dual role of torque generator and horsepower provider. In fact, in a sense, these two "forces" are similar and had it not been for James Watt and the economic and political systems surrounding him, we might never have had a unit called horsepower; the terms force or torque alone might have sufficed for man's needs.

We've often seen the expression: "Horsepower is a rate of doing work." It's that last word, "work", which appears to, usually, generate the misunderstandings. Consider this analogy. A pair of perfectly, evenly matched arm-wrestlers or tug-o-war teams undoubtedly conclude at the end of their "contest" that, by heck, they've been *working!* Generated heat and sweat alone appear to indicate this but, by the strict economic laws prevalent in Watt's time, *no work has occurred;* i.e., no movement of material which could be turned to human advantage or profit. So, the newly invented combustion engine, inherently part of the industrial revolution, was seen largely in the role of its labor (or work) content; i.e., how much could it move—over what distance—in what time period?

In pursuit of this over-riding concern, James Watt devised the unit of work (or labor), which could relate the unique labor value of the horse to the hoped-for-value of the new mechanical engine. One surmises that man himself could have been the comparison factor though the horse was probably more consistently capable than mankind.

Anyway the horse's measured performance was the one chosen and is the now familiar figure of 33,000 pounds lifted a vertical distance of one foot in one minute, or any variation of that: e.g., one pound up 33,000 feet in one minute, etc. Now that's quite some horse! But, to justify investment in any new fangled invention likely to supplant the valued horse, standards were deliberately set high.

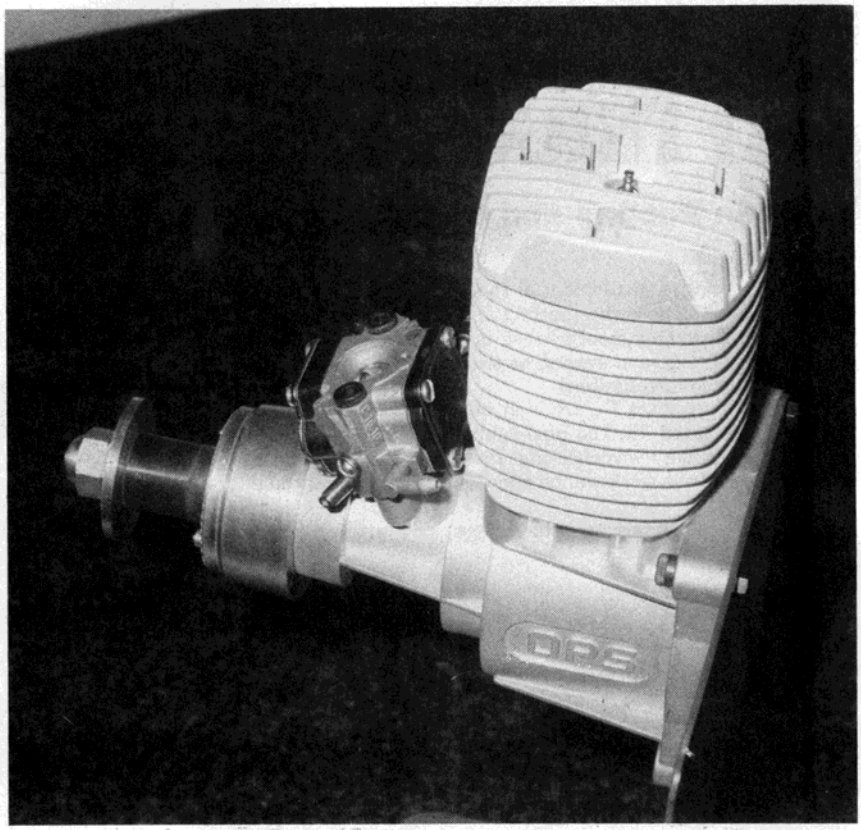
Drawing these strands together; a straining though stationary horse, unable to move its load, is certainly by any normal human understanding generating immense power (torque), but by the economic standards, it fails miserably and is producing no work of value. Worse, the straw input (fuel) has been totally wasted.

Though the origins of the horsepower unit might be thought distressingly non-scientific, of course, it does retain an objective means of measuring power "capacity." Getting back to definitions, it might be more historically correct to say that: "horsepower is that torque (force) which can usefully be of value." The fact that horsepower is a *derived* unit (the product of force × distance × speed) and is not a *fundamental* unit capable of being measured directly, gives the game away; it strictly has no independent existence outside those units for force/distance/speed.

A human example which might help in sensing the essential difference between torque (force) and horsepower, is to visualize a person walking up a given hill in one minute while carrying a 100 pound load; then, imagine a repeat—but this time in 1/2 minute. Clearly at the top more effort will be acknowledged after the 1/2 minute jog, plus more heat generated by far, even though the load lifted (torque or force, what you will) remains the same. The only thing which changed was the speed (or rate) at which the task was undertaken and that productivity increase certainly might represent something of value—and thus qualifies as an horsepower increase of twice the previous example in this particular case.

Getting right back to our model engines, it should be clear that though torque (force or effective pressure) is maximum at a certain RPM level (by virtue of various designed efficiencies), nevertheless horsepower usually increases with RPM even though torque is declining solely because it is usual (in the area after maximum torque) for RPM's to go on increasing at a rate greater than that at which torque is declining.

Crankshaft horsepower is arrived at by multiplying RPM × torque, so at some point (going up the RPM scale) torque usually commences a more rapid rate of decline at the same time as the RPM 's gradually fail to pro-



PHOTOGRAPHY: MIKE BILLINTON

A somewhat radical departure from standard two cycle practice of higher and higher RPM, the new OPS Maxi 30 is a two cycle. .90 cu. in. engine which puts out 2.45BHP @ only 5,500 RPM.

duce the large rates of increase with each successive load reduction; and it is at this point that horsepower starts *its* decline.

In that "climbing a hill" analogy, our weight carrier would well operate at an even more economically valuable rate (higher horsepower level) by reducing the load to 50 pounds—provided elapsed time got below 1/4 minute. In fact, by using various combinations of load/running speed, one would soon ascertain this particular human's best horsepower level (i.e., not dissimilar from the methods used to arrive at horsepower in engine testing).

All of this relates to propeller selection for propulsion in this way: there is an optimum area/diameter prop for a specific mass, size, and hoped-for speed of the plane. (I cannot advise any special ground rules for arriving at such; in modeling, experimentation seems to be the order.) Anyway, having provisionally decided on a particular size, then *whatever* power unit is fitted to the craft, if it can operate at its maximum horsepower level using that prop, then that's the route to the most vigorous performance you're likely to get. Going to lower RPM (and thus to normally a higher torque point) will result in worse performance. Any story along the lines of—"I fitted a larger prop and it went better"—only indicates that initial prop selection was too small for the craft and/or incorrectly matched to the maximum horsepower level. Equally, use of a lower horsepower engine, turning a large prop and giving a superior performance than a more powerful engine (which needs a small prop to achieve high RPM and thus high horsepower only indicates that the advantages in correct prop selection *for the particular model* more than outweigh the disadvantage of using a less powerful engine. Gearing of a high RPM/high horsepower engine so that it too can slowly turn that same large prop while itself is running at peak horsepower at high RPM will certainly then result in that combination much more lively than the lower horsepower/low RPM engine/model set-up.

Another engine book

Mention was made in an earlier Motor Matters of learned books by Ricardo and Mackerle. Since that time, I've been gently pointed towards a book published by the Massachusetts Institute of Technology and authored by Charles Fayette Taylor. Almost guaranteed to awe any knowledgeable engine person (myself included) and leave them feeling humble, it summarizes virtually all current knowledge on the internal combustion engine. Specifically concise though this summary is, the result is still two volumes totalling 1,156 pages; and with an additional bibliography of 157 pages alone being larger than many actual books on the subject. Plus we have 36 pages of index.

Interesting was Taylor's gracious acknowledgement to Harry Ricardo in the preface of Volume One.

Flyin' things for fledglings

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

Hi gang . . . . well, here we go again. Another session in the old hangar to fill you all in on what the rest of the gang is doin' and also to fill you in on some of the news that I've picked up during the month. Oh yea! Things are really hoppin'! Lots of activity and lots of building, which means that I have some neat photos to share with you. First of all, let me tell you about the latest efforts of old Flying Aces friend, Mike Midkiff. Boy, I'll tell ya, gang, this guy has got to be one of the most prolific builders in the whole U.S. of A.! And, he's still doin' it . . . with a whole passel of new models all ready for the flying season.

I'm gonna show you photos of a couple of his models cause I think they're so great. His WWI Macchi *Folgare* is nothing short of a work of art! I know you're gonna agree with me, a really beautiful model. I'm also showing you his P-40, always one of my favorites of the WWII group.

Now, are you ready for this? Mike tells me that he is just putting the finishing touches on a Sopwith 1-1/2 *Strutter.* Now, that's my kinda thing! World War I stuff. I love 'em. I'm gonna make Mike promise to send us a shot of the *Strutter* when it's finished. Here's the real good news, though. You, too, can build a Mike Midkiff model. That's right! Mike is making his plans available to all the gang . . . and, at a good price, too!

Mike will sell a complete set of any of his plans for five bucks and that includes postage and handling! Have you got that? Just send a fiver and name the plan you want and you'll get it. Mike springs for postage, packing, envelope, etc. Now, if you want to know all the different plans he's offering, along with the sizes, just send a self-addressed stamped envelope and the catalog sheet will be coming right back at ya.

Easy, right? Sure it is. Just send your order or your SASE to the following address: Mike Midkiff, 7611 Cypress, Humble, Texas 77396. This is a good one, so send that SASE and find out about all the neat items that Mike is offering. Tell him Van sent ya!

And, now, it's nostalgia time, again! There are so many of us who love the oldtimers and, as you know, I'm one of 'em! Well, this month, I've got a real "goodie" to show you.

Our old buddy, Lou Roberts, out in Denver, sent a photo of his old time ukie model - just completed. Lou built it from scratch from the old plans for the *Tethered Trainer* as it was first called. It was later kitted by Scientific and was called, The Scientific *Cyclone.* I got to tell ya, gang, that this was one of my all time favorite ukie models and I think it's a really great looking job. Lou's version is finished in orange and yellow and should be really colorful. He kept the old time flavor, too, by powering it with a Forster .35. Now, I'll let you in on another secret. I've got a complete original kit for a Scientific *Cyclone* and, I gotta tell ya, that photo of Lou's model really turned *me* on. I kinda got a feelin' that I, too, am gonna have a *Cyclone* sometime in the not-too-distant future. Yep, a really pretty model.

Now, let's get back *to* scale. You may remember that a few months back, I showed you a neat photo of the "bare bones" of a super Fokker *D-17.* It was built by Hugh Butterfield of Momence, Illinois. At the time, I remember thinking that it was one of the best "skeleton" shots I had ever seen—a really "super" framework—and scratch-built, too. Well, now we've got a chance to see the finished product. That's right! Hugh has forwarded a photo of the completed model all ready to fly.

Now, in all honesty, Hugh tells us that he

PHOTO: HUGH BUTTERFIELD

Last time we saw this Fokker *D-17* of Hugh Butterfield, it was an exquisite bare bones framework. It's all dressed up now and ready to fly.

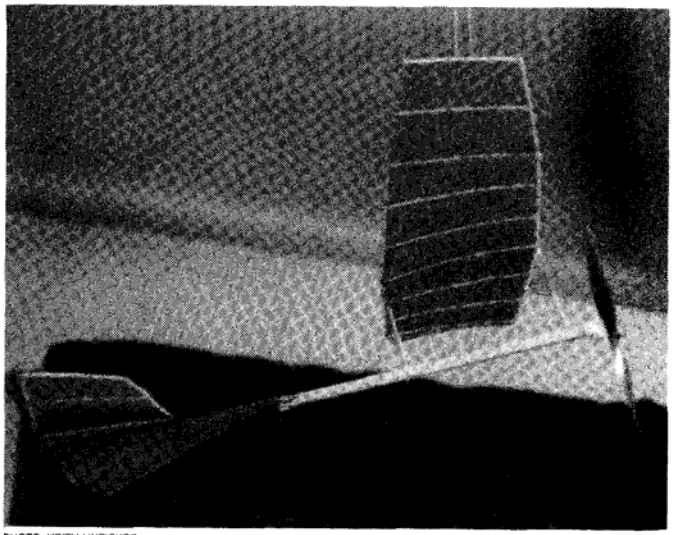


PHOTO: KEITH UNZICKER

One of Keith Unzicker's first efforts (**above**). He says he's starting to dabble in CO_2 as well. That's a Scientific *Cyclone* (**below**) with a Forster .35. Both belong to Lou Roberts. The *Cyclone* and Forster are nostalgia favorites.

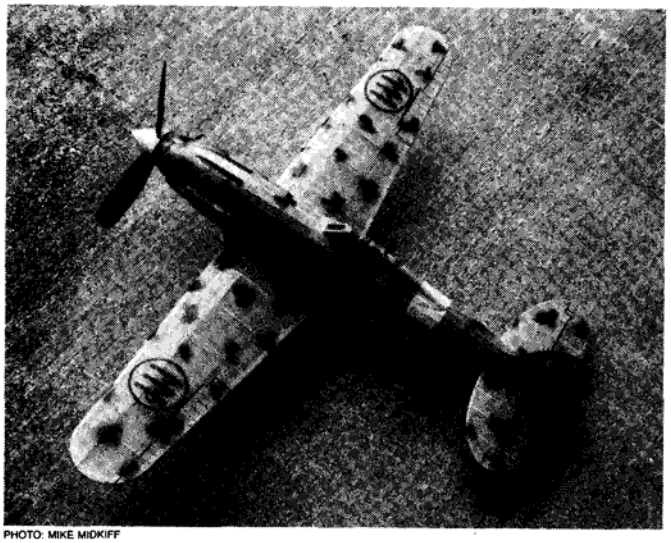


PHOTO: MIKE MIDKIFF

Not only is Mike Midkiff prolific, he's also a great builder. Take a look at that Macchi Folgare (**above**) and the Curtiss P-40 (**below**). If you're looking for some of his plans check the text for inside info.

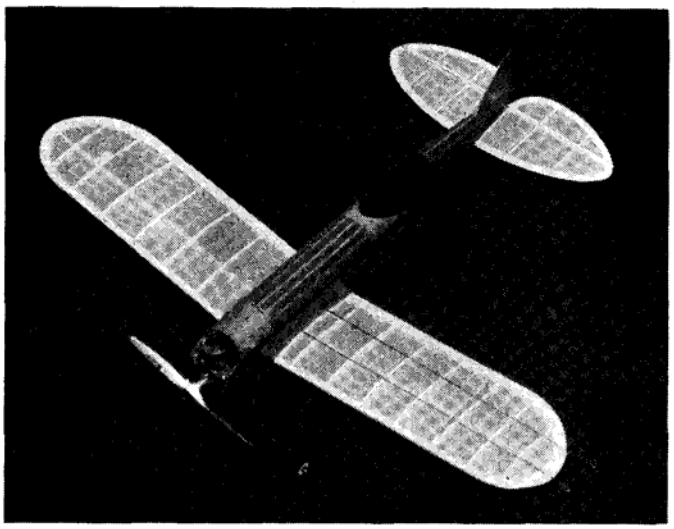


PHOTO: LOU ROBERTS

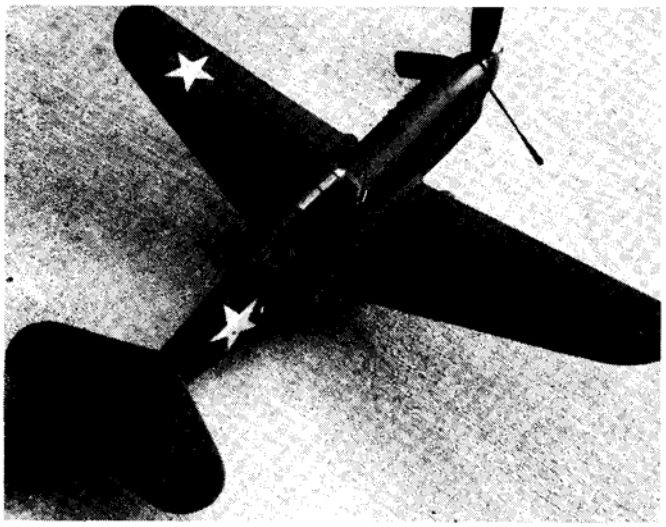


PHOTO: MIKE MIDKIFF

hadn't test flown yet as of the time the photo was taken. As a matter of fact, he promises to send a shot of the model in flight if, in fact, it really flies well. To tell you the truth, gang, if it were mine, I wouldn't really care if it didn't fly well. It would sure make a terrific shelf model, wouldn't it? My guess, however, is that Hugh will get some decent flights from it and we'll see that flight photo in a future column. If you want to know more about this one, don't ask me! Drop a note to High Butterfield at Route 1, Box 611, Momence, IL 60954.

I gotta tell you, too, that I had a really nice letter from a young beginner out in Roanoke, IL. His name is Kieth Unzicker and he's doin' great! Keith is 14 years old and is just getting into free flight rubber. He tells me that he had built mostly kits from Indoor Model Supply and is having good luck with them. He says he's also designed a few of his own and is also getting interested in CO_2 power. Keith also mentions that he likes our monthly get-togethers here in the column, and looks forward to every issue. Way to go, Keith!

He also sent us a shot of one of his models from an Indoor Model Supply kit and, as we can all see, he's doing a nice neat building job. Glad to have you aboard, Keith; keep joining all the rest of the gang, every month. We're glad to have you with us. Tell ya what, gang . . . I'll give you odds that before too many months go by, we'll be seeing' a photo of a neat scale CO_2 powered job out of Keith's shop! How about that, Keith, gonna keep me honest?

Gee, we were talkin' about old-time ukie a short time ago and that reminded me that I wanted to tell you something else about ukie flying. I know, from may mail, that a lot of the gang are into U-control and I wanted to remember to pass the following info on to you.

Windy Urtnowski, one of the other columnists on this mag, also publishes the PAMPA *Newsletter.* It's the stunt control-line newsletter and currently goes out to approximately 400 members. Windy tells me that PAMPA is actively seeking new members and that beginners are *especially* welcome.

The newsletter has a lot of appeal to "non-experts" and covers neat things like finishing, motors, trimming, etc., etc. Windy sent me a copy of the newsletter - a nice thick, readable, mag just oozing good info and, all presented with a wild sense of humor I might add! Seriously, if you're into control line, I kid you not! You'll really dig this little gem.

Hey, dues are only $7.00 per year, so how could you go wrong? You'll get seven bucks worth of laughs just outta Windy's cartoons! If you want to take a shot at it, drop a note to the following address and ask for an application. Just mail your request to PAMPA, 329 Lincoln Place, Brooklyn, NY 11238.

No kiddin', gang, even if you're not now into ukie, you'll get lots of laughs out of this newsletter. I guarantee that it's "fun" oriented. Heck, how could anyone have a name like "Windy" and not have a sense of humor?

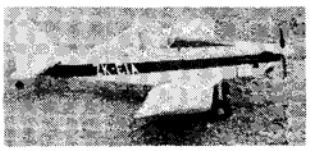
Well, it looks like it's getting near that time when we gotta close the old hangar doors on another great session. I want to thank all you guys and gals who keep the news and great photos coming into the old hangar here at 10 Brothers Rd. in Wappingers Falls, NY 12590, so I can pass it on to the rest of the gang. And, to those of you who haven't kept in touch lately, I've just given you the address, so how about it? Let's hear from you. I'll be lookin' forward to next month's get-together and hope to have some neat new stuff to tell you about . . . . but, don't sit back and wait! Tell us what *you're* doing. As I've always told you, the rest of the gang is interested in *you* and *your* projects, too . . . okay?

I'll just say so-long for this time and will be waiting to hear from you.

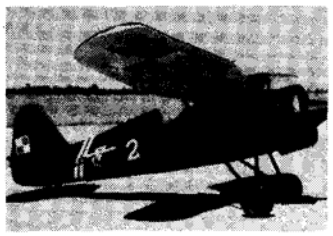
Happy flyin'

Carstens Flying plans

R/C SCALE



CF-604 PIPER PAWNEE BRAVE. This R/C sport-scale crop-duster features a span of 49 inches and four channel operation. A fine subject for any good .40 size motor. By Arthur Heenan. FM 7-82 ..... **$6.00**

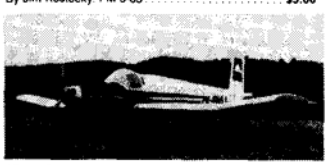


CF-617 POLISH FIGHTER. This 40 inch span R/C sport scale model features a gull type wing design. For two to three channel systems and 1/2A powerplants. By Christ Nagy. FM 12-82 ..... **$5.00**

CF-623 AMERICAN EAGLE EAGLET. A stand-off scale R/C model of an American light plane of the 1930's. With a span of 68 inches, it is designed to be flown with a .35 size motor. By Al Wolsky. FM 2-83 ..... **$5.00**

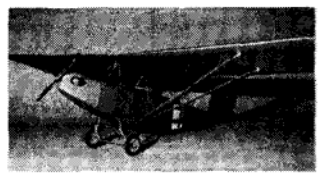
CF-627 DOUGLAS DEVASTATOR. An R/C sport-scale version of a WWII Navy veteran, for four channels and .60 size mills. Wing span is 62 inches. Foam core wing construction. By Dan Reiss. FM 4-83 ..... **$6.00**

CF-631 SYS MONOCOUPE. Designed for single channel pulse or micro multi-channel R/C systems, this schoolyard scale classic features a span of 36 inches. For .020 power. By Jim Kostecky. FM 5-83 ..... **$5.00**

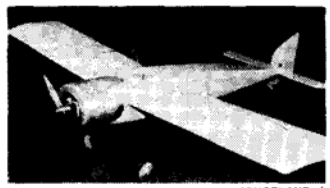


CF-636 FLETCHER FU24-950. R/C cropdusting at its best with this sport-scale version of New Zealand's AG plane. Spans 63 inches and utilizes four to five channel radios and 40-45 size motors. Plans on two sheets. By Art Heenan. FM 7-83 ..... **$12.00**

CF-651 FOKKER D-XXI. This R/C stand-off scale model of a little known WW II fighter features a span of 43 1/2 inches and is designed to be flown with .15 to .21 size motors. By Kalevi Sundqvist. FM 12-83 ..... **$6.00**

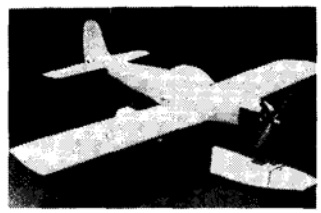


CF-665 SPARROWHAWK II. A Schoolyard Scale version of an obscure but charming British lightplane. Designed for 1/2A engines and two channel R/C systems. Spans 48 inches. By Don Srull. FM 5-84. ..... **$6.00**

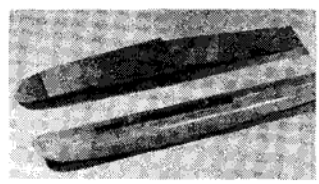


CF-621 MORANE SAULNIER MODEL H MONOPLANE. A 36 inch span stand-off scale R/C ship for .049 to .10 size motors and three channel radios. By Don Martin. FM 2-83 ..... **$5.00**

SEAPLANE

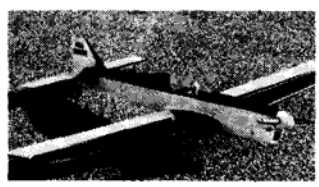


CF-600 SEAHAWK. An R/C scale-like floatplane featuring a 47 inch span. For four channel radios and .40 size motors. By Kalevi Sundqvist. FM 6-82 ..... **$6.00**

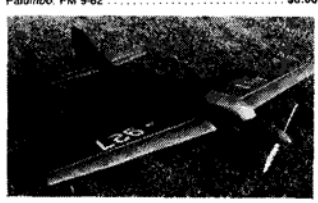


CF-602 20-40-60 FOAM CORE FLOATS. Three sizes of foam core floats for conversion use with virtually any R/C landplane type. By Dick Sarpolus. FM 6-82 ..... **$5.00**

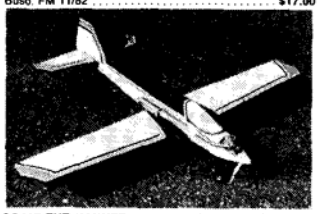
R/C PATTERN



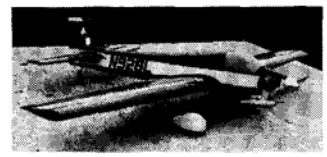
CF-609 FAKEOUT. This hot .40 powered R/C sport pattern ship features a 58 inch span. Built-up construction. By Dom Palumbo. FM 9-82 ..... **$6.00**



CF-613 BIG ONE. A giant R/C pattern design for use with a geared .61. The wing area of this behemoth is 1200 square inches with over a 70 inch span. On two sheets. By George Buso. FM 11/82 ..... **$17.00**

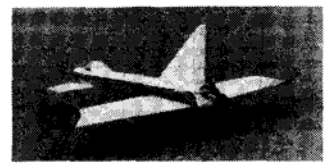


CF-637 THE HAMMER. A hot sport/pattern design which makes use of the current crop of high performance .19-.25 size motors. Plans show two versions for either internal or external pipe mount. For four channel radios. Spans 50 inches. By Dick Sarpolus. FM 7-83 ..... **$6.50**

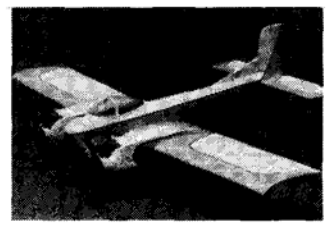


CF-619 GAMBLER. This R/C sport/pattern design features a 700 square inch wing and .60 power. Scale-like looks add to the fun. By Bob Lobozzo. FM 1-83 ..... **$7.00**

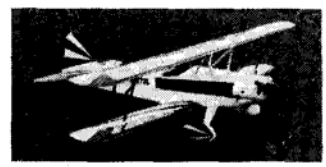
R/C SPORT



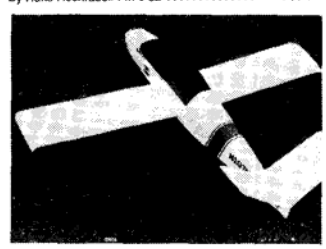
CF-597 SABREBAT. A .60 size R/C canard sportster, featuring foam core wing construction. By Dan Reiss. FM 5-82 ..... **$6.00**



CF-605 TWO SQUARE. This R/C twin features a span of 66 inches. For two .60's and four channel radios. Formed plywood fuselage. By Dan Reiss. FM 8-82 ..... **$6.00**



CF-608 COMBO BIPE. A 54 1/2 inch span R/C biplane which combines the good features of many popular designs into one. For use with four channel radios and .40 size motors. By Hans Hochradel. FM 9-82 ..... **$8.00**

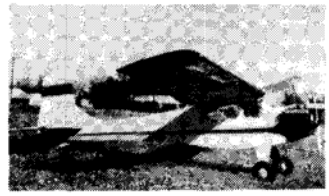


CF-611 MINI MONI. A 1/2A R/C sport-scale version of a popular new homebuilt aircraft. A 36 inch span natural for schoolyard flying. By Bob Aberle. FM 10-82. ..... **$5.00**

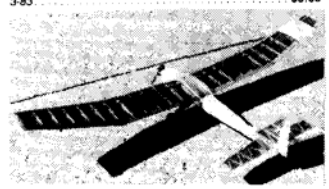
CF-634 PINE BARON. An all pine R/C trainer which features a wing span of 70 1/2 inches. For four channels and .40 size motors. By Al Trapanese. FM 6-83 ..... **$6.00**

CF-640 SPINNER II. Just the ticket for pattern training, this .60 size, low wing design features a span of 63 inches. Foam wing and built-up sheet balsa fuse construction. By Mike Blackard. FM 8-83 ..... **$6.50**

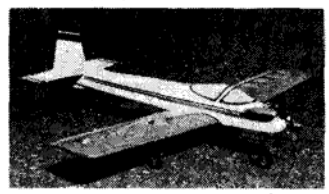
CF-615 MONOWING. A unique R/C flying wing with a span of 40 inches. Designed for three channel equipment and .15 size motors. By Kalevi Sundqvist. FM 11-82 ..... **$5.00**



CF-624 R/C SUE. An R/C version of a perennial freeflight sport favorite for use with three channel radios. The 59 inch span ship flys with .19 - .25 power. By Dr. D.B. Mathews. FM 3-83 ..... **$6.00**

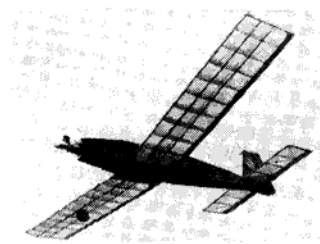


CF-629 SIG RISER MODIFICATION. Simple changes can turn Sig's popular Riser kit into a fine powered trainer for .09's to 10's. By Dr. D.B. Mathews. FM 4-83 ..... **$3.00**

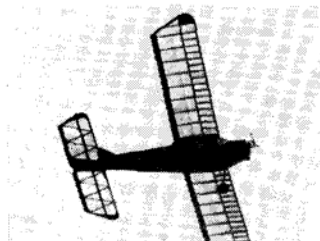


CF-642 PEPPER. This low wing R/C sport design features a 50 inch span and flys with .19-.25 size motors. An excellent choice for that first low wing ship! By Dick Sarpolus. FM 9-83 ..... **$6.00**

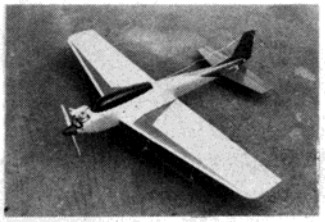
CF-648 SABREBAT TWO. A unique twin engined R/C sport canard in a push-pull configuration. Features a 60 inch span and takes two .60's for power. By Dan Reiss. FM 11-83 ..... **$6.50**



CF-665 SPARROWHAWK II. A Schoolyard Scale version of an obscure but charming British lightplane. Designed for 1/2A engines and two channel R/C systems. Spans 48 inches. By Don Srull FM 5-84 ..... **$6.50**



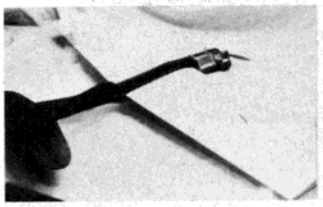
CF-664 AIRKNOCKER. This remake of an old FM favorite is designed to produce scale-like flights on two channel R/C operation. Rudder only flight control with throttle adds to the fun. Spans 52 1/2 inches and takes .09-.15 engines. By Bill Winter. FM 4-84 ..... **$6.00**



CF-653 FASER. This 48 inch span Sport/Pattern design is a perfect match for one of the hot new .21–.25 size motors. By Al Trapanese. FM 1-84 ..... **$6.00**

CF-662 FOUR RUNNER. This 58 inch span, four channel R/C sport model is designed to be flown with .40 size four cycle motors. By Dick Sarpolus. FM 4-84 ..... **$6.00**

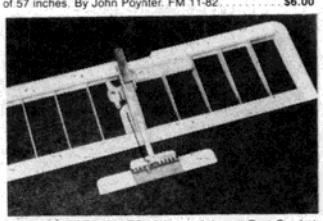
CONTROL LINE



CF-598 SC-2. A top C/L slow combat design for use with .36 size motors. By Phil Cartier. FM 5-82 ..... **$5.00**

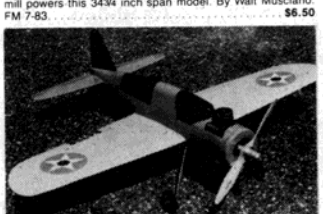
CF-606 ECLIPSE. Ultra high-aspect-ratio C/L stunter for .35 to 40 power. Features a 63 inch span and adjustable controls. By Dennis Adamisin. FM 8-82 ..... **$6.00**

CF-614 MISS JULIET. Stylish C/L stunter for use with .40 - .46 size motors. Features include a large canopy and a span of 57 inches. By John Poynter. FM 11-82 ..... **$6.00**



CF-618 MASTER KILLER. A state of the art Fast Combat model for use with the hottest .36 size motors. Features a span of 39¾ inches. By John Jo. FM 12-82 ..... **$4.00**

CF-639 P-39 AIRACOBRA. A controline scale version of the famous WWII Bell fighter used by the Russians. A .25-.35 will powers this 34¾ inch span model. By Walt Musciano. FM 7-83 ..... **$6.50**



CF-630 OS2U-1 KINGFISHER. Something a bit different for C/L carrier events. Featurs include a sliding leadout placement and a span of 30½ inches. For .40- 60 size motors. By Tom Schaeffer. FM 4-83 ..... **$5.00**

R/C BOATS

CB-15 TWINKLETOES. A sleek R/C outboard hydroplane for use with K&B outboard motors. By Richard Hanson. FM 10-82 ..... **$6.00**

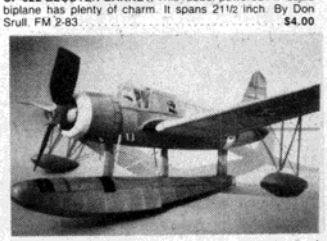
RUBBER

CF-599 EMBRY-OK. Designed to compete in the F/F rubber Embryo class, this design includes many scale-like features. By Al Lidberg. FM 5-82 ..... **$4.00**

CF-601 B-25 MITCHELL. A 36 inch span, super scale, rubber powered version of a famous WWII bomber. By Mike Midkiff. FM 6-82 ..... **$4.00**

CF-607 McRAE SUPER DART. A 27½ inch span rubber scale beauty. By Florent Baecke. FM 8-82 ..... **$4.00**

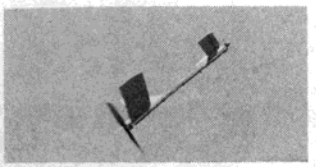
CF-622 GLOSTER GANNET. This rubber powered F/F scale biplane has plenty of charm. It spans 21½ inch. By Don Srull. FM 2-83 ..... **$4.00**



CF-628 OS2U-1 KINGFISHER. This rubber scale version of the famous Navy rescue/scout plane features either wheel type gear or optional floats. The Curtiss replica features a 27 inch span. By Mike Midkiff. FM 4-83 ..... **$5.00**

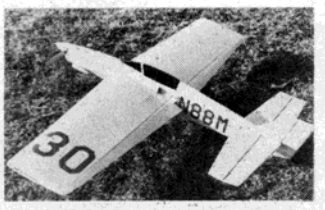
CF-620 POLISH RWD 6. Winner of the 1930's Berlin event, this design is faithfully reproduced for rubber scale competition events. Features include a 32½ inch span with 150 square inches of area. By Hurst Bowers. FM 1-83 ... **$5.00**

CF-635 FIESELER Fi-167. This unusual WWII German biplane is designed for F/F rubber scale competition and features a span of 30 inches. By Hurst Bowers. FM 6-83 **$5.00**

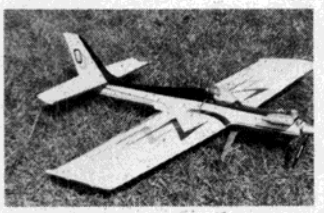


CF-616 FLECHETTE. This simple sheet balsa F/F canard features outstanding flight performance. By Don Ross. FM 11-82 ..... **$3.00**

PROFILE C/L

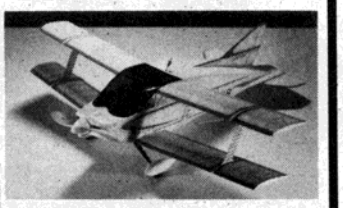


CF-633 PROFILE MISS DARA. The popular Goodyear racer is rendered in profile form for C/L sport and stunt flying. Features include a span of 51 inches, adjustable leadouts and side mounting for .36 to .46 size motors. By Allen Brickhaus. FM 5-83 ..... **$6.00**



CF-625 ROOKIE. This C/L stunter features an upright mounted motor in a profile fuselage design. The ship features a 50 inch span. By Don Winfree. FM 3-83 ..... **$6.00**

NEW PLANS



CF-663 HIPERBIPE. Winner of the 1983 Nats freeflight Gas Scale event, spans 18⅜ inches and is a replica of a full-size aerobatic homebuilt. By Dave Rees. FM 4-84 ..... **$6.00**

CF-667 BIG QUICKIE. Designed for C/L formula racing events, and modeled after "Goodyear" type racers, this plane performs with .36 size engines and spans 38 inches. By John Ross. FM 5-84 ..... **$6.50**

CF-668 F-4U CORSAIR. The venerable "bent wing bird" is modeled in a size to suit .35-.45 motors and four channel radio equipment. The model spans 36 inches. By Pavel Bosak. FM 6-84 ..... **$6.50**

CF-669 F6F-3 HELLCAT. A Rubber Scale masterpiece! This 33¼ inch span model of one of America's greatest WW II fighters is also a fine flying subject. By Mike Midkiff. FM 6-84 ..... **$6.50**

CF-670 KING KOMBAT. Put the thrill back into R/C flying with this 36 inch span, .19 powered combat design. By Floyd Manly. FM 7-84 ..... **$6.00**

CF-671 MILES SPARROWHAWK. Second at the 1984 Nats, this rubber scale model of a famous racer features a removeable wing and a span of 24¾ inches. By Larry Kruse. FM 7-84 ..... **$6.00**

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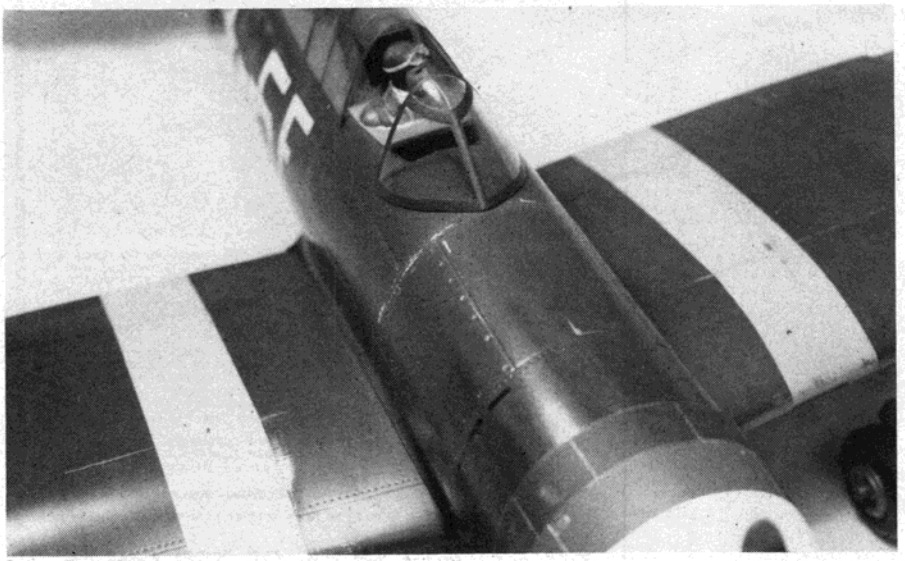
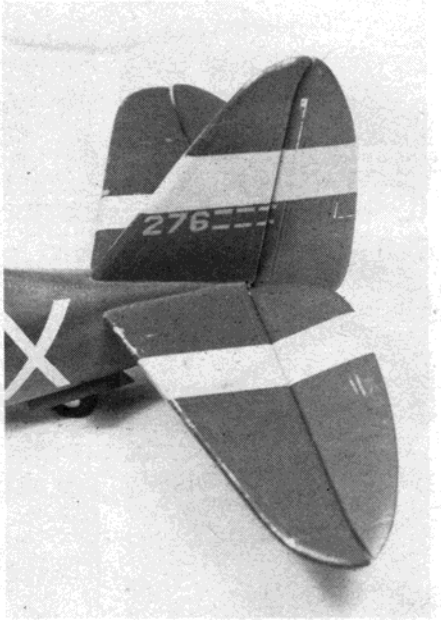
R/C sport scale

By Rich Uravitch





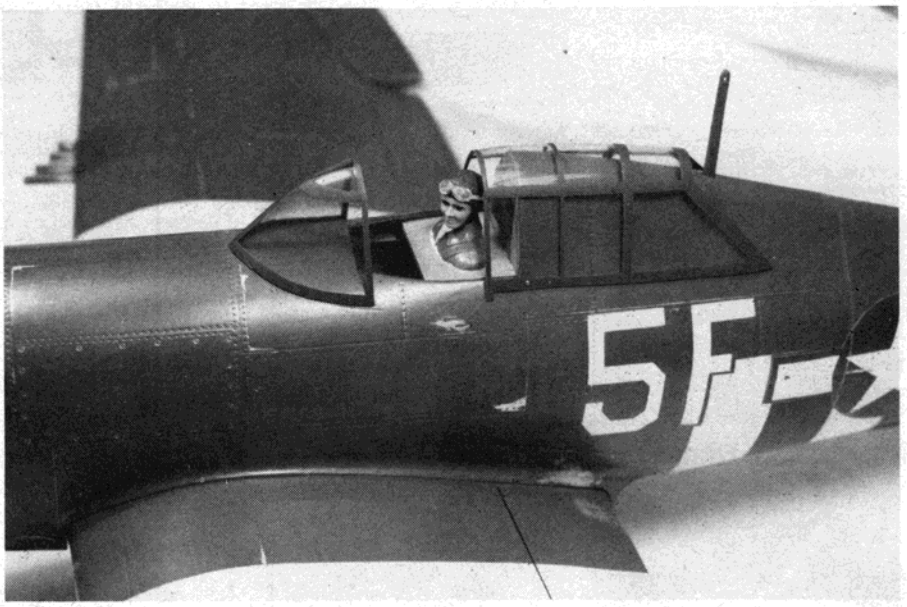
PHOTOGRAPHY: RICH URAVITCH

Chrome MonoKote serves well as a base for an all-metal weathered finish (**above and right**). Chevron flat camouflage paints have been sprayed over the MonoKote to allow the "bare metal" finish to show through.

In the last installment we told you how to use a simple dressmaker's tool to simulate rivets on your Chrome MonoKote™ covered model. If you're duplicating a natural metal aircraft, a little burnishing for different texture and you're all finished. However, this approach also works very well when the same Chrome MonoKote is used as a base for a painted finish. The MonoKote provides a lightweight, durable surface with the distinct advantage of being able to create "weathering" in a most convincing manner.

In order to gain a better understanding of the weathering process, we must first remove ourselves from the model world and think full scale. Airplanes, especially those in combat, are subjected to some pretty harsh environmental conditions. During WWII, fighters on both sides were exposed to swirling sand, blinding rain, pelting hail, and lots of other decidedly uncomfortable conditions. On top of this, a war was going on which meant the exteriors of the machines were not usually kept in pristine, museum quality conditions. Thinking along these lines, try to visualize the effect of wind-blown sand on the painted surface, especially leading edges. How about the result of removing access panels repeatedly? Repairing projectile holes? All of these can be duplicated on your model. Visualization is the key element.

The first step in the process (after MonoKoting) is to completely paint the model including the application of all markings. I use the Chevron "Perfect" camouflage flats for a number of reasons: first they are accurate in color; and secondly, they are easy to weather due to their "softer," less brittle make-up. Having completed the paint application, allow 24 hours to dry and get ready to "age" the model. The tools required are rather simple . . . a number 11 X-Acto blade and some "000" steel wool. Start the process by using the X-Acto to remove paint along various panel edges. The important thing here is not to be uniform or symmetrical, i.e., the left wing should not be exactly like the right wing!



Think full scale when weathering. Work on the areas that were most exposed; e.g., leading edges, access panels, steps, etc. Whatever you do, don't make one side look the same as the other!

Depending on the degree of weathering you desire, use the steel wool to remove some of the paint randomly from various areas of the model. The leading edges always take the most abuse! When you get the effect you want, use a gray "wash" (80% thinner, 20% pigment) to add gun blasts, exhaust staining, and streaking. When you're satisfied, shoot a coat or two of clear epoxy (flat or gloss depending on the desired finish) or polyurethane to seal everything and impart an overall, even finish.

Before embarking on this task, take a picture of your airplane, then take another when you're finished. Marvel at the difference . . . your modeling buddies will!

Til next time. . .

R/C giant scale

By Frank Costello

Ever get a glitch with your jumbo bird for no apparent reason? You're flying along smooth as can be and suddenly you see it "hiccup" and the plane does a little dance in the air for a second. After checking the radio thoroughly, and finding nothing wrong, most of us would just attribute it to "gremlins"; those all-pervasive little devils seem to get in everywhere and cause mysterious problems.

Well, the problem is not limited to flying. In the April issue, if you remember, we discussed spark plugs and the difference between hot and cold plugs. It seems that our old friend (?) "Sir Gremlin" decided to switch the labels on the plugs and the hot plug is labeled cold while the cold plug is labelled hot. I hope it didn't confuse you too much. Just switch them back and you're all set.

While you're there re-reading that column, check out the part about the projected core plug. I received a letter from Dick Roush of Roush Mfg. (Kioritz & Cobra Engines) about these plugs. Dick has some fine info that I thought would be beneficial to everyone and so I've repeated his comments below.

"As of February of last year, there has been a Champion RCJ-8Y plug available. The 7 and 8Y plugs are of the new tungsten coated copper electrode type. This type of construction will bridge a couple of heat ranges other than the one it is listed at. Champion uses the copper core in the electrode because it will cool faster than the usual type".

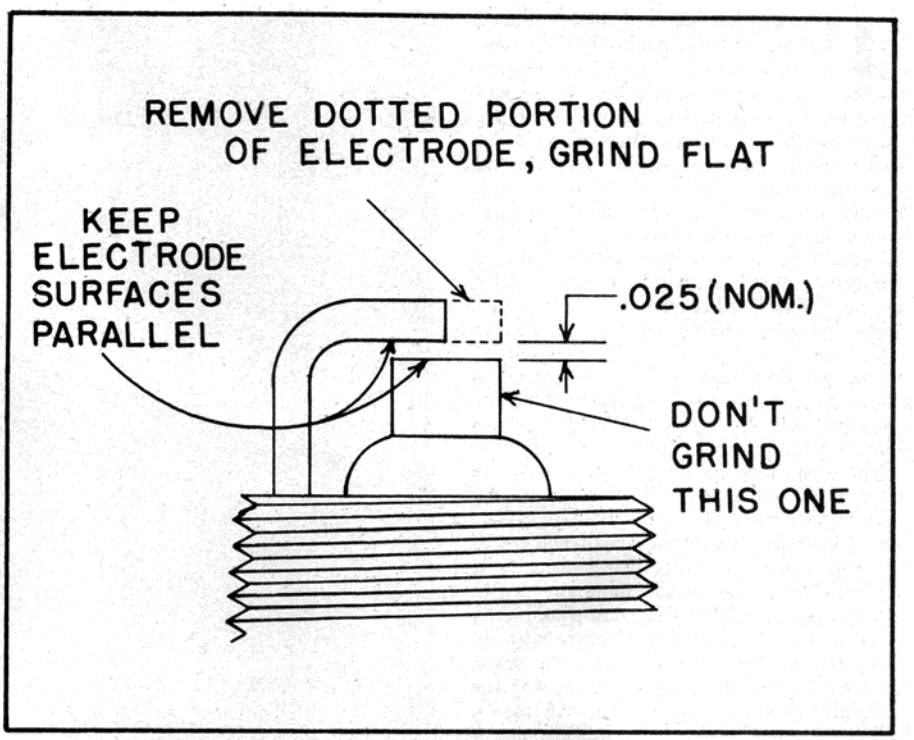
"The 8 heat range is the best to use in all of our engines because of the many types of oil being used at assorted ratios to gasoline. Most manufacturers of high quality engines such as Kioritz, Kawasaki, Zenoah, and Sachs-Dolmar recommend a plug with a heat range of 7 or 8."

What Dick is saying here is that the new style Champion spark plugs with the copper core electrode have a special coating of tungsten on them to get a hotter spark without destroying themselves by pitting and corroding. Because of this coating you shouldn't grind, file or otherwise mar the center electrode. If you aren't sure whether your plug has a copper core or not, just leave it alone. If you haven't filed it, it will be fine. If you have, the plug will just foul that much quicker.

Your best bet, in modifying the plug, is to touch only the side ground electrode and here Dick has a super idea. If you check the sketch you'll see what I mean.

Dick suggests cutting the ground electrode off so that only half of it protrudes across the top of the core. This will give a broader spark because it allows the spark to fire across the end of the electrode. Also the spark is not shielded from the fuel-air mix as much allowing it to fire more efficiently. An added boon is that carbon deposits are less likely to form in such an exposed position.

Dick also cautions that the projected core plug will not work in all engines. Some, like the Quadra, have the plug recessed in a cavity in the combustion chamber. Here the plug will work fine by extending the spark out into the cavity so it is better exposed to the fuel-air mix in the cylinder. On some engines, though, the plug fits directly in the center of the combustion chamber. The 2.3 cubic inch Cobra that Roush Mfg. makes is a good example. Because of the clearance between the piston and the top of the combustion chamber, a projected core plug will be hit by the top of the piston. I don't have to tell you what this does to your ground electrode. It goes flat! Don't worry about the engine though. It won't run in this condition anyway.



If you aren't sure what type of engine you have, put one of the projected core plugs in it and turn it over *slowly*. If it hits the plug you'll feel it because you won't be able to turn the engine over any farther. If it doesn't hit the plug, use it! You'll probably see an improvement in the performance of your engine.

By the way, Dick has these special copper cored tungsten coated plugs available. They're Champion RCJ-8Y and Dick sells them for $2.50. Write to Dick Roush at Roush Mfg., Rear 3405 Cleve Ave., S.W., Canton, Ohio 44707.

Also available from Roush is a new type of oil for our jumbo turkeys. Specially formulated for air-cooled two cycle engines in extended use, this oil is in the most convenient package for our use that I have ever seen. Called "One-Mix" two cycle oil it comes in a sealed, pre-printed, plastic container with a pour spout molded in. Just snip off the end of the spout with a pair of scissors and squeeze the entire contents into a gallon of gasoline and shake the can. The stuff is pre-measured to come out to a 40:1 mix.

Try it this way: stop at the local service station on your way to the field with an empty one gallon can. Pour the contents of the package in the can and have the service station attendant pump in exactly one gallon of gasoline. You haven't measured anything and you haven't touched any oil or gas!

After flying, if you have any left, put it in your car fuel tank and go home with an empty can. Not only is that safer but it will force you to get a fresh gallon of gas the next time you go flying which isn't a bad idea either. Stale gasoline has caused many a crash by making our engines run poorly.

Another fine point about the "One-Mix Oil" is its guarantee. Ever heard of a guarantee on oil before? The manufacturer is so confident that this is the best oil for your engine that if you use only this oil and no other in your engine from the time it's brand new, *they will guarantee your engine!* If it ever siezes or is otherwise damaged or destroyed by lack of lubrication they will give you a new engine. Incredible! Any manufacturer with a claim like this must be very sure of his product. I intend to use this oil all summer and I will share with you, come fall, my findings on it. If anyone out there is using it also, please let me know and we will publish your comments and findings as well. One-Mix Two Cycle Oil is available from Roush Mfg. at the above address for seventy-nine cents per package.

R/C pattern

By Dean Pappas

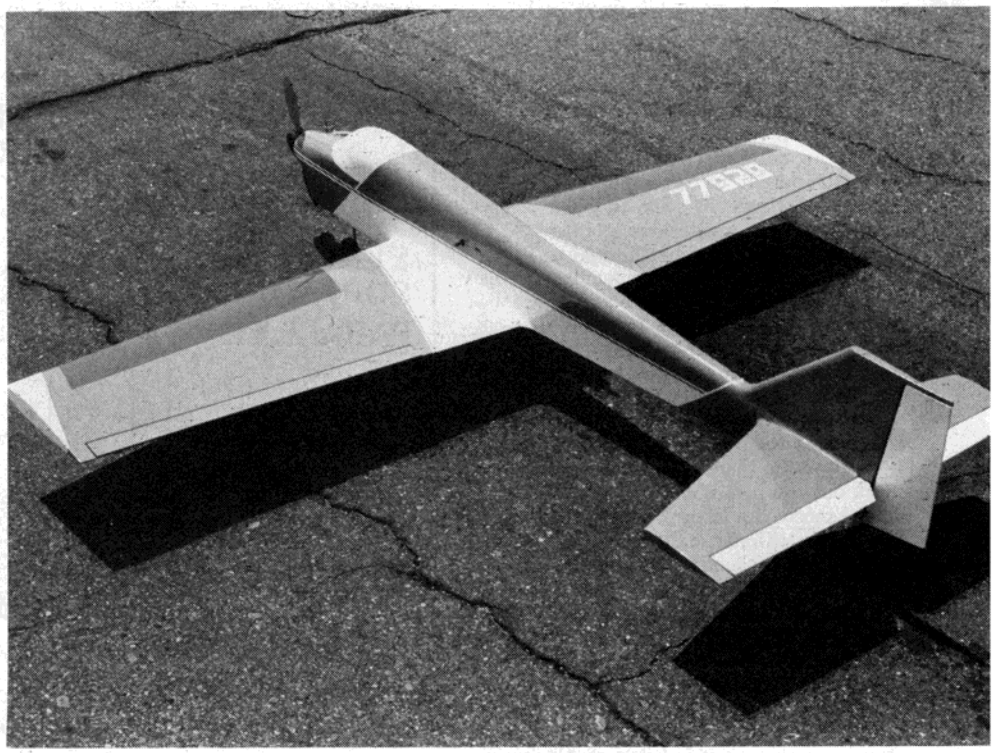
The weather has been such, up here, that I've been able to fly these past two weekends; mostly for the purpose of trimming and for experimenting with propellers. The taildragger *Turnarare* I spoke of a few months ago is getting fixed gear. Somewhere between four and five ounces worth of vertical performance should be gained. It seems that the aerodynamic cleanliness of retractable landing gear becomes unimportant when flight speeds are reduced to about seventy-five or eighty miles per hour. This has been accomplished with a Weller 3-blade 10-8 that has been trimmed to leave the blades on the long side ($10^1/_2$" diameter). These props come untrimmed to allow the user to use the biggest diameter that will still meet the 105dB, one meter limit. Remember the noise?

The friendly people at D.W. Airscrew have once again indulged my experimenting nature by cutting some *wide* bladed 12-9's for me. Within the next week or so I will try to develop a combination similar to that used by Yoshioka at the World Championships in Pensacola last Fall; he was using a laminated wood 12-9 of his own manufacture with an O.S. VR and Hattori tuned pipe. The most striking feature of his presentation was the virtually constant speed of his *Citation* (about 70 miles per hour). His was also one of the quietest planes of the meet. This baseball bat of a prop will go on the front of my Y.S., with a Rossi quiet pipe (not the one with the square back) set at about fifteen inches from the high point to the glow plug will go on the back end. I had previously used this pipe and length on the O.S. with an 11-10. The result was a reduced top speed (running well above the pipe peak) in level flight, and instant torque when the nose was pulled up. It could well be that the speed variation was greater than the illusion, but people would comment that the speed and the sound seemed constant!

The second *Turnarare* is on the board, and as soon as it is done, a rather interesting project will begin. On paper it bears a striking resemblance to a Control Line Stunt ship with a thyroid problem. This behemoth is the result of—dare I call it—"cultural exchange," between Stunt Columnist Windy Urtnowski (you know him, he's just two pages over) and myself. Bossman Bob Hunt acted as interpreter. The result should have 860 square inches, weigh between eight and eight and one-half pounds, and be powered by a 120 four stroke. I pose a challenge to all the "engine men" out there: how to build a supercharger for these four strokes, and how to build quiet extractor-type exhaust systems. Jan van Beek, at the World Championships, used a 10 inch long straight pipe of about $^3/_4$ inch diameter on his Saito 120. He reported a definite RPM gain.

More trimming

By now, that new airplane should be "dialed in" and really groovin'. Not so you say? Commonly enough you'll see someone with an airplane that seems to fly well, except for some minor traits. Say the airplane is difficult to stall turn, or is difficult to do smooth axial rolls with. Maybe it just doesn't seem to track, or "flits about", or possibly pinches at the top of loops (or even worse, seems to want to fly out of the top of them). What could all these problems have in common? The balance point, that's what. Oh yes, I forgot to mention slight pitching problems in Knife Edges and in verticals (both up and down). Let's get to the causes and their symptoms first.



PHOTOGRAPHY: BOB HUNT

The ***Technician***, an AMA or FAI pattern aircraft designed by Carl Lovins, debuted at the 1983 Nats. Used an ST 61X and Silver Seven while flying in the Expert class. It's now a kit by L&L Model Products.

Balance too far forward

1. Too much down to fly inverted, and difficulty in consecutive rolls (especially when done quickly).
2. Loops tend to pinch at the top, or require excessive elevator at the bottom.
3. Pitching tendencies to the top in both Knife Edges, *and* in *both* vertical up and down lines.
4. Full rudder required for Knife Edges (any of today's designs should be able to maintain the altitude with less than 20° of rudder).
5. Plane does not spin or snap. Check elevator throw first.

Balance too far aft

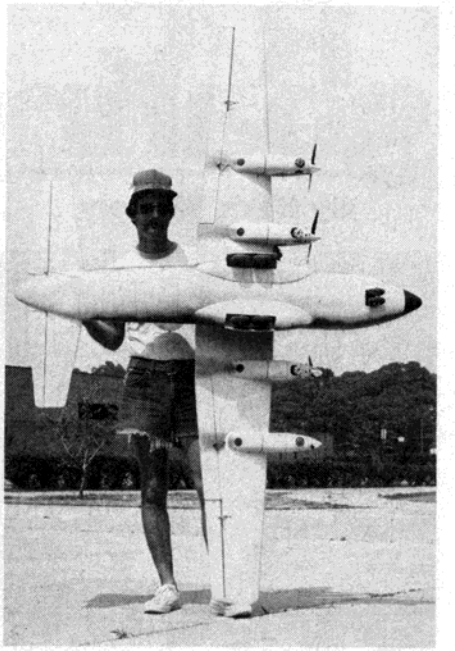
1. Stall Turn becomes difficult. This is usually the first sign.
2. Airplane climbs when inverted without elevator input (severe) or loops tend to "grow".
3. The airplane "dutch rolls" or does a *Kwik-Fli* dance. The onset of this problem is sometimes only noticed in the wind.
4. Airplane overspins (sometimes fatal). If none of the other symptoms are noted, try more aileron/less rudder first.

Having listed all that, all that remains for me to do is to list the procedure I use for adjusting the C.G. Since I like to do snap rolls and spins, I try for the most rearward position that does not cause the problems I listed. The starting point should be the design recommendation. If any of the first set of problems appears, just add nose weight, I realize that this sounds overly-simplified, but that's how it's done.

It is a little distressing to find oneself in front of a typewriter with a blank piece of paper, and a blank mind. Honestly, now, a little feedback from those of you out in the "Land of Pattern" would be helpful. Short of telling me what would be helpful to you, I will end up exhausting everything I know about Pattern and will end up having to talk about quarter scale, or something. Aaahhrrg! No slight intended, as I think quarter scale is fun. My first inclination, as a Pattern flier, is of course to prove that Nosen Champs can indeed do accurate 8-point rolls.

R/C sport

By Dick Sarpolus



PHOTOGRAPHY: DICK SARPOLUS

Lance Schneider's eight foot, four engined C-130 *Hercules* was an easy winner of one of the Project of the Month awards that Dick's club, the Monmouth Model Airplane Club sponsors. This month's column mentions some of the activities that can liven up club meetings and promote the interchange of all kinds of modelling ideas. By the way, Lance won a gallon of fuel for the C-130. He'll definitely need it.

Project-of-the-month

For more than fifteen years, our local R/C club has included the Project-Of-The-Month as an important part of our monthly club meetings. The prize, awarded to the winner of the most votes received from the members after all the projects have been seen, is a gallon of fuel. Our club has given out more than two hundred gallons over the years, and we still feel it's a worthwhile club activity.

Why? There are many reasons. One is simply fun; this is the adult version of Show-And-Tell, started early in our school experience. People enjoy show-and-tell, and why not? I think a big part of our enjoyment of this hobby is the social activity; the bull sessions at the flying field, modelers' workshops, local hobby shops, and the monthly club meeting. It's a chance to show your friends what you have been building and tell them about it. Some of our project presentations are a series of mini product reviews, with no pulled punches.

Comments are heard, such as: this kit was terrible; nothing fit where it was supposed to; the plans were no good; the directions were poor; the covering wouldn't stick; the paint wrinkled and peeled off; and so on. Conversely, some modelers report that every piece of wood in a kit was perfect, the pieces almost went together by themselves, it balanced where it should, and flew great. Over the years, we see that for some people, all their projects were a battle to complete, while for others they were all a pleasure.

The main reason for encouraging club members to bring their projects to the meetings, I feel, is for learning. Many clubs always have a large number of beginners in the hobby, and there's a lot to be learned by a close inspection of other models. The builder is usually subjected to many questions about the construction of the aircraft, the products he used, the radio installation, and of course the final question — how does it fly?

We encourage the showing of partially constructed models; more can be learned by seeing what's under the covering and the paint. Unfinished projects seem to receive the most questions, and some complex models are brought in a number of times until they are completed. Scratch built projects, whether from magazine plans or an original design, also get a lot of interest. Projects can include electronic gadgets, field boxes, sailplane winches, and all kinds of things associated with the hobby.

Some clubs hold an annual Project Night; one group calls their annual program the Spring Fashion Show. The intent is the same — to show-and-tell about your new projects with your fellow Club members, award some prizes, have fun, and learn. A similar activity but aimed at interfacing with the general public rather than other enthusiasts is to set up a model display in a public location.

Our Club does this in a nearby large enclosed shopping mall, usually in May each year. The mall's management encourages activities like this, provides all the display tables, spectator barricades, and advertises the activity on their large outside signboards. We set up the exhibit early on a Saturday morning and close it down Saturday night. This past year, our R/C aircraft display was held on the same day that the local EAA Chapter set up their display. With our variety of R/C models to view and the EAA's display of a number of homebuilt aircraft — both completed and under construction — plus several ultralights, the mall shoppers were exposed to a lot of aviation hobby activity that day. We don't know how many new R/C enthusiasts we get started this way, but the public exposure is certainly worthwhile.

Club auction

A traditional club activity is our spring auction; this adds a bit to the club treasury as well as being a fun event. Our rules are probably typical: the club gets 10% of the amount each item is sold for, from the seller. The seller has the right to make one bid on his own item being auctioned, so he can keep it from being sold below the minimum amount he wants. One procedure we have found necessary to keep things moving along is to not get bogged down with small items; there is a minimum value, so miscellaneous items are auctioned off as a lot, not individually.

Most modelers like auctions; it's a time to sell that good stuff you don't need so you can buy some more good stuff. We see modelers coming to an auction with three or four kits to sell because they're never going to get around to building them. They sell the kits — and leave with three or four different kits.

Annual banquet

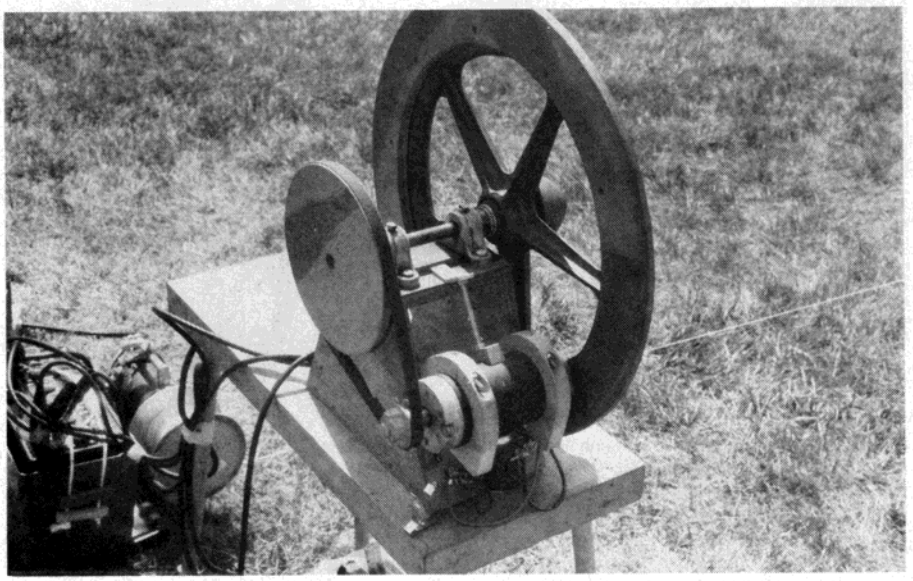
Another tradition for many clubs is an annual banquet, a social event for the wives and members to enjoy. Our club, for many years, has held small contests throughout the flying season, kept a record of the points accumulated by the members, and awarded trophies to the yearly winners at our banquet. We generally arrange for a cocktail hour, a good dinner, a band for dancing music, the trophy presentations, door prizes (both modeling and non-modeling type), and occasionally some special awards. The club treasury subsidizes the event as much as possible and we usually have good attendance.

Reviewing these annual events, another popular one is our Summer Club Picnic, stressing whole family participation. The menu has been improving every year; at our last picnic we had hot dogs, hamburgers, chicken, corn on the cob, a table full of various salads, beer, and soda — forget the diet that day. We're fortunate to have members who will organize an affair like this. Included are games for the kids, with prizes. Last year we had enough 1/2A control line models on hand to let the kids get some C/L flying instruction.

There may be those who feel this attention to social activity isn't necessary for a successful R/C club. After all, the primary purpose of a club, most would agree, is to obtain and keep a flying field for the members' use. The activities of a club will be set up in accordance with the majority's wishes. I'm happy that our Club is an active one, with a full calendar of events. Project of the month, coffee and donuts at the meetings, an annual auction, a mall show, the club picnic, the club banquet, an AMA helicopter contest, an AMA sailplane, and fun fly events — all are scheduled for 1984. In past seasons we've held Club pylon races and AMA contests for pattern, scale, old timer, pylon racing, helicopter, and sailplane events. All of this plus special exhibitions and demonstrations for Scout groups, schools, parks, etc. Can't forget to mention the continuing instruction to help the newcomers to the hobby develop their abilities. It takes interested and dedicated members to keep these activities going. I'm proud of the Monmouth Model Airplane Club — and I'm sure there are hundreds of other clubs with an equally busy calendar.

R/C Soaring

By Herk Stokely



PHOTOGRAPHY: HERK STOKELY

One of the four line retrievers designed and built by Don Clark which were used for a recent Capitol Area Soaring Association (CASA) annual contest. The equipment helped 80 fliers complete their rounds by 3 PM.

The silent majority

I saw that title inscribed on a T-shirt at a contest last fall. There was also a silhouette of a sailplane printed beneath it. When I asked what it meant, the owner told me that it was from the 1983 AMA Nats. He said there were more individual entries in sailplane events than any other class of competition at the Nats. Now I'm not saying that there are more modelers in soaring than any other type of modeling, but there are a lot of us; even if we are usually rather quiet.

Capital Area Soaring Association

This group which used to be part of the large composite DCRC group is now a separate organization for R/C Soaring only. CASA, as they call themselves, is a fine and friendly group that includes some of the best known names in R/C Soaring in the east. These folks run an annual contest in the metropolitan Washington, DC area that I consider a "gathering of the clan" in the east. Last year, that contest was held at one of the most beautiful soaring sites that I've ever visited. CASA somehow obtained permission to use the campus-like ground of the National Geographic Society in Rockville, Maryland. With four retriever-equipped winches, they completed the flying of almost 80 contestants before 3 PM each day, and capped off the first day with a neat picnic-social under a huge oak tree on the grounds. These folks are very friendly and agreeable in a traditional southern way, and still they put on a high level competition that draws some of the best. This year, they're going to do it there again; probably during September. Look at the AMA contest listing for dates and who to contact, but don't miss it. See you there.

New frequencies

By now many of the pilots I see have at least one radio on the new frequencies. They work well, and the mutual interference problems we feared have not occurred. Many times during the last summer I saw 10 or 12 sailplanes in the same part of the sky, soaring smoothly and beautifully under the complete control of their owners. Have you thought to appreciate the tremendous effort that our AMA put into getting them for us? We Americans often elect our leaders and then blame them for all of our problems. It's usually a cop-out on our own responsibilities, but we do it. In some areas it's stylish to "put-down" AMA as a sort of incompetent "big-brother" that can be blamed for whatever modeling problems seem important at the time. Let's take time to realize what a monumental effort it took to get this wonderful breakthrough in allotted frequencies for us. Let's think about what it means to us to have them and about even more on the way in a few years. Consider the time spent by individual modelers working constructively with AMA and the FCC to put this all in place. For most of us, there was no effort involved; we just walk down to the hobby shop, plunk down our money, and get all the benefits. Maybe we should buy a postcard, and write a note, and tell someone there that we're glad they did it.

Soaring is social

When I wrote about CASA a few minutes ago, I talked about the people as much as the competition. I've been in modeling since 1945, and have participated as a competitor in most of its different phases during that time. More than any other type of modeling, my experience with soaring (since 1971) has been that its competition is very much a social experience. If you're getting into soaring, but think you wouldn't enjoy competition, I suggest that you try it. A few people can't enjoy themselves if they aren't winning, but the numbers of that type in soaring must be pretty small. I see darn few of them, but I have sure enjoyed the company of most and have made a lot of fine friends as I've taken part in this sport.

An alternative to F3B

The FAI/F3B events that are used for World Championship Soaring events require very expensive and specialized aircraft, take a large number of officials, and a lot of equipment to run, and are almost impossible to compete in unless you have a highly trained and somewhat athletic team to help you. I wonder why it's not too popular in the USA?

I want to propose an American alternative to F3B. If we were to develop one, maybe the world wouldn't follow us, but maybe it would. Some of the folks I correspond with in other countries have mixed feelings about F3B (as I do) and some just don't like it at all. I really do like and enjoy our American-style thermal-soaring, where I can go and compete as an individual, where the launching equipment is supplied, and where—if I happen to be feeling my age—I can still fly all of the tasks. I also think that our events could be improved a bit. A few months back, I wrote about the British "Open Class" rules for man-on-man thermal competition. I think that a National Soaring Championship event based partially on their system would draw in a high level of participation from US fliers, and would provide a type of competition that would be available to everyone, and would truly let the best rise to the top.

First, I'm convinced that man-on-man is the only really fair way of scoring. If I fly only against the people who flew in the same time slot, the luck factor of the old "good-air/bad-air" business just goes away. Five or six man flight groups would require that many winches, but that's not too much for a National class event. Set a ten-minute window in which each group flies. No launches start until the time starts, and ten minutes later all scoring for that group stops. If the landing takes place before the end of the ten minute period, the landing bonus points count. I'd suggest about 25 points for landing in the 25 foot circle (non-graduated). Change flight groups in every round to eliminate the other luck factor and fly the top scorers in a fly-off round at the end of the competition. We have plenty of good winches now, and on-the-field frequency changing is becoming more common. I don't think we're far from being able to use this kind of competition system here, and I'm for it. I'd also like to see us develop a National Championship ladder program that brings together the best in the US. I'm not sure that classes are relevant at the top, and I haven't given much thought to the elimination programs. What do you think?

F/F sport

By Larry Kruse

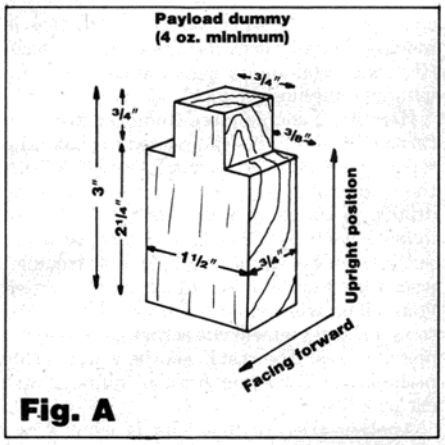


Fig. A

Speaking unofficially

Terry Rimert, unofficial curmudgeon of the Everglades and stalwart force behind NFFS unofficial events at the Nats for the past several years, has sent official word of the 1984 NFFS Unofficial events to be held in Reno this year. The schedule looks like this:

Mon., Aug. 6	Indoor autogyro, ornithopter, and helicopter-sponsored and run by NFFS.
Tues., Aug. 7	Embryo Endurance-sponsored and run by Bill Baker. Unlimited Rubber Biplane-sponsored by Mike Bailey, run by George Perryman. Cargo-sponsored and run by Minneapolis Model Aero Club. 1/2A Payload-sponsored by NFFS, run by ????
Wed., Aug. 8	Rubber Speed-sponsored and run by Illinois Model Aero Club. 7-11 Rubber Distance-sponsored and run by McDonnell Douglas Club. Rubber helicopter, autogyro, ornithopter-sponsored and run by NFFS.
Thurs., Aug. 9	Dick Korda Open Rubber-sponsored and run by McDonnell Douglas Club. Team Hand Launch Glider-sponsored by Bob Boyer-run by NFFS. Sig Mini-Maxer event-sponsored and run by George Perryman. NFFS Symposium and Free Flight Hall of Fame Awards.
Fri., Aug. 10	Old Time Free Flight-sponsored and run by John Pond. (not a FFS event) Old Timers Banquet-sponsored by participants, organized by John Pond.
Sat., Aug. 11	Team Mulvihill-sponsored by George Perryman.

Additional events will include FF Nostalgia with schedule and event director to be announced later.

For those of you not familiar with the NFFS events, suffice it to say that they are all geared to maximizing the fun of freeflight and minimizing the cost and effort. At that, there are specific rules for each event (or non-event, if you will).

NFFS unofficial rules

Cargo, Helicopter, Autogyro, Ornithopter, and Rubber Speed will be flown according to AMA Rules.

Dick Korda Open Rubber

Rubber powered model with no restrictions to size. One flight with no time limit. Longest flight determines winner. Timers use binoculars at launch site. Launch window will be 10 minutes beginning at 6:30 AM.

Unlimited Rubber Powered Biplane

1. No restriction on size, weight, propeller, or design except smaller wing must be 50 percent or more of the area of the larger wing.
2. Model must R.O.G. unassisted.
3. Flight duration—three minutes maximum. May be reduced due to weather or field restrictions.
4. Six attempts to make three official flights. An official flight is 40 seconds.
5. In event of two or more contestants making three maximum flights, fly-off flights will increase in increments of 30 seconds each.

Embryo Endurance

1. Not over 50 square inches for monoplanes or 70 square inches for biplanes. 45 square inches max for largest wing area. Stab area not to exceed 50 percent of wing area.
2. Fuselage volume must enclose a space 1 1/4 × 1 1/2 × 3 inches or larger.
3. Wing and tail to be built up, covered on both sides with tissue paper or equivalent.
4. No folding props. All models rubber powered only.
5. Model must R.O.G. from card table top *unassisted* from a three point rest.
6. Landing gear legs must have 3/4 inch diameter wheels or larger.
7. Four attempts for three official rise above table top level flights.
8. Highest flight total plus bonus wins. Fly-off to break ties.
9. A bonus for the following details will be given; five seconds for raised cabin or windscreen with open hole and headrest. Three seconds for three dimensional wheel pants. One second for three dimensional exhaust pipes.

7-11 Rubber Distance

1. Single rubber motor-free length 11 inches or less.
2. Single propeller-two fixed blades, seven inches or less.
3. Propeller driven directly by the rubber motor (no gears).
4. No limit on models or flight attempts. Launch is optional.
5. Flights during which model points back to "Take-off Point" will not be scored.
6. Flights are scored on the straight line distance from landing point closest to launch point.

Sig Mini-Maxer

1. Model must be built from Sig Mini-Maxer kit. Wood may be substituted for kit wood, but must be same thickness.
2. Models will fly according to Category III rubber rules.

1/2A Payload

1. No wingspan; or wing area limits shall be imposed.
2. The permissible engine size shall be greater than .025 cubic inch displacement, but no larger than .050 cubic inch displacement.
3. The dummy pilot shall be of the minimum dimensions per the accompanying sketch and have a minimum weight of 4 ounces. (Fig. A)
4. Dummy pilot visibility—There must be at least .5625 square inch of visibility through transparent areas in front and both sides for the head of the dummy pilot. (3/4 inch square windows)
5. The total minimum weight of the model and dummy ready to fly shall be nine ounces.
6. Fifteen second engine run for Category I and II, and ten seconds for category three. Other flight rules the same as AMA Payload.

For further details, you may contact Terry at 367 Orange Avenue, Baldwin, FL 32234. A thought just came to me—Hey, Terry, why don't you set up a series of NFFS Unofficial event postal meets throughout the year? It would keep all of us in the hinterlands active throughout the year and our fleet prepared for the Unofficial NFFS Nats events each summer.

Personally, I have just acquired one of Micro-X's new *Hornet* embryo kits which I intend to fly at Reno. It is, by way of a mini-review, a nifty little gem with excellent wood and well-illustrated plans. Jerry Skrjanc, Micro-X's honcho, tells me he lost the prototype OOS at two minutes plus. It looks like a winner for sure.

If you, too, are headed toward Reno this summer, why not commit now to entering one or two of these NFFS fun events? Plans and kits are readily available for almost any of them. Better get started now. Tempus is a'fugiting.

C/A Combat

By Phil Cartier

Do you train for flying combat? Or do you just fly for fun? I like flying models, but flying is still a hobby, not a job. A hobby or a sport implies something done for relaxation, recreation, or enjoyment. Let's do it, not over do it. What brought on this little tirade was a letter in the MACA newsletter from a friend of mine, Jeff Johnson, about eye exercises. Off the wall? Maybe not. This might be going overboard for the average flyer, but these exercises should help anyone with not-so-hot peripheral vision. Can't see very well out of the corner of your eye? Read on. Better side vision will make combat flying more fun and driving the car to the flying field safer.

First exercise: put several marbles of two different colors in a small box. Looking down into the box, gently roll the marbles around and try to follow one or two with your eyes. Don't move your head!

Second exercise: tie a string to either side of a door or window three or four feet wide. Stand back about ten feet and hold the strings up to your eyes. Try and sight down each string with one eye. To do this, your eyes have to turn slightly away from each other, opening up your peripheral vision. Gradually move towards the window, keeping the strings tight. The closer you get, the more your eyes have to turn out.

Jeff found these exercises in a hockey magazine. A doctor was recommending them especially for goalies. I want to thank Jeff for passing them on. It's the kind of thing most of us just wouldn't come across otherwise. Jeff also had a few more exercises in his letter. To get the MACA (Miniature Aircraft Combat Assoc.) newsletter, send $9 to Joe McKinzie, Treasurer, 6259 Shirley Dr., Smithfield, TX 76180.

Just being in reasonably good physical shape can help too. Flying all day in the hot sun requires some physical stamina. A little jogging, swimming, tennis, racquetball can make those days less taxing and more fun. Five minute miles or marathon runs aren't required though. Just a little something to keep in shape.

Of course, the best training for combat flying is flying combat. Notice I said fly combat, not combat matches. Fly practice matches with other flyers. Especially if you're fairly new at this, practice some basic skills instead of just busting up airplanes helter skelter. Put a little method in the madness. Take turns locating the other fellow visually and flying your plane up behind his. A Basic skill, but a lot of flyers can't do a wingover and pull out behind the other guy consistently. Another thing to practice is moving around the circle. Try doing consecutive loops and figure eights with a partner without tangling the lines.

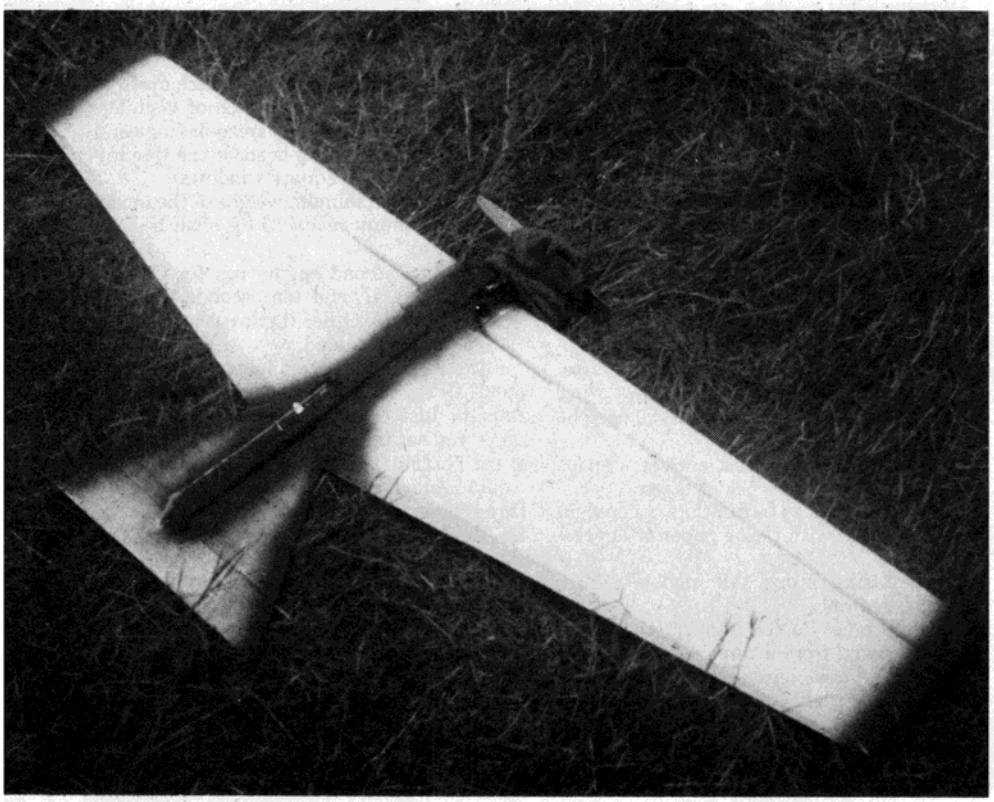
Here are a couple more things to do. Take turns following. The leader tries to shake the follower, and the follower tries to stick with the leader. The first one to lose it buys the drinks. A couple of tricks help in trying to follow somebody. First of all, don't turn too quickly. Unless you are right in his streamer, wait a fraction of a second before turning so your plane will follow his flight path. Turn too soon and you will cut across the circle his plane makes. The result can be a mid-air or perhaps you'll turn in front of him and get cut or killed.

Another trick in following is what I call "shading the corners". It's the opposite of what I just said. Turning just a hair early helps you gradually catch up. Be patient though. Unless you have a really tremendous airplane advantage you won't be able to catch up in one or two maneuvers. Try and pick up a foot or two in each turn. If you're stuck with the heavier, slower plane, shading the corners is the only way to keep up. If you're really stuck, you actually have to second guess your opponent and turn before he does. It takes a lot of luck but in many situations you may notice your opponent has a preferred maneuver so your guess may be right more often than not. In other cases you can kind of "herd" him into turning the way you want by threatening to make a pass or move even though you know you can't actually get close enough for a cut.

Practice flying can really help your overall performance by improving pit work. I'd say that even among the best pilots, good pit work wins about one third of the matches. So practice starting and pitting at home on the flying field too. Prepare the plane in the pits, just like at a contest. Check the plug. Check the prop. Make sure the bellcrank is bolted down and the hinges are solid. Look for cracks in the wood around the control horn and motor mounts. Warm the motor up for a few seconds before taking the plane out to the circle. Then line up a friend and have a fun match. If instead you practice sloppy techniques at home, they'll come back to haunt you at the contests.

Practice hot-starting too. At least once a flying session pit a plane just like you would at a contest. Put in half a tank of fuel.

As soon as it comes down, run over, refuel it, and try and start it. The results can be very interesting. Usually a motor, especially the usual lapped iron piston style, start differently hot. Some need choking with a thumb over the intake. Others like an exhaust prime. Some just need a couple of hard flips. Find out at home instead of on the road. Hot starting is also one of the first things to go as the piston and sleeve wear out. Combat motors lead a hard life, so it's important to keep tabs on each one and know how it's behaving.

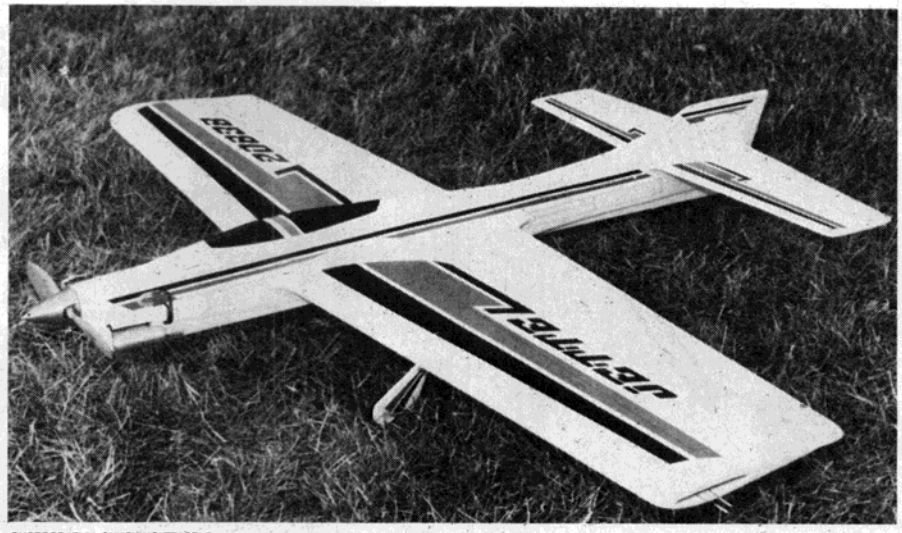


PHOTOGRAPHY: PHIL CARTIER

This combat planform is more often seen in England. The characteristic stab attached to the wing makes a one piece structure that's a little sturdier in a crash than the stabilator and boom of American combat planes. This one was the work of Bobby Mears, has a 48 inch span, and 470 square inch area.

C/L stunt

By Windy Urtnowski



PHOTOGRAPHY: CHUCK HOLTZAPPLE

The *Jette* is Chuck Holtzapple's pride and joy. An ST .46 pulls it around the circle while a *Genesis* wing keeps it airborne. All-up weight is 50 ounces with a nice Sig dope finish.

This column is aimed at the non-expert flyers. We are *all* non-experts. Not knowing something only holds us back when we're afraid to ask. I've received several letters asking basic stunt questions, but they seem to be asked hesitatingly.

So my first advice for you is to *ask, ask, ask,* . . . Don't be shy. *All* questions are legitimate. I have found very, very few fellow pilots unwilling to share what they know and often they will take you under their wing immediately (Windy will even give you a tour through the Sweeper.—Ed). Any one that has ever asked me for help has given me the personal satisfaction of helping. Our individual expertise as modelers is something we can all share. Besides, most people will find it flattering, if you ask.

My next advice would be to keep it simple. Build profiles or Gieseke *Noblers* long after you think you're ready to get involved in more complex problems. By keeping it simple you'll learn faster and spend your time more efficiently. Many a talented pilot has gotten in over his head and lost interest when things came crashing down on his high-tech stunter. My advice is to build profiles until you know the pattern well enough that your ships last a full season. Build Fox .35 type ships until you can trim them quickly, and then—and only then—tackle a more complex design.

My advice for beginners is to use MonoKote™. Don't even bother with a paint finish while you're at the crash and burn stage. You'll never learn the pattern if you spend your whole life finishing. A general rule of thumb in my building is that finishing takes about half the time a completed full stunter takes. Build *two* MonoKote *Tutors* instead of one dope finished full body stunter. You'll learn twice as fast. Finishing should be saved for that time in your career when crashes are as rare as tax reductions.

I'll suggest also that you try to cultivate friendships in the hobby. Join a club. Write letters. Stamps and phone bills are *tools.* You can make them work for you. Getting better takes time; don't rule out any potential help you can get. Join PAMPA if you want to know what the other pilots around the world are up to. Their newsletter will inspire you with events taking place in "Stuntland." It's the best $7.00 investment you can make in this hobby. If you're not now a member, mail a check for $7.00 to my address which is at the end of this column, and I'll put you on our computerized mailing list. Another piece of stunt literature you might enjoy is *Prop-Wash,* the Garden State Circle Burners Newsletter. It's available from Arnold Knadle, 53 Pitcarin Dr., Roseland NJ 07068. Keeping abreast of the goings on in stunt is part of the addiction. *Prop-Wash* is only $4.00 per year. That's *less* than dinner at McDonalds (Hear that Les?—Ed.).

My advice is as soon as you can do a loop, enter contests. It's fun and you'll meet fellow stunt-junkies. It's hard to talk many new pilots into entering contests. *Do it.* You won't be sorry. Don't sit on the sidelines. We all started where you are now, doing loops, and hoping we wouldn't crash in front of the troops. You'll meet friends, check out the various stuntships around, get ideas—hey, you may even win a trophy.

As you progress you'll want to get involved in weighing everything, trick finishes, designing your own supersled,—but you have to start somewhere.

So if all this advice seems simple, it's because it is. Sometimes the easiest answers are the hardest to figure out. Maybe this column has helped you see a flaw in your game plan. Maybe you know more than I'll ever know, and should be helping me. *Fine,* either way we should be communicating and enjoying the exchange.

As a teenager who loved stunt I was always pestering Harold Price for answers. He gave me simple formulas for success that through the years I've made unnecessarily complex. Now I'm back to square one where Harold pointed me 20 years ago. Build it light and straight. It worked in '63 and it still works in '84. If I wasn't *so smart* as a teenager I'd have learned *sooner.* I outsmarted myself. Harold, I have a confession to make. When I was 18 and you were 38, I never respected you. Now that I'm 38, I realize how special you really are. You answered my dumb questions, and gave me a way of thinking that still works good today. *You're some kind of guy.*

This is about all I can say to help out the non-experts. Thanks to all the troops who've written with questions and sent in pictures.

Maybe you were expecting an article on how to glue A to B? That you can pretty well figure out yourself. It's the *overview* we all need help with. I hope this column has pointed you towards superstardom. I hope you'll make some new friends in the hobby, run up a gigantic phone bill, fill your lungs with balsa dust, join PAMPA, subscribe to *Prop-Wash,* and get used to asking, asking, asking. Then put that MonoKote flying ironing board in the back of your Rolls Royce, and go enter a contest.

The day may come when you'll say: "Hey, that was *simple.*" Then it will be your turn to answer the questions.

Random useful tips

Other random thoughts cross my mind every time I try to help beginners, coach juniors, or help people climb the stunt ladder. So, like it or not, here's the first one. Use good fuel. Old fuel will give inconsistent motor runs. Keep the cap on the fuel can tight. Fuel exposed to the atmosphere quickly looses its ability to produce horsepower. Make sure the brand you use has castor oil. I've had excellent results with fuel supplied by Carolina-Taffinder. This seems like an oversimplification, but good fuel will turn many a sluggish performer into a reasonable ship that you can learn from. Bad fuel will ready you for a nervous breakdown quicker than the downhill side of a reverse wingover.

Fuel tanks are another easily overlooked item. If your ships run faster when inverted, lower the tank with a 1/16 balsa shim. Shimming the tank correctly may take some time but it's worth the effort to make it perfect. By raising and lowering the tank with shims you'll arrive at a spot where lap times are equal upright and inverted. Get used to doing this, it's a big step towards improved performance.

Glow plugs can ruin your parade too. I use idle bar plugs. When all of a sudden the motor doesn't seem to snuff, change plugs. It's the easiest thing to replace. Just because it glows doesn't mean it's functioning one hundred percent.

Make a habit of flushing your fuel filter clean every so often. Use a filter on the line you fuel the tank with. Clean filters will avoid many an expensive, frustrating, and embarrassing afternoon. Check for pinholes regularly.

Always keep a spare battery in the toolbox. *Cheap insurance for sure.*

Wipe your lines down with alcohol periodically to avoid sticking. Balance all your props and get used to having an organized, well stocked toolbox.

I'm sure there are a million other common sense tips you can benefit from as a true non-expert. I've only listed the most obvious in an attempt to pass on the basic technology you'll need to get better.

Maybe 20 years from now, the people I've helped will respect me, as I now respect Old Harold. *Maybe.* . . . Windy Urtnowski, 9 Union Ave., Little Ferry, NJ 07643.

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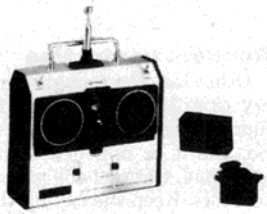

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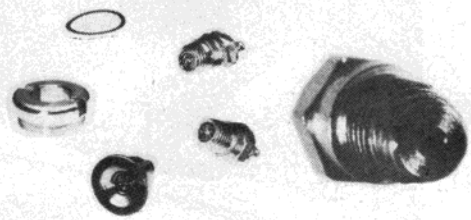

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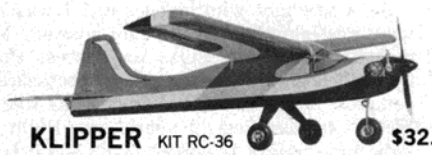

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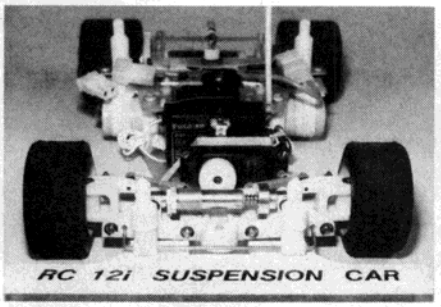
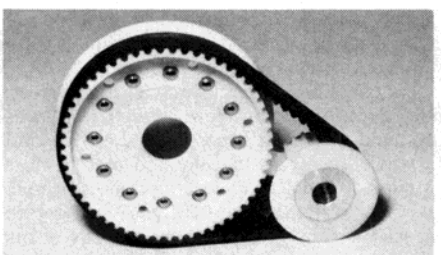
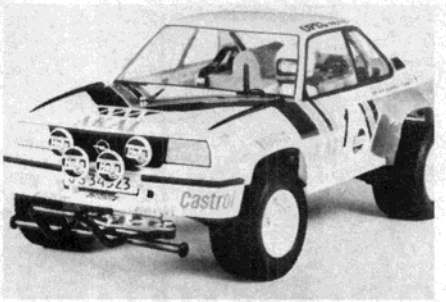


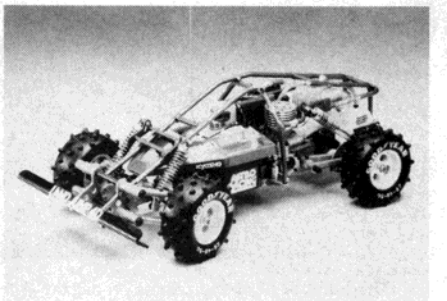
ASSOCIATED ELECTRICS, *1928 East Edinger, Santa, Ana, CA 92705,* has released a new independent front suspension, Part No. 4210, for the RC12i car. It features a fully adjustable coil-over shocks, caster, camber, toe-in, ride height,and anti-roll bar for $45.00. For more information, or to place an order, contact Associated Electric at their address above.



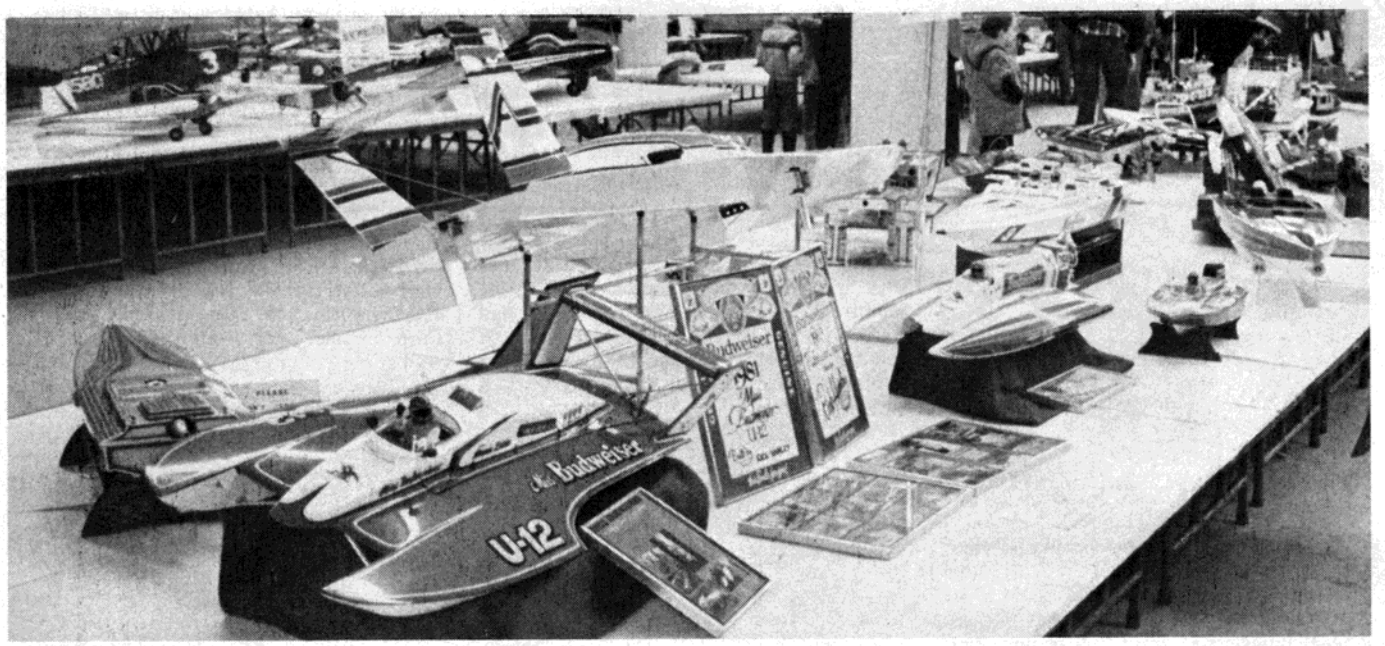
ASSOCIATED ELECTRICS, *1928 East Edinger, Santa Ana, CA 92705,* has introduced a new belt drive for for the RC500 car. This lightweight belt drive, Part No. 5350, features a super-light and super-strong belt with lightweight plastic sprockets. This assembly allows the car to accelerate faster and stop quicker. List price for the Associated belt drive is $24.00. For more information, or to place an order, contact Associated at their address above.



MODEL RECTIFIER CORPORATION, *PO Box 267, Edison, NJ 08817,* has announced the release of their Opel *Ascona 400* Rally R/C car to their 1/10 scale series of R/C cars. Listed as kit 5837, the *Ascona 400* has a chassis made of tough ABS plastic resin which includes a protective box for the radio. Specifications: length - 435 mm (17.1 inches); width - 230mm (9.0 inches); height - 160mm (6.2 inches); motor - Mabuchi RS-540S; and power source - 6 or 7 volt 1200 mAh battery. Semi-pneumatic rubber tires simulating the Michelin TRX treads are mounted on rugged rims, supported by massive ball bearings for toughness and fraction low. A front swing arm and rear trailing arm suspension give you great handling on the track or in the dirt. The Mabuchi motor is coupled to a forward/reverse three step speed control for long lasting positive throttle response. For any additional information, contact Model Rectifier Corp., at their address above.



TOWER HOBBIES, *PO Box 778, Champaign, IL 61820,* has introduced a new off-road car, the *Integra,* for .19-.21 gas engines. This new car retains the high speed and power of the previous *Land Jump* with added features that create better performance. Four wheel drive and independent suspension combine with four coil-over, oil filled shocks, roller or ball-bearings at every friction point in the drive train, and a front differential. A one way centrifugal clutch drives the front wheels and not only senses when they need power but which one needs more power. A streamlined body shell and bumper and lightweight knobby tires round out the *Integra.* Overall weight has been kept to 7 3/4 pounds. The only additional items required to complete the car are a two channel radio and an engine. For more information about the *Integra,* contact Tower Hobbies at their address above. GC



PHOTOGRAPHY: VIC MACALUSO

The number of sport boats on display in the static competition at the WRAM Show continues to grow. Some of the best models around are here.

R/C Power Boats at the 1984 WRAM Show

By Vic Macaluso

Becoming ever more popular, the boating crowd displayed greatly increased participation.

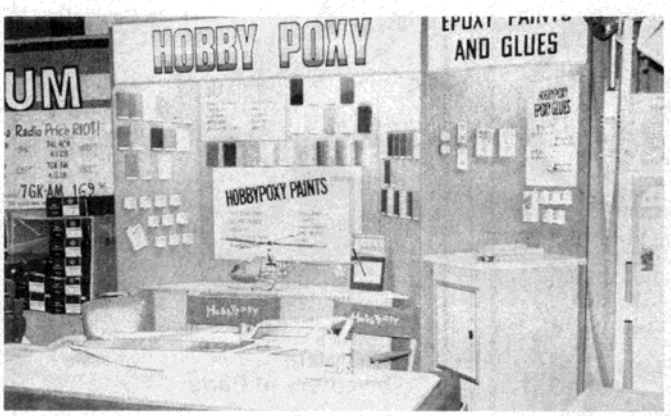
Once again all the crowds have come and gone, the display booths have been disassembled and we are all anxious to get back to our workshops to figure out how we can justify to our wives and savings just why we need a new. . . . ! My main impression after this particular show was there are so many new goodies, so little time, and money! Oh, well, I'm sure I'll manage! All kidding aside this seemed to be an especially busy year for the manufacturers because of all the new kits and accessories introduced.

Leading the pack with new kits is Dumas Products of Tucson, Arizona with a total of five new kits introduced this year. Of special interest to readers of this column are the two performance kits. A 3.5 mono hull in fiberglass should prove to be very competitive in that racing class, and the spectacular 1/8 scale *Atlas Van Lines* (1983) seemed to get the most attention at the Dumas booth. (The 60 Scarab was also quite popular.)

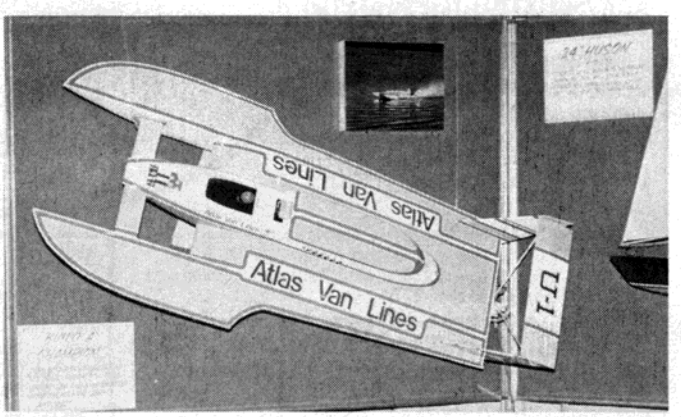
As usual Hobbypoxy Inc., 30 Pine Street, Box 378, Rockaway, New Jersey 07866, was on hand with their expertise and advice, and a whole spectrum of colors to match most MonoKote™ colors as well as their new military camouflage colors. If you ever get to speak to Ken Williams, who usually mans this booth, be prepared to have all your questions answered in a very complete way. This guy knows his stuff (No pun intended)!

Another manufacturer who is responding to the needs of the R/C boat racer is McDaniel R/C Products of Herndon, VA 22701, with their new long shank Bo-Starter. This new nickel-cadmium, glo-plug ignitor has a longer shank to reach down into those deep vee hulls and to give more finger clearance when using some of the shorter starting belts. This should eliminate some of the starter burn we sometimes get in tight situations.

As usual I try to save the best for last.

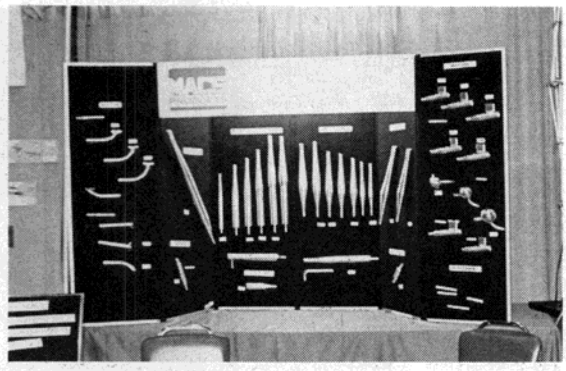


HOBBYPOXY, Rockaway, NJ 07866, always has one of the more popular boothes because of their fine finishes and the able direction of Ken Williams.

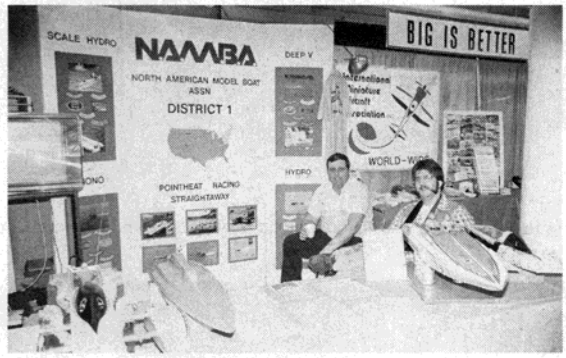


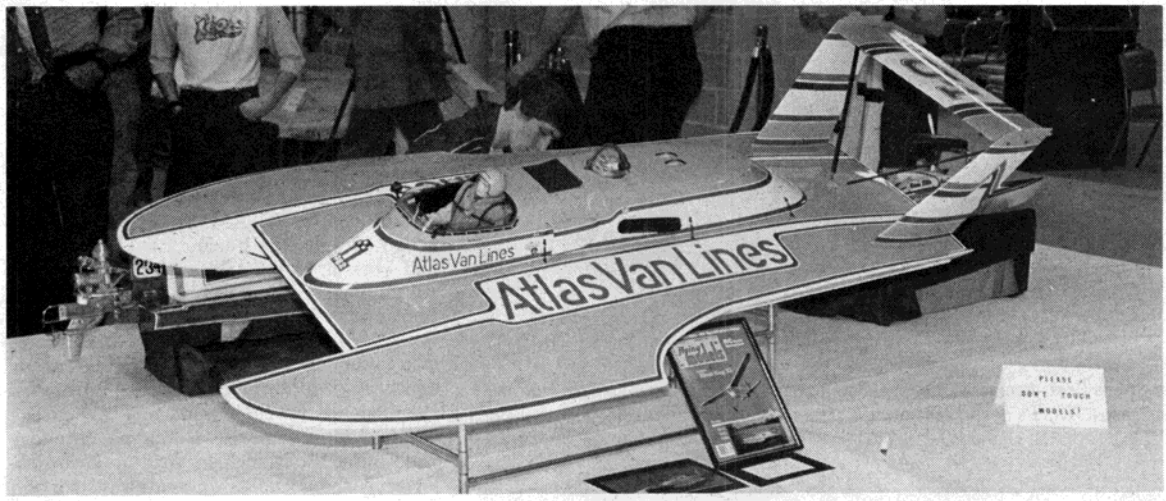
DUMAS PRODUCTS, Tucson, AZ 85719, drew a lot of the boating fraternity's attention with their new 1/8 scale *Atlas Van Lines.*

RADIO CONTROLLED MODELS (RAm), Chicago, IL 60630, has many handy boating accessories displayed by Ralph Warner (**above**). **M.A.C.K. PRODUCTS,** Rahway, NJ 07065, (**below**) has some quality drive train accessories.



MACS PRODUCTS, Sacramento, CA 95826, displayed their extensive line of tuned pipes and engine adapters. NAMBA International (**below**) was represented for the first time at the show. Doug Twaits, an FM contributor, manned the booth.





This impressive 1/5 scale *Atlas Van Lines* by none other than Vic Macaluso won first in the Hydro category.

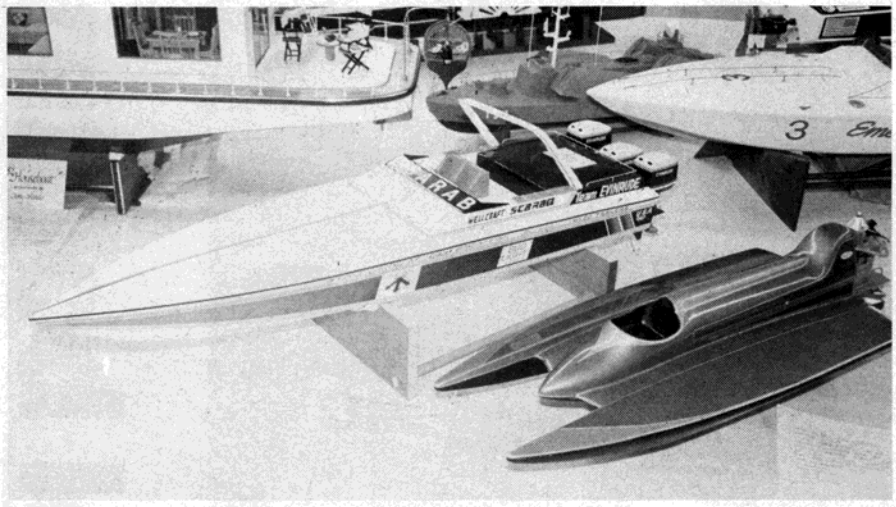
This year, in my opinion, SR Batteries of Bellport, NY, is the winner with their completely nickel-cadmium powered boat or plane electric starter. The manufacturer claims at least 25 to 30 starts on a piped 60 engine on one charge. At this time SR Batteries' plans are to market this as a retro-fit kit for the 12 volt Sullivan starter which will come complete with a 12 volt cigar lighter charging cord. A 15 minute recharge is claimed by SR Batteries. This is one item I can't wait to get my hands on. Look for a product review in an upcoming issue of FM.

All in all, I think the manufacturers are really tuning into our needs as power boaters in both kits and accessories. Like I said before; "so many goodies—so little time and money!"

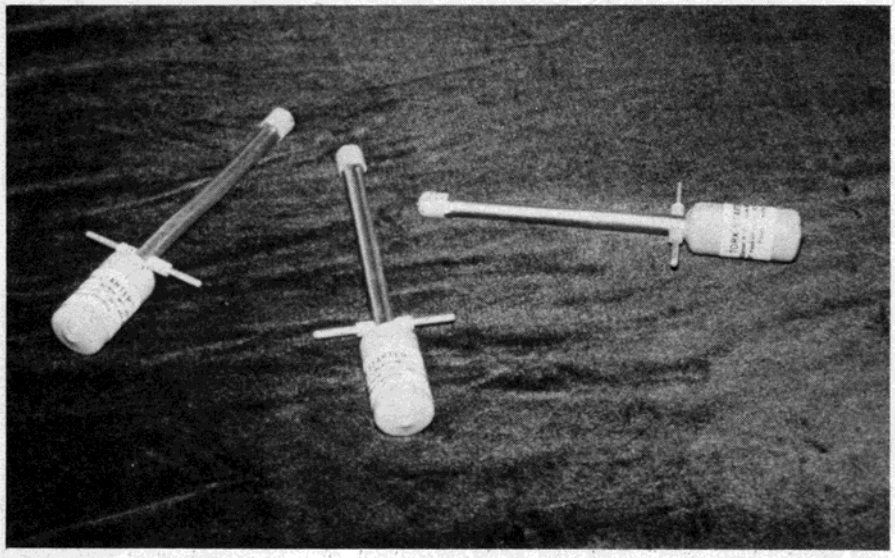
The part that turned me on most about this show was the modeling competition. It's

SR BATTERIES, Bellport, NY 11713, have aerospace quality batteries for every occasion. Larry Sribnick is the brain behind this company.

The flashy paint schemes and exotic powerplants and drive trains of the sport boats always draw a lot of attention.



The addition of a second Sports Boats category (**above**) added more trophies and fairer judging. Now there are Hydro and Mono hull classes. Hydro's defined as having a step, tunnel, or break of some kind in the hull bottom. McDANIEL'S R/C PRODUCTS, Herndon, VA 22701 showed their new long shank Bo-Starter (**below**).



at the trade shows like this one that you get to see some of the best models around. The power and racing boats tend to steal the show with their flashy paint jobs and exotic power plants and drive trains. No shortage of polished aluminum and stainless steel here folks! These boats are defintely made for Show *and* Go! On the other hand the scale boats lend an air of magnificent dignity to the festivities. Most, if not all of the scale boats were excellent examples of workmanship and the top two or three in each class were easily museum quality. You really have to be there to appreciate them.

This year's WRAM Show featured an added category in Racing Boats. This year had both a Hydro Class, (any hull with a step, tunnel or break of some kind in the bottom) and a Mono hull class (all other hull types). This not only broke the boats down into fairer judging categories but also made another set of trophies available to reward the modelers for their work.

The winners in the Deep-Vee category were: First-Vic Macaluso, with his *Scarab-S-Type* Turbo; Second-Mr. Gateway (sorry I missed the first name) with his Wellcraft *Scarab;* and Third-Mike Nunnziato with his *Sightler.*

In the Hydro category the winners were; First-Vic Macaluso (who is this guy anyway??!) (Good question-Ed.) with his 1/5 scale *Atlas Van Lines;* Second-Mr. W. Overton with his 1/8 scale *Atlas Van Lines* on a *magnificent* trailer, and Third-Mr. J. Hightower with his 1/8 scale *Miss Budweiser.*

Once again the WRAM Club did a fine job of running this show and out did themselves with the large silver bowls presented as trophies. They were most helpful in all areas and as usual the security was extremely tight. If you didn't have your receipt for your model you just didn't leave with it!*Great!*

Each year this show gets bigger and better and it's all because of we, the modelers in the sport of R/C. Let's show our support by continuing to attend this show and voicing our needs to the manufacturers.

Till next year. . .

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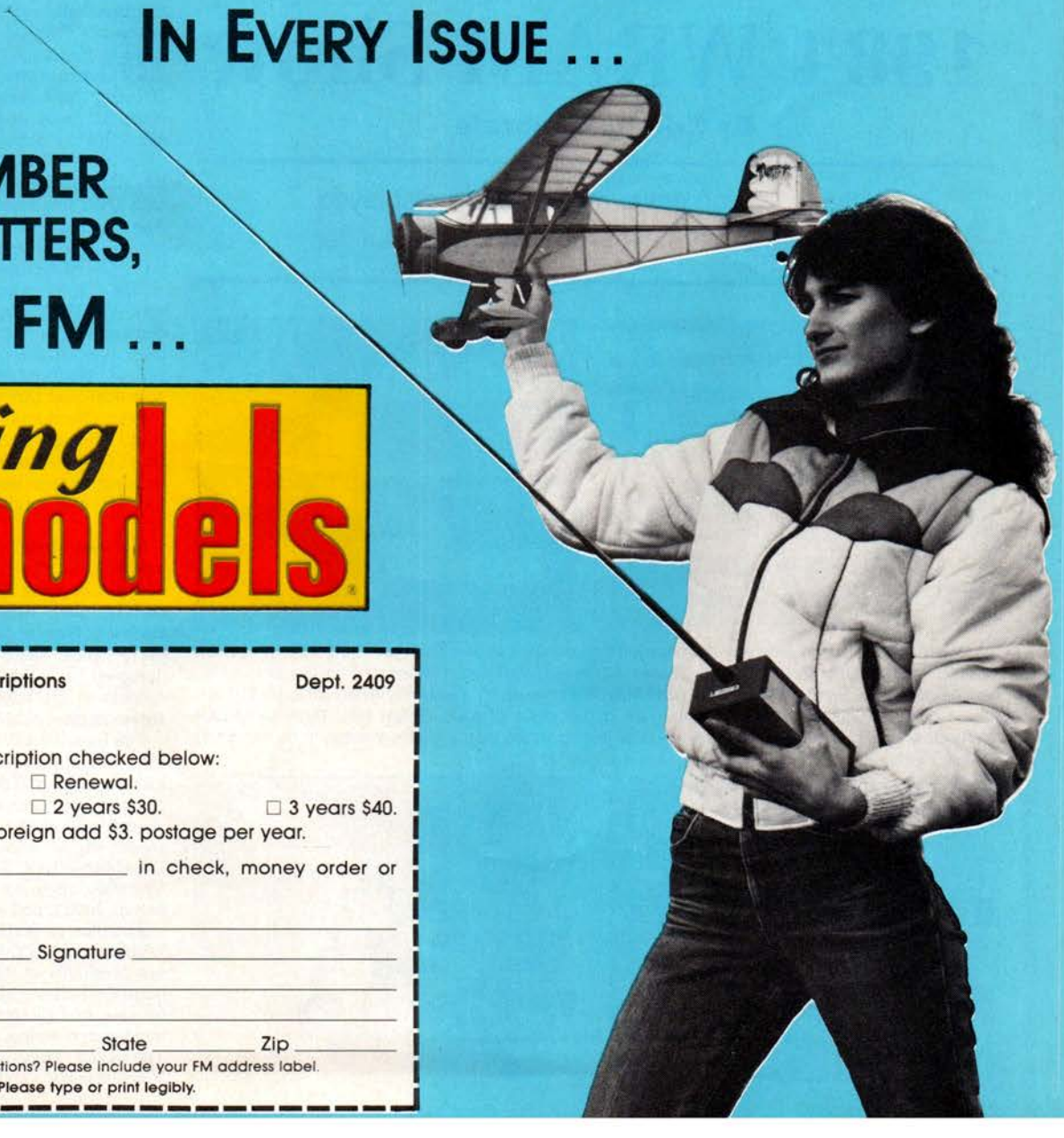

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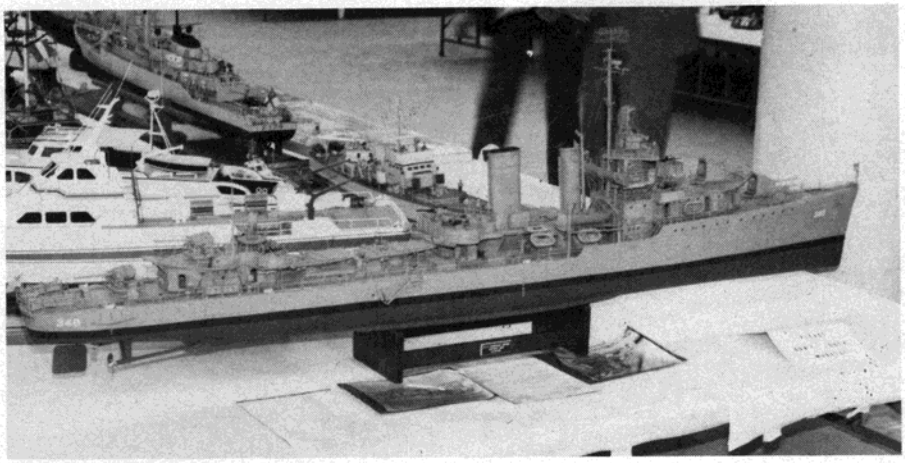


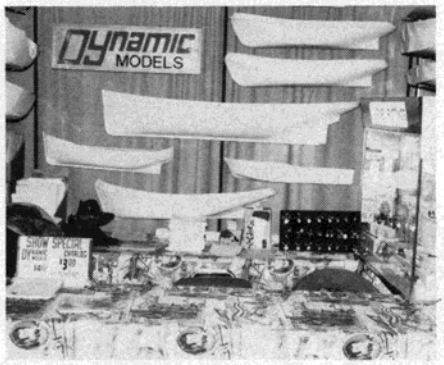
PHOTOGRAPHY: ERIC GOLDSCHRAFE

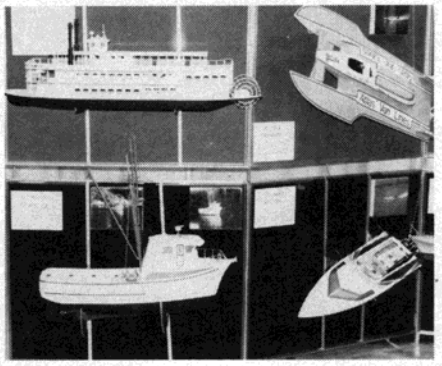
An impressive wealth of detail earned Art Hickey's *USS Farragut* the Best in Show award. The hull was plated, hatches and doors in place, and rigging well executed. It also sails as well as it looks.

R/C Scale Boats at the 1984 WRAM Show

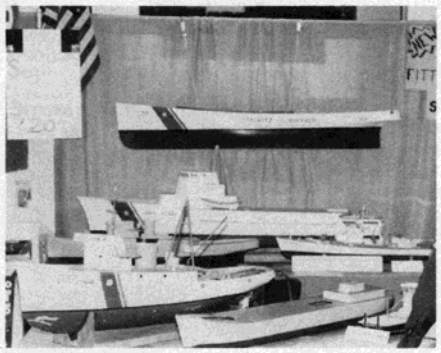
By Eric Goldschrafe

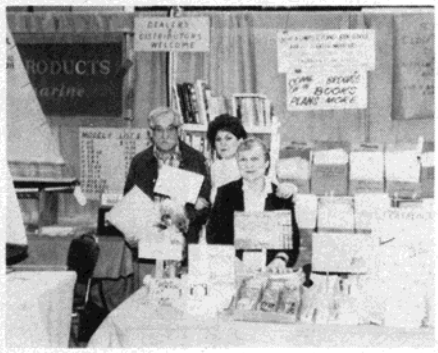
A flotilla of fine scale models were displayed along with many new products for the builder.





DYNAMIC MODELS, Port Jefferson, NY displayed their coming *Calypso,* destroyer, and Coast Guard cutter hulls (**above left**). **DUMAS PRODUCTS,** Tucson, AZ. showed their *Creole Queen* sternwheeler and *Thompson Trawler (***above right**). **STAUBITZ OF BUFFALO,** Williamsville, NY, has a wide variety of Navy and Coast Guard scale subjects mostly in 1/32, with a few in 1/48 and 1/72 scale. (**below left**). **TAUBMAN PLAN SERVICES,** Jersey City, NJ is the place to go for just about any plan available that has to do with boats (**below right**).





This year's WRAM Show again showed increased interest and participation in R/C boating, particularly in the scale division. New products were very much in evidence, and the contest tables were packed with dozens of fine models.

Dumas Boats (Dumas Products, Inc., 909-B E. 17th Street, Tucson, AZ, 85719) had a large, colorful display as always, but with several new boats in their line. A sternwheel riverboat, the *Creole Queen,* of all-wood construction and a 48-inch length, was centered in the display, with a 36-inch fiberglass and wood Thompson *Trawler* mounted below. These kits are designed for R/C, and Dumas has the fittings and running hardware necessary to complete them.

Robbe Model Sport (Suite 345/55, The Office Center, Plainsboro, NJ, 08536) also had a lavish booth, with many interesting models on display. Most of their new models will be announced at the Toledo show, but a sneak preview showed several new kits, aimed at the builder that does not have the experience or time to construct a more complicated wood or fiberglass kit.

Dynamic Model Products (P. O. Drawer C, Port Jefferson Station, NY, 11776) had many new items to show, with several new fiberglass hulls scheduled for release through the rest of the year. Coming soon are the *Calypso* in 1/48th scale, a 1/24th scale 1930's-era Coast Guard cutter, and a new 1/48th scale destroyer. A new series of super-scale full-sized plans for these and many of the other Dynamic hulls will be available this year.

Taubman Plans Service (11 College Dr., Box 4G, Jersey City, NJ, 07305) was present with their fine selection of plans and books. Abe and his lovely wife and daughter spent the weekend catering to the many needs of hundreds of modelers.

M.A.C.K. Products (P.O. Box 33A, Rahway, NJ, 07065) again had their "fish tank" display set up for live demonstrations of their many motors, transmissions, and drive setups. Sailboat winches and accessories were featured this year.

RAm Products (4736 North Milwaukee Ave., Chicago, IL 60630) was on hand to show their extensive line of speed controls, lighting devices, and accessories, as well as a pair of new scale deep-vee performance boats.

Midwest Model Supply Co. (Box 581R, Romeoville, IL, 60441) is now marketing several of the Laughing Whale kits, including the *Lobster Boat* and the *Fantail Launch II.* Both kits feature die-cut and machined wood parts (balsa, bass, and mahogany), and are designed for small R/C systems. The *Fantail Launch* is intended to be powered with a steam engine, available also from Midwest.

The Laughing Whale (174 Front St., Bath, Me., 04530) had their extensive line of boat kits on display. These kits feature all-wood construction, using bass, balsa, and hardwoods, and many will operate on a small steam engine which is available from The Laughing Whale. The kits range in size from 19 inches up to 53 inches, and include tugs, fishing boats, and steam launches.

Staubitz of Buffalo (105 Hollybrook Dr., Williamsville, NY, 14221) displayed many of his products at the show. Most were fiberglass hulls, with decks, superstructures, funnels, and turrets (also of fiberglass), with molded-in coloring, deck plating, and details. The model subjects include Coast Guard and Navy vessels, mostly in 1/32nd scale, with a

few in 1/48th and 1/72nd scale. A couple of vacu-formed kits are also available, including a finely-detailed 1/32nd scale (*very* scale) 26-foot motor whaleboat, designed for use aboard R/C models.

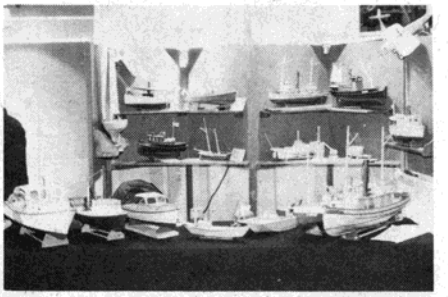
A mentioned earlier, the contest held in the lower level of the building featured a lot of interesting and nicely-made boats and ships. They ranged from houseboats to harbor tugs in non-military scale, and from submarines and subchasers to battleships in the military scale category.

Tony Orlando, from the Bronx, NY, placed third in non-military with his nice trawler, while Richard Marshall, Midland Park, NJ came in second with his ornate sidewheeler, the *Highlander.* First place in this division went to Arnold Stein, from Flushing, NY, for an outstanding job on a 1/4 inch scale model of the side-wheeler *L'Orenoque.* Arnie's model features independent sidewheel controls, smoke, and sound effects, and it was totally scratchbuilt.

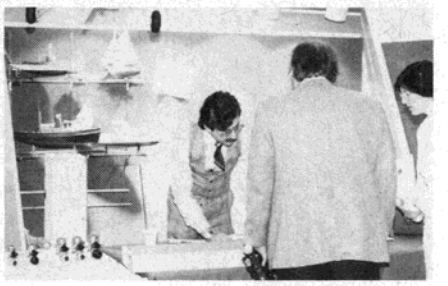
In Military Scale, third place went to Fred Hutchins, of New York City, NY, for his sleek model of the *H.M.S. Alacrity.* This replica of an Amazon-class frigate was scratchbuilt, and measures 78 inches in length. This length, and the 43-pound weight belie the speed and agility on the water. Second place went to "Der Kapitan," our good friend and FM author Bud Lederer. Bud's rendition of a U-boat was made from a 32nd Parallel kit, with an awful lot of work thrown in. A video tape of the sub in action was available for the spectators, giving a good look into the world of R/C submarines. "Kapitan" Lederer's boat is fully operational in all respects, and has special features such as gyroscopic depth control and operating torpedoes. The first place award went to the giant model of the *USS New Jersey* by Bill Brown of Collingdale, Pa. This 9-foot-plus model featured working guns, independent motor control, and weighs a hefty 180 pounds. It requires two separate six-channel radios to operate it.

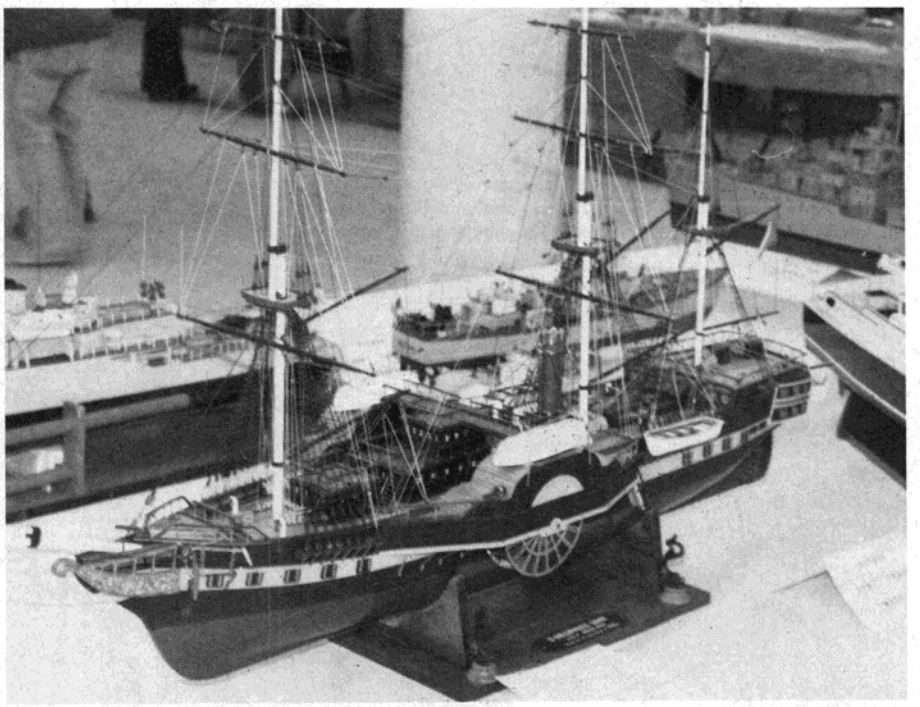
It is quite an honor to announce that the Best In Show model belongs in the Scale Boat section, Arthur Hickey copped this award with his really outstanding model of the destroyer *USS Farragut.* Art, from Marion, MA, used a Dynamic hull as a base for this vessel, but the craftsmanship that went into it must be seen in person to be appreciated. The hull was plated, every conceivable hatch, door, and fitting is in place, and all of the lights work. The phenomenal detail on the guns and torpedo tubes, and the execution of the masts and rigging make this model worthy of a museum collection, but it sails as good as it looks.

The WRAM crew deserves a "well done" for this show, and our congratulations go out to the winners.

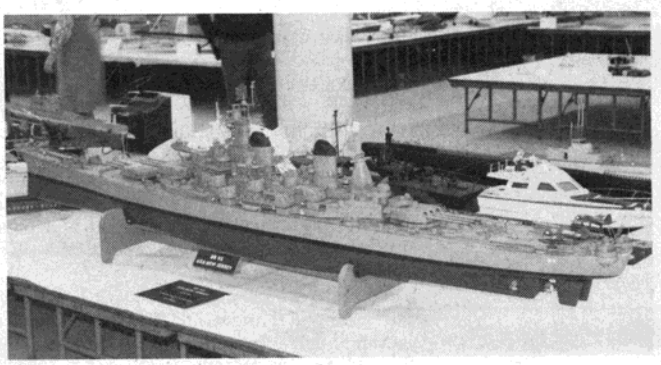


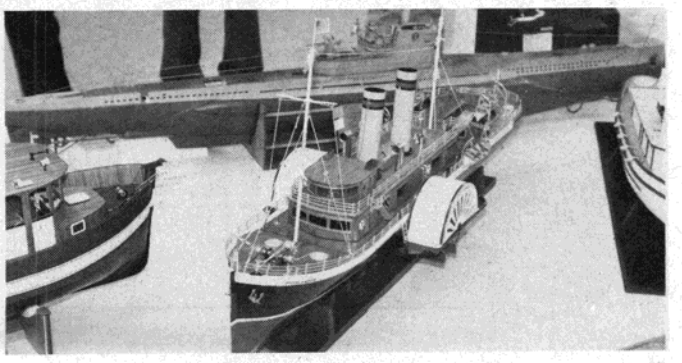
ROBBE MODELLSPORT, Plainsboro, NJ, brought many of their impressive kits (**above left**), and hinted at new ones to be announced shortly. **LAUGHING WHALE,** Bath, ME, has an extensive line of all wood kits of working vessels (**above right**). **RAm PRODUCTS,** Chicago, IL 60630, displayed their extensive line of speed controls and lighting devices (**below left**). **MIDWEST PRODUCTS CO., INC.,** Hobart, IN 046342, has purchased some of the Laughing Whale line of kits. They have released (**below right**) the *Lobster Boat* and the *Fantail Launch.*





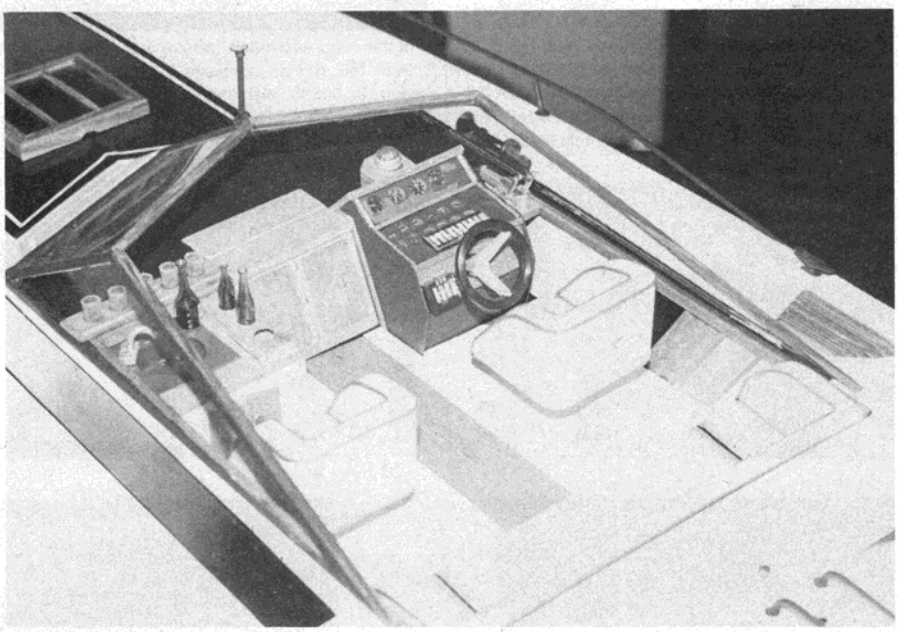
First place in Non-Military Scale went to the *L'Orenoque* (**above**) a sidewheeler that featured independent sidewheel controls, smoke, and sound effects. The work of Arnie Stein. Size alone was impressive enough, but the detail and operating features of Bill Brown's *USS New Jersey* (**below left**) also helped earn it first in Military Scale. Richard Marshall took second place in Non-Military Scale with the *Highlander* (**below right**).





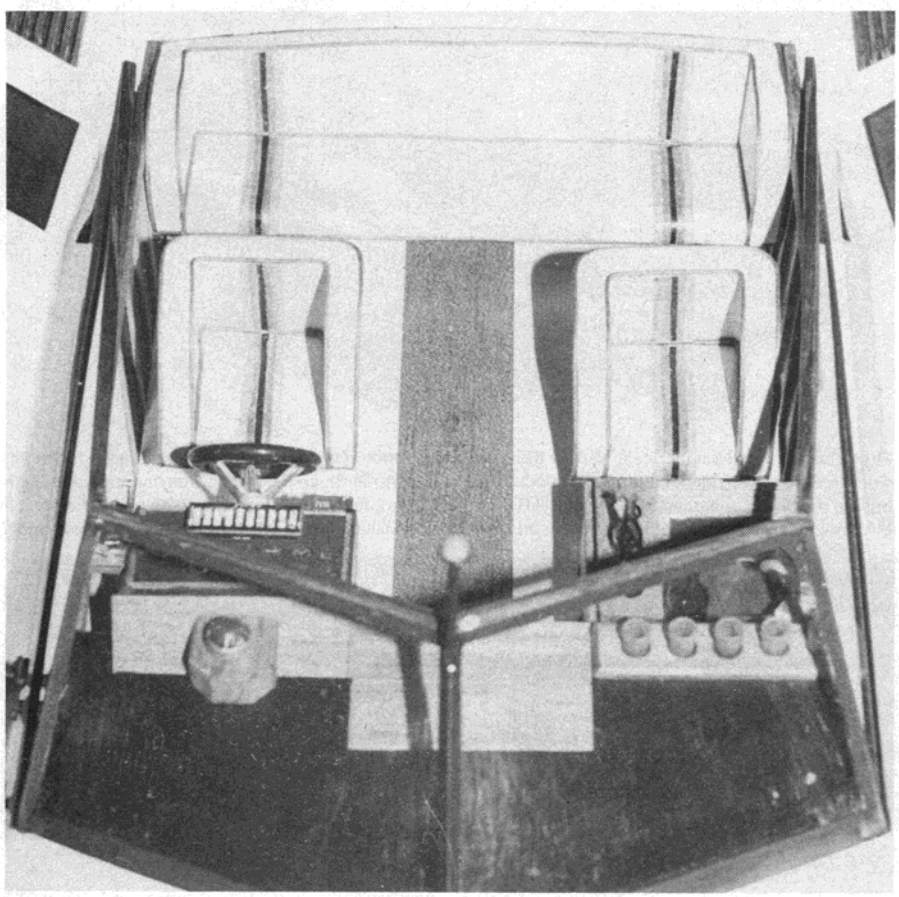
R/C sport boats

By Vic Macaluso



PHOTOGRAPHY: VIC MACALUSO

For those who like to make their boats look good while going fast, Vic offers some helpful how to's. Cockpit dashboard is made from plastic card stock (**above**) and then trimmed with mahogany veneer. The floor (**below**) is also made from plastic card stock and the seats from vinyl covered balsa.



In case you haven't noticed, there seems to be a growing trend towards more realistic looking boats in the racing categories. If you are a hard core racer who firmly believes in everything on a hull being functional (nothing wrong with this!) read no further. But, if you're like most of us who like our boats to not only go fast but look good doing it, read on. This month's topic will be on cockpit detailing. (I'll bet the flyboys thought they had this area locked up!)

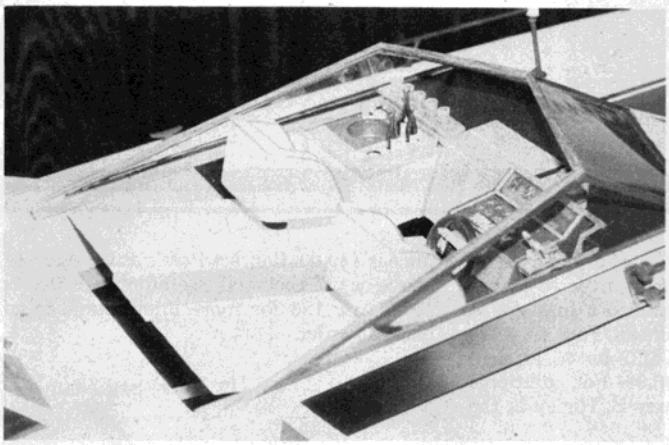
Because there are so many scale or scale-like racing hulls on the market today, cockpit detailing has become much easier because of the availability of full color brochures of the fullsized hull you are modeling. If you happen to be building one of the new Dumas *Scarab*™ kits you are really in luck because these hulls come with a fully molded interior including seats and dashboard.

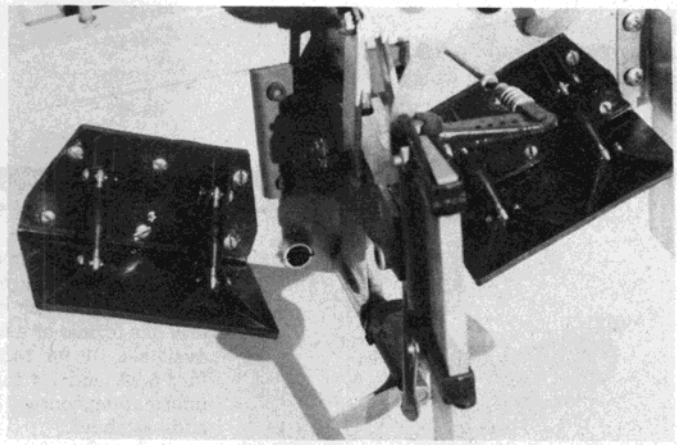
What I'd like to do is aim my comments at the modelers who intend to fully scratch build their cockpit as I've done in these photos. The photos show only the finished product because every model is different and many of the construction techniques will differ so I'll just highlight the various features and materials used in my particular *Scarab-S Type Turbo* cockpit.

Starting with the most complicated structure, the dashboard, 90% of this was constructed from .030 thickness plastic card stock available at any hobby shop. The gauges were (or appear to be) recessed by simply punching holes in the card stock and gluing some pre-printed gauge faces behind the holes. The rocker switches are inexpensive DIP switches available at Radio Shack. Simple isn't it?! The steering wheel was liberated from one of my nephew's toy trucks and painted the correct colors. (I owe him my soul for this one! Six year olds just don't seem to understand what creativity is all about.) (the authorities call it child abuse, Vic-Ed) The rest of the trim on the dashboard as well as any other visible wood in the cockpit is simply 1/32 inch mahogany veneer cut into properly sized strips. The cabin doors and hatchway are also mahogany veneer with the framework being mahogany strips glued to it. The nice part about using mahagony is that it works and strips very easily and when oiled gives a very passable appearance of teak.

The cockpit and wet bar sides are appropriately colored vinyl with the colored trim stripes being applied with either different colored vinyl or, if you're lucky to find the correct colors, magic marker. Speaking of the wet bar, those little bottles, and cups can be found at any hobby shop that carries doll house supplies. They are also available in many different scales. What good is a pleasure boat without having some of the pleasures of life aboard.

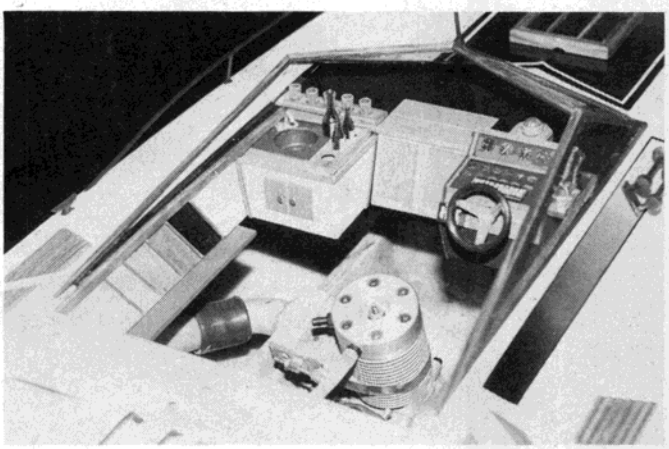
The seats are simply 1/4 inch soft balsa covered with vinyl material and cloth covered electrical wire for the piping around the

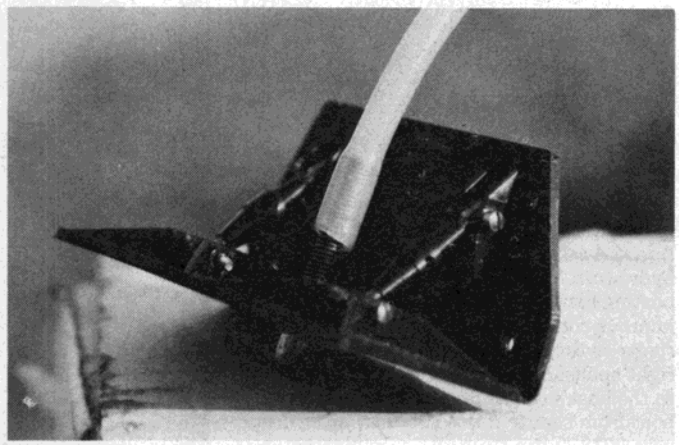




The cockpit floor is removable for access (**above**) to the engine and drive train. Easy to see engine access here (**below**). Those little bottles and glasses can be obtained from doll house supply stores.

Aeromarine Laminates continue to roll out new products. This is their double width trim tab (**above**). This view (**below**) shows the two independently adjustable turnbuckles which help with those special trimming needs.





Aeromarine has married their new scale *Michelob Lite* deck to their proven *Mean Machine* hull in their newest catamaran offering.

edges. Hot Stuff™ or Super-T™ comes in very handy for this job.

As you can see from the photos, most of the material required for this project came from scraps lying around my workshop. All it takes is a little imagination and a lot of work to come up with what you see here. Don't forget, the manufacturers' brochures can supply all the information you need to create a really special cockpit.

Shown here are two new releases from Aeromarine Laminates, 77 Cedar St., Babylon, N.Y. 11702, (516-587-9149). Newest in their line-up of racing catamarans is their *Michelob Lite* hull. This model is based on their race proven 65 *Mean Machine* hull with a scale *Michelob Lite* deck attached. This boat has all of the fine handling and speed of its predecessor with the added class of a scale look. Soon to be released with this hull will be a scale *Popeyes* cat.

Also new from Aeromarine is their double trim tab. This is a double width tab with independently adjustable turnbuckles for those larger models or for models with special trim requirements.

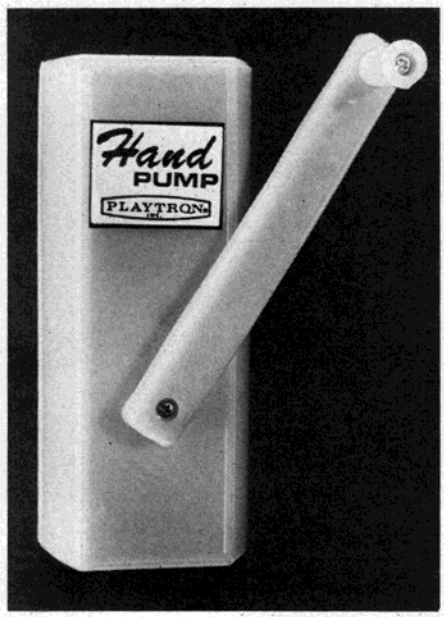
For information and pricing of these and other products in the Aeromarine line-up, call or write them at the above address.

Till next month.

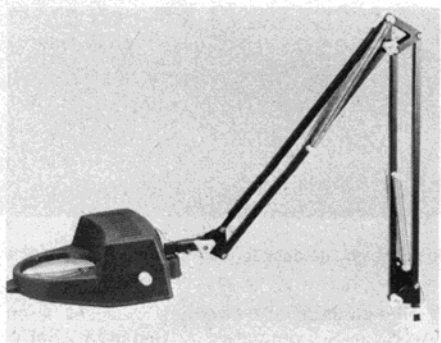
letter rip

POWER PRODUCTS, *766 Broadway, Seaside, CA 93955,* has released their outrigger hydro turn fin assembly. This unique piece of boating hardware was designed and tested to improve cornering ability of almost any outrigger hydroplane. The fin's position on the right sponson generates turning forces close to the boat's center of gravity and keeps the boat from sliding. Listed as the Power Products 2013 hydro turn fin assembly, the unit includes a molded glass fiber filled nylon bracket, a 0.01 inch thick hardened aluminum turn fin, and all the necessary mounting hardware for $4.98. The 2011 nylon bracket lists for $2.98 and is designed to mount directly to sponsons whose back surface angle is 45°. If the back surface has a different angle, it can easily be shimmed with scrap wood stock. To obtain additional information about the 2013 hydro turn fin assembly or the 2011 nylon bracket, contact your local hobby dealer or write to Power Products at their address above.

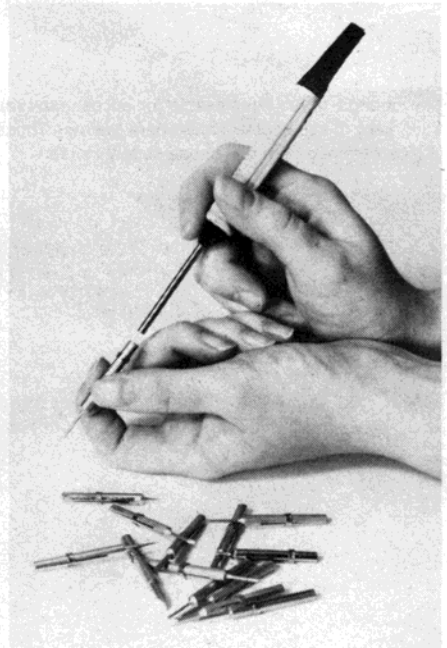
HARRY B. HIGLEY & SONS, *433 Arquilla Dr., Glenwood, IL 60425,* has extended drills which feature high speed steel drills fitted on an extension. They measure over 16 inches long and can reach deep into a fuselage to drill in a former or a bulkhead. Four sizes are available: 1/8 for $4.99; 5/32 for $5.49; 3/16 for $5.99; and 1/4 for $6.99. For additional information, contact Harry B. Higley at the address above.



AIRBORNE R/C DISTRIBUTORS, *7929 Parston Dr., Forestville, MD 20747,* has released their Playtron Hand Operated Fuel Pump which is small enough to fit anywhere, easy to carry and to operate. Made of a special plastic/glass fiber compound, the pump is very tough and will fill or empty a fuel tank. List price for the pump is $9.95 and is available from local hobby dealers. For more information, contact Airborne at their address above.



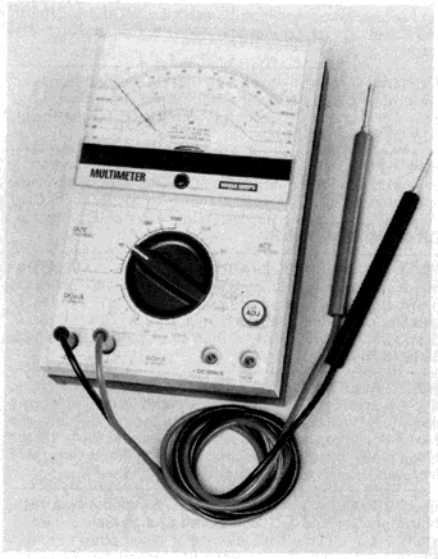
POLK'S MODELCRAFT HOBBIES, *346 Bergen Ave., Jersey City, NJ 07304,* offers the modeler a multiple position magnifier lamp. The 39 inch long flexible arm can traverse the entire work area providing both illumination and an enlarged view of detailed work. It uses a 60 watt lamp and is UL listed. List price is $30.00. Contact Polk's at the address above or use their toll free number, 800-227-1617, ext. 126 for more information or to place an order.



M.M. NEWMAN CORP., *PO Box 615, Marblehead, MA 01945,* has announced the availability of 40 types of slide-on tips for their line of Antex miniature soldering irons. These tips are easily changed by sliding onto the heating element and are made from a special copper alloy for both maximum strength and heat conductivity. Nickel, iron or gold plating come on the various shapes such as spades, chisels, needles, cones, pyramids, and blanks. Prices for the individual tips start at $1.20 each and a catalog with price list is available. For more information, contact M. M. Newman at their address above.

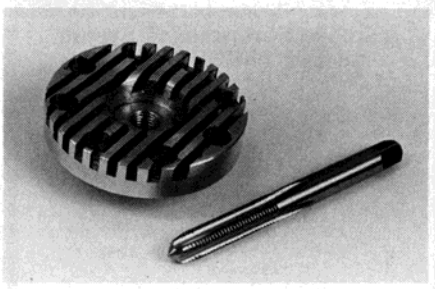
MINI-VAC, *P.O. Box 3981, Glendale CA 91201,* has introduced a new small tool for cleaning hidden or hard-to-reach places. The Mini-Vac is a light weight vacuum cleaner designed to work in the same applications as compressed air cleaners. Powered by either AC or DC the Mini-Vac is equipped with two interchangeable wands, two fine bristle brushes, and a cloth vacuum bag. Compact and portable, the Mini-Vac sells for $29.95 with a 90 day guarantee and is available at many stores nationwide. If not, contact Mini-Vac at their address above or call 213-244-6777.

DRI INDUSTRIES, *PO Box 20612, Bloomington, MN 55420,* has made available a 24 range AC/DC milliammeter called the Multimeter. Color and type correspondence between meter scales and selector range make operation fool-proof. A detailed instruction book provides the information for the many



uses and operation of the Multimeter which comes with at full one year warranty. The meter sells for $42.89 postpaid. For more information, or to place an order contact DRI at their address above.

VACO PRODUCTS CO., *1510 Skokie Blvd., Northbrook, IL 60062*, has recently introduced a new line of Folding Hex Key sets. Pocket size, each set is held together by a single frame which acts as both a holder and a driver handle. The individual keys are made of top grade alloy steel, heat treated and tempered for maximum strength, and have a rust resistant black finish. The four different models include both standard and metric sizes. For additional information, contact Vaco Products at their address above.



HARRY B. HIGLEY & SONS, *433 Arquilla Dr., Glenwood, IL 60425*, has recently intro-

duced their Glow Plug Tap, a difficult to obtain tool because of the uncommon size of glow plug threads. This 1/4-32 tap, listing for $4.99, can be used on most engines.

timetable
of coming events

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., Bloomingdale, 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 Park 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; 714/581-1127.

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.

BARTOW, FLORIDA—June 9-10, IMPBA 1/16 and 1/8 record trials, hosted by F.A.S.T. at Square Lake, from daylight to dark. Contact: Don Pinckert, 9 N. Grant Ave., Masaryktown, FL 33512; 904/799-0595.

PORTLAND, OREGON—June 9-10, NAMBA District 8 points, enduro, heat race, offshore, outboard, scale sport 40, and unlimited hydro, hosted by Rose City Model Yacht Club at Force Lake. Contact: Dallas Cook, 1165 Ave. E., Seaside, OR 97138; 503/738-8582.

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 Sportsmen'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.

LAS VEGAS, NEVADA—June 17, NAMBA District 19 points, outboard, outboard OPC, hosted by Las Vegas Mini Mariners at Sunset Lake. Contact: Ray Rajm, 4383 Paramount, Las Vegas, NV 89115; 702/643-9697.

MARYSVILLE, 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.

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-

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
Model Power Boat Association
IMPBA
38355 Hidden Lane
Mt. Clemens, MI 48043

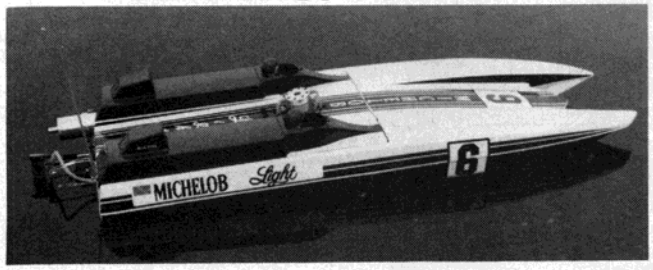
NASWCC
North American Scale Warship Combat Club
Paul Fleming, Operations Officer
P.O. Box 1126
Gig Harbor, Wa. 98335

NAMBA
NAMBA International, Inc.
Mrs. Myrtle Coad, Exec. Sec.
6073 Sunrise Drive
Lower Lake, CA 95457

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

Aeromarine Laminates *beautiful semi-scale replica of the*

"Michelob Light"



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!

- ★ **Factory joined Hull & Decking**
- ★ **Engine Stringers Glassed in place & Drilled**
- ★ **Standard Color White (recommended). (Blue/Black/Red/Yellow available n/c)**
- ★ **Simple to build**
- ★ **Full Size Drawings, Instructions**
- ★ **Hardware List suggested**
- ★ **Extremely Stable Hull Design (Excellent speed & turning ability)**
- ★ **Includes an 8" x 12" Glossy Color Photo of the Full Size "Michelob Light"**

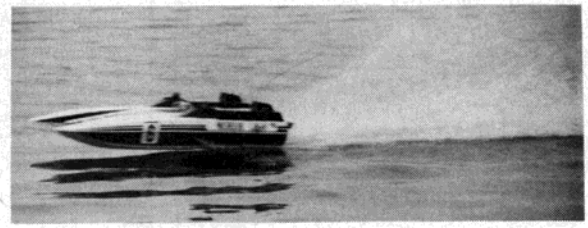
For .65 to .90 Engines or Twin Engines .45 to .65

Hull Length: 43" / Beam: 16"

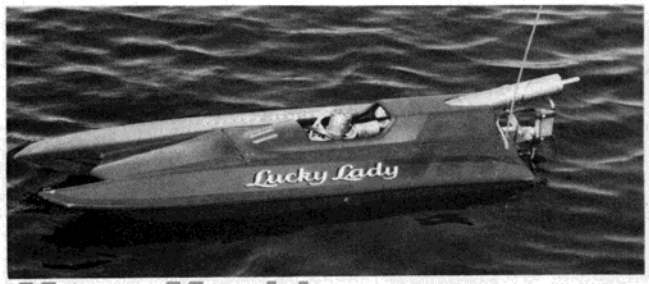
$239.95 Kit #ML-65

A very complete Hardware Kit, (less engine & radio).

$94.75 Hardware Kit #MLH-65



Our "Michelob Light" model replica scorches the waves!
All Boats shipped within 5-days (unless special Color combinations).



Mean Machine "40"

Fantastic performance with a 7.5 Outboard!

For .40 to .65 Engines (or Outboard)

Hull Length: 37" / Beam: 15"

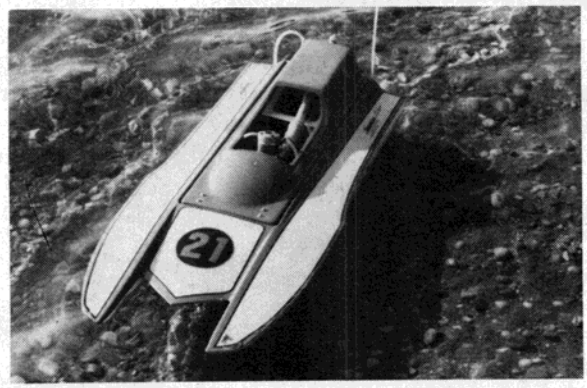
$189.95 Kit #MM-40

Mean Machine "21"

For .21 to .40 Engines

Hull Length: 29" / Beam: 10"

$134.95 Kit #MM-21



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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 23-4, 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 ox 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.

SAN DIEGO, CALIFORNIA—July 1, NAMBA District 19 points, unlimited hydro, hosted by Southern California Scale Thunderboat Assoc. at Model Yacht Pond. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

SPRINGFIELD, MISSOURI—July 7-11, NAMBA R/C warship combat maneuvers, hosted by R. C. Warship Combat Club at Sequoiota Lake. Contact: Terry Darby, Chilhowee Ranger Station, Tallassee, TN 37878; 615/856-3133.

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 til dary (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.

BELLE ISLE PARK, MICHIGAN—July 14, IMPBA hydro race, all classes, hosted by Wolverine Miniature Race Boat Assoc. at Blue Heron Lagoon; tuned pipe or muffler required. Contact: Jo Ellen Gault/Rick Grenier, 5444 Kreger, Sterling Heights, MI 48077; 313/268-1297.

KENOSHA, WISCONSIN—July 15, IMPBA closed course heat races, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd Street, Greenfield, WI 53221; 414/384-8587.

FLINT, MICHIGAN—July 21-22, IMPBA record trials, AB-CD-EF scale, hosted by Wolverine Miniature Race Boat Assoc. at Thread Lake, starts 9 a.m. Contact: Greg Bailiff, 15410 14th St., Detroit, MI 48238; 313/867-6879.

KENT, WASHINGTON—July 21-22, NAMBA District 8 points, heat race, offshore, outboard, sport 40, unlimited hy-

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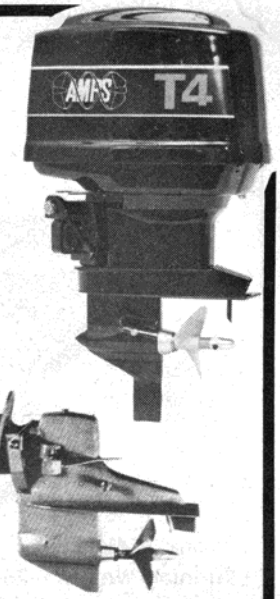

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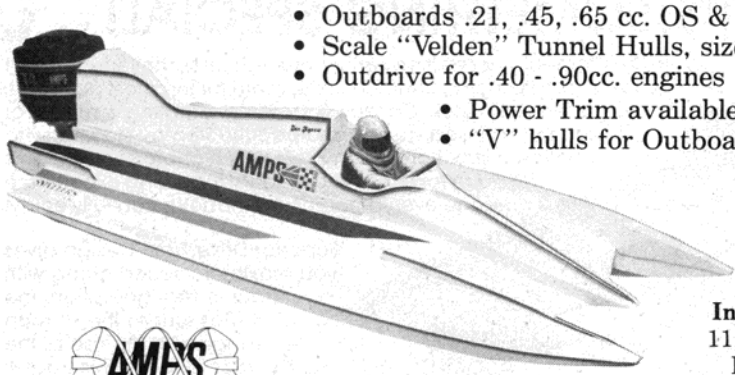

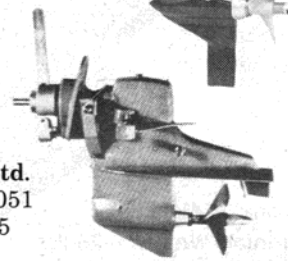

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dro, hosted by seattle Model Yacht Club at Kent Lagoon. Contact: Pete Ferguson, 17331 SE 136th, Renton, WA 98056; 206/932-6031.

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 Omertzu, 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.

SOUTH EL MONTE, CALIFORNIA—July 22, NAMBA District 19 points, unlimited hydro, hosted by Southern California Scale Thunderboat Assoc. at Legg Lake. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

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.

KENOSHA, WISCONSIN—July 28, IMPBA closed course heat race, 1/8 scale hydro race, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd St., Greenfield, WI 53221; 414/384-8587.

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.

ABERFOYLE, ONTARIO, CANADA—July 28-29, IMPBA heat racing AB-CD-EF mono and hydro, 20 outboard, District 1 scale 60 highpoint, hosted by Golden Triangle Marine Modellers at TCG Gravel Pit, starts 9 a.m. Contact: Jim Hallman, 43 Ripley Cres., Kitchener, Ontario, N2N 1W2, Canada; 519/742-4533.

KENOSHA, WISCONSIN—July 29, IMPBA heat races for hydro, mono, outboard tunnel, hosted by Badger Model Boaters at Badger Lake, County E & I-94, Exit 339, starts 9 a.m. Contact: Richard Smentek, 3534 So. 33rd St., Greenfield, WI 53221; 414/384-8587.

INDIANAPOLIS, INDIANA—August 4-5, IMPBA record trial (Sat.) Sunday: must have run within 10% of record on Sat., hosted by Indy Model Boat Club at Lake #3, starts 9 a.m.; a muffling device or tuned pipe is required, also no short stacks or open exhaust permitted. Contact: Bill Lefeber, 8135 Warbler Way, Indianapolis, IN 46256; 317/842-3591.

NEWARK, NEW JERSEY—August 4-11, NAMBA District 1 host for the 13th Annual NAMBA International Nationals at Weequahic Lake. Contact: Douglas Twaits, 23 Elm St., Stanhope, NJ 07874; 201/347-5765.

WHEELING, ILLINOIS—August 5, IMPBA heat racing, AB-CD hydro and mono, hosted by Racing Dolphins at Potawatomie Lagoon, starts 9 a.m.; 95 DB limit. Contact: Bob Oaks, 220 Lewis Ave., Wauconda, IL 60084; 312/526-8526.

TOLEDO, OHIO—August 11-12, IMPBA Scale Internats, electric/steam only, hosted by Maumee Valley Model Boat Club at Walden Pond, Ottawa Park, from 9 a.m. to 5 p.m.; no gas. Contact: Robert Noble, 1808 Strathmoor, Toledo, OH 43614; 419/385-1710.

ST. LOUIS, MISSOURI—August 11-12, IMPBA Twin Mania '84, twin engine hydro only, straightaway and oval and heat racing, hosted by St. Louis Thunderboaters at Water Co. Pond, 8 a.m. check-in; mufflers must have alternate frequency, no back-up boat. Contact: Richard Zimmerman, 2555 Greenbriar, Florissant, MO 63033; 314/921-3824.

ROSEDALE, WASHINGTON—August 15-19, NAMBA 2nd Annual North American Scale Warship Combat Championships, hosted by North American Scale Warship Combat Club at Meyer's Pond. Contact: Hal Amith, 826-A 34th Ave., NW, Gig Harbor, WA 98336; 206/858-6221.

KANSAS CITY, MISSOURI—August 18-19, NAMBA District 7 points enduro, heat racing, outboard, scale, unlimited hydro, deep vee, hosted by Kansas City Radio Control Boat Club at H & S Sporting Lake. Contact: Gary Harmon, 7739 Kessler, Overland Park, MO 66204; 816/649-5179.

EDMONTON, ALBERTA, CANADA—August 18-19, NAMBA District 16 Thunderboat Regatta Trophy, heat race, enduro, outboard OPC, hosted by Chinook Model Boat Racing Assoc. at Lake Hermitage. Contact: Dave Arsenault, 671 Abbottsfield, Edmonton, Alta. T5W 4R4, Canada; 403/474-3307.

GREELY, ONTARIO, CANADA—August 18-19, IMPBA oval heat racing, 20-40-60 mono and hydro, 20-40 08 tunnel, 60 scale, hosted by Ottawa Remote Control Club at Spratts Pit, starts 10 a.m.; tuned pipe or muffler required. Contact: Al Hacker, 2030 Garfield Ave., Ottawa, Ont. K2C 0W8, Canada; 613/224-1218.

KENT, WASHINGTON—August 19, NAMBA heat racing, offshore, outboard, unlimited hydro, sport 40 ABC, mono and hydro, hosted by Seattle Model Yacht Club at Kent Lagoon. Contact: Dough Smith, P.O. Box 352, Enumclaw, WA 98022; 206/825-6497.

ANCHORAGE, ALASKA—August 19, NAMBA District 11 points heat race, deep vee, offshore, outboard, hosted by Anchorage R/C Model Boat Assoc. at Lake Taku. Contact: Jim Raffuse, 2667 Northrup Pl., Anchorage, AK 99508; 907/277-2986.

CHINO, CALIFORNIA—August 19, NAMBA unlimited hydro, District 19 points, hosted by Southern California Scale Assoc. Thunderboats at El Prado. Contact: Ted McKay, 4366 W. Pt. Loma Blvd., San Diego, CA 92107; 619/226-2261.

RENO, NEVADA—August 25-26, NAMBA District 9 points heat racing, unlimited hydro, sport 40, hosted by Reno Model Boaters at Lake Paradise. Contact: William Samuels, 2190 Prater Way #9, Sparks, NV 89431; 702/359-2507.

LONDON, ONTARIO, CANADA—August 25-26, IMPBA mono's, hydro's and V8 scale race, hosted by Thames Valley Model Boat Club at Triune Investment Pond, starts 9 a.m. Contact: Walter Marcon, 343 Berkshire Dr., London, Ont. N6J 3R5, Canada; 519/473-1371.

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