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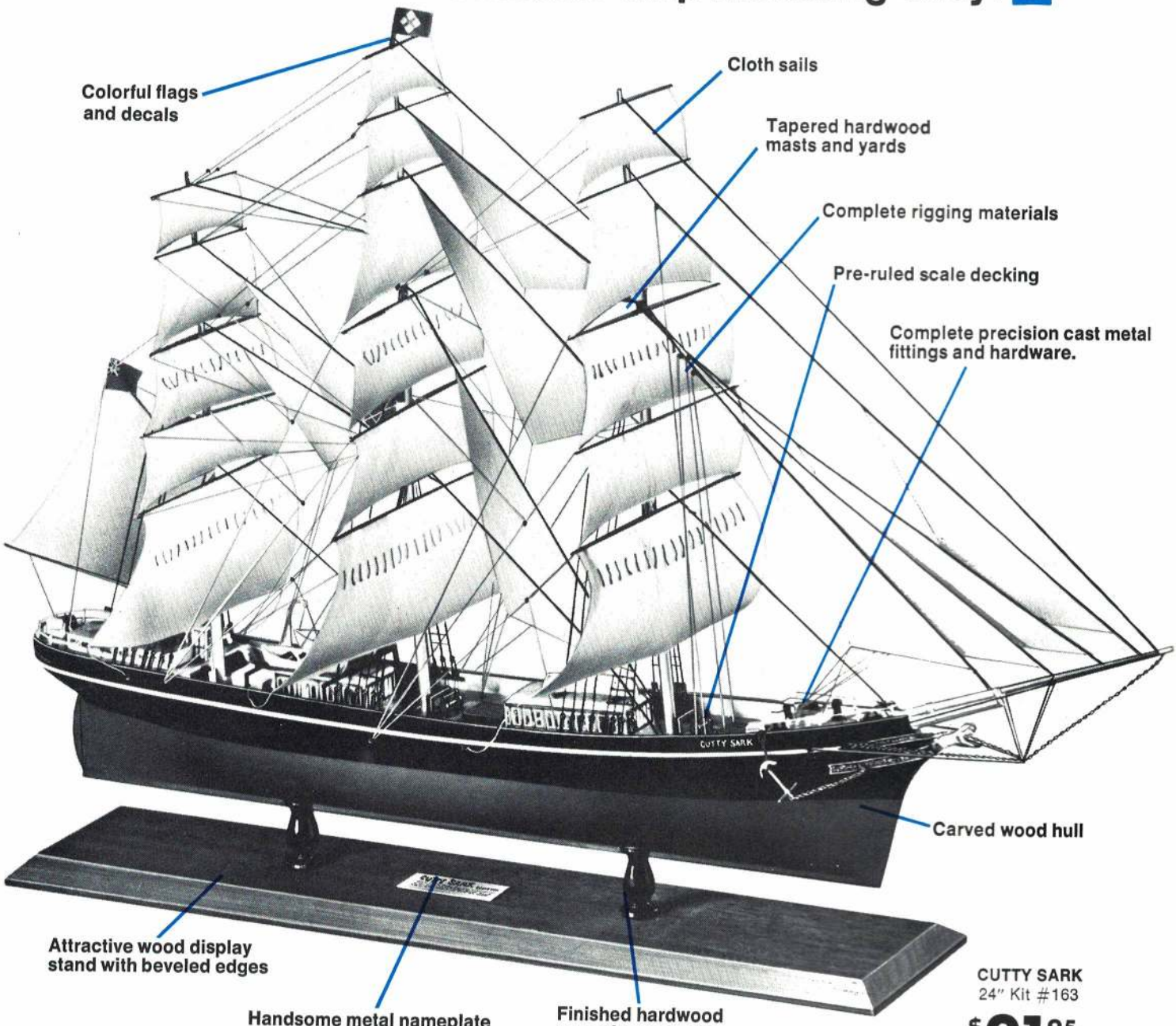

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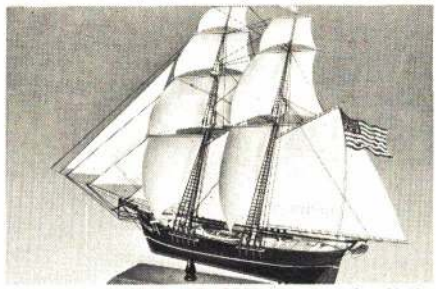

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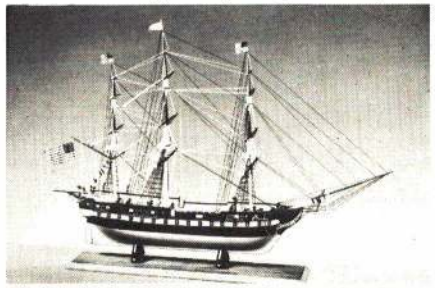

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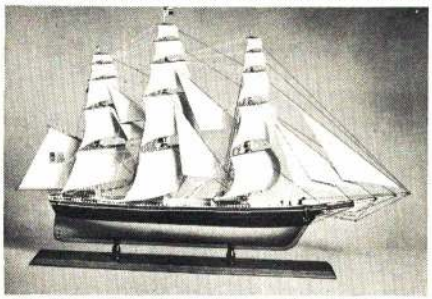

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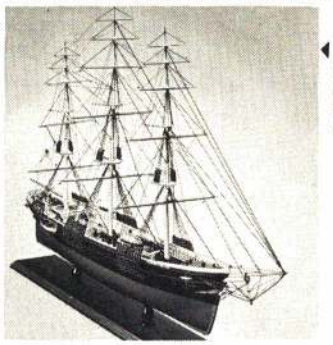

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AMERICAN aircraft modeler

VOLUME 76, NUMBER 7 – JULY 1973

COVER PHOTO

Mike Saponara's RC Sport design, the Skyphonic, photographed by AAM Art Director Kelly Matthews. Turn to page 56 for details on this simple to build, easy to fly model.

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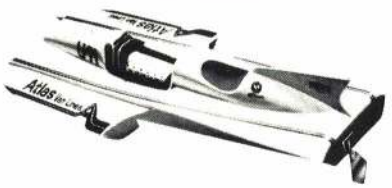

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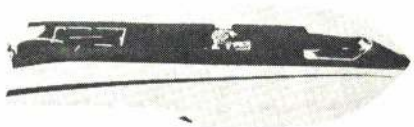

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EDITORIAL

IT'S A GROWING PROBLEM

As this is being written it is the first week of May. We have received several letters from readers complaining about non-delivery of merchandise from the RC industry. We have also attended the two major trade shows of this year. There's one more coming up in June. The shows have been very crowded, much more so than last year. Club memberships are way up and the AMA is bigger now than it ever has been at this time of the year. AAM's circulation is the largest it has ever been since WWII, when it was called *Air Trails*. These facts and happenings are related.

This year has not seen any fantastic new developments in RC equipment itself. But the sale of new equipment is well over 100% above sales of last year. The buying is not by modelers wanting to just update to latest new developments, but by new modelers.

To learn what is behind some of this growth and to find out the reasons for the slow delivery of merchandise, I called most of our prominent RC manufacturers. Each has reported sales are up—some reporting as much as 150%. That's more than double last year's business. All reported various supply problems for the components to build equipment.

It seems the pocket calculator and the new safety devices in automobiles (which involve electronic triggering gadgets) have created such a terrific demand for components that the electronics industry has been nearly unable to supply them. Only a few years ago the RC business was actively sought by integrated chip and battery manufacturers. Military and space related business was down, so it was viewed as a good market. But now, with calculators, automobiles, and higher import taxes, the U.S. electronics industry must meet a larger domestic demand. The model industry is considered a bit less desirable—after all, we use only a few hundred thousand servo chips (ICs) each year, while other markets want millions of other ICs.

In addition, even basic components like capacitors, resistors, and transistors are getting a bit less available. The manufacturers are finding that they must either scrounge around the electronics industry for parts from available stock at any warehouse, or patiently await their shipment from suppliers. Orders take as much as 52 weeks to fill. Of course, if enough items had been ordered last year, production would continue smoothly at that pace. But, as stated earlier, business is up by 100% or more.

All manufacturers in this model business said that production is at its highest level ever, and that to further increase production speed would require training much new personnel, which they don't want to do. It is a miserable situation to gear up for more production not knowing for sure how long the increased business will last. That is, if they could get enough parts.

What this means to you is simply be patient if you have an order for equipment. It really might take eight weeks to make it. This is true even though the manufacturers have planned for and increased their production speed (without harming quality).

Where is the business going? Looks like nearly half the total sales are made to newcomers. Of these, about 25% are to brand-new modelers, while the others have had previous experience in control line or free flight. Each manufacturer with a long history of production in the model business still finds product loyalty is a big thing with us. Of those buying another additional radio, about 60% buy more of the same brand rather than switching to a new brand. So, this is the rest of the total industry business.

If business is so good in the industry, then why don't we see even more modelers at the field? Why are there not that many more FCC licenses? Why haven't the publications experienced the same rate of growth? Where do these newcomers go flying? Who helped them learn to fly? Why have they not joined the AMA at least? According to one of our manufacturers, only one out of eight radio sets is ever heard from (of those for which a warranty card is on file). I wonder what is the figure for all the radios made—about one out of ten or 15?

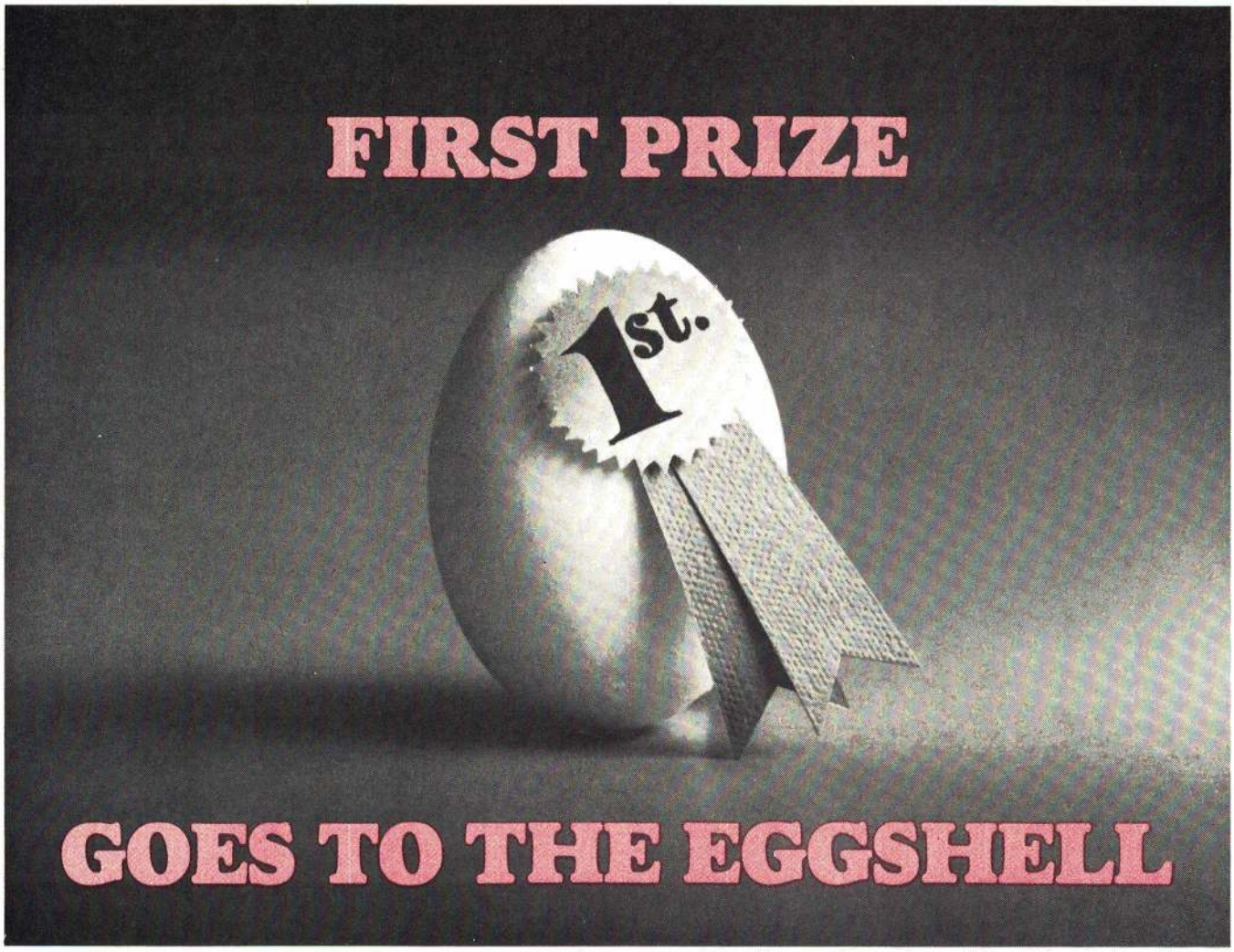
In the last several years the AMA and all the model clubs, including FF, CL and RC, have taken a real interest in solving the airplane model image problem and in gaining good public exposure through mini-airshows and demonstrations. We are getting rid of the "boy with his toy" stigma. We have better public acceptance through general usage of mufflers. We have gained flying sites through local government agencies. I think there is no question about the effectiveness of our PR efforts. We are clearly an accepted sport.

At their level, our manufacturers are taking care of the growth in business. At our level, as modelers, we must too. Clubs might think in terms of several flying fields, not just one. Sure that one was hard to get, but what is it worth when 50 guys with planes come to fly on a Sunday? Let's see, ten minutes in the air for each flier per day if his frequency is open. How about ten models flying at one time? Gads, have a few mid-airs! Might be better to have a field for each frequency group, for example, a site for 27 MHz, another for 72 MHz and possibly a third for 50 MHz band—at least you are limited to five planes in the air at a time!

How about trying to find the new modelers by having your hobby shops get the name of each new customer to supply to the local club. That customer must be licensed—yep, another $25 expense—he needs AMA, he should get to know the industry through the magazines (all of them). Naturally he needs a place to fly, your club field! Would you rather he found a field by himself and became a mysterious source of interference? Incidentally, in finding these newcomers, some of the RC manufacturers might help by supplying names of new equipment users in your area. After all, they want the guy to stay in the hobby and buy again.

Unfortunately, it is a fact of life that we don't have even this much contact to the new control line and free flight modelers. Business is up in these areas too and perhaps to an even greater extent. Those new buyers for radio equipment were asked to indicate their past modeling experience in filling out the warranty cards. Again, half of them were previously in modeling other than RC.

When we have some facts on growth in CL and FF as an industry, we'll present them in another editorial.—*Ed Sweeney*



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Modeler Mail

Military Scale

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Kevin Harper, 8718 Bravo Valley, San Antonio, Tex. 78227

Finding plans and enough information to build a special scale model can be a problem, Kevin. Author Bill Hannan has some great tips on how and where to look in his article "The Research Gambit" (October 1971 AAM*).*

—Editor

Turkish modeling

As the Control Line Team Manager of the Model Airplane Club of Istanbul, I thought your readers would be interested in our activities. Our club mainly concentrates on Radio Control, Scale, Pattern, Control Line, Stunt, Free Flight, Power and Glider. There are many Turkish designs of models made by our club members that have proved to be quite successful.

Here are some pictures of our club's activities. I am pictured with two of my Stunt designs—Hazret 15 with a Fox 15 and Golcuk Mk.2 with a McCoy 29. The other is a picture of a group from I.M.U.K.'s (Istanbul Model Airplane Club) Control Line team.

Murat Yucad, Istanbul Model Ucak Kulubu, T.H.K. Apartmanlari Laleli, Istanbul, Turkey

Let's educate Mom

My mother cannot understand the mechanical experience I can gain from an RC plane. She thinks it is just an expensive toy. Could you help me enlighten her? Also, any letters from AAM's readers would be greatly appreciated.

Mark Hagen, 33 North 6th St., Rio Vista, Calif. 94571

Fact is our models are miniatures of real or hypothetical aircraft and as such must obey and conform to all the same laws of physics, aerodynamics, mechanics, and logic. That's a practical education in itself. Would she rather you built bird feeders?

—Editor

RC scene in Germany

I am in the U.S. Army stationed in Germany with an airborne battalion, whose primary mission is psychological operations. In addition to my being an active AMA member since 1970, my area of interest is in RC aircraft.

Recently I've been able to include in our battalion's official monthly mission (airborne operation) parachute jump the flying of my RC plane, complete with a mini-jumper in full Army parachute harness. He wears a flying suit, has a helmet and goggles in WW II style. A red and white 14" dia. parachute of nylon completes his outfit. As in normal airborne operations, a jump log is maintained for each jump for every individual. My mini-jumper has one. This mini-man has special orders from the Army awarding him parachute wings after completion of the first five jumps (he now has 20 altogether).

Our battalion is also frequently combining official and social activities. A total of five jumps under the guidance of a German airborne jumpmaster gets one of our men their German airborne wings—vice versa for one of their men with our jumpmasters. My mini-jumper has four German jumps, and needs one more. Our next operation will be coupled with a picnic afterwards, a combined German-American mission. Altogether, it is estimated over 400 people will be there, including dependents. An award ceremony is planned at the picnic to give the wings out for both armies. My commander, a lieutenant colonel, is also due for his fifth jump this day and the award of the wings from the German and airborne troops. I have permission to fly my plane and jump my mini-man this day.

Recently, the German Flug Modelbau of Boeblingen (suburb of Stuttgart) with over 50 members, held their annual static display of over 200 models (all RC) at the Sporthalle. Combined with this display, the club had an RC helicopter (Kavan Bell Jet Ranger) flying demo every hour. This club has an ideal flying location/field. Complete with two runways, ample parking for members and guests, every Sunday finds many people at their field watching them fly RC.

I fly as a guest at their location, as their membership is full up and has been for the two years I've been here, so while I await a turn at becoming a member, the facilities have been graciously offered to me. Were you aware that in Germany you cannot fly RC any closer than 1.5 kilometers to any built-up or inhabited areas? (1.6 km is 1 mile.) Also, mufflers are required by law here. Additionally, RC can only be flown at designated locations.

SSG A.J. Campus, 5th Psychological Operations Battalion, APO, N.Y. 09046

A modeler reminisces

Due to other interests, I have set aside my model plane and train hobby work, and am not active in these pursuits. My original reason for joining AMA was to obtain a number to put on any planes I built. It doesn't sound too logical a reason, as I think about it, for joining AMA! As far back as about '38 I recall AMA activities being written up in the model airplane magazines.

My interests as a youth were nonflying Scale, when it came to contest entering. Building the model plane was my enjoyment; whether I received a prize was secondary.

The rubber-powered planes I used to construct were only a dime or twenty-five cents as I recall! The Megow and Comet kits seemed to be the most easily purchased in the late thirties. Today, when you look at the price tag on most advertisements you realize how something that could be constructed for less than a dollar then, is now replaced by popular items costing much more!

At present I have a completed Me109 by Guillow (24-3/8" span, cost $5) rubber-powered, that I bought in '68 or earlier. It was on the shelf in a Hobby Shop in Carson City, Nevada.

A few years ago I bought a Guillow P-47—it cost $10 and has only 30¾" span. So being 6-3/8" longer than the 109, the price is doubled. To date I have only completed about 90% of the assembly (gluing) of the fuselage. The balsa will be probably dried out and decayed before I ever finish the rest! Its big engine cowl seems perfect for powered flight engine installation, and the generous wing area makes the kit a possible graceful free flighter! So you see I get a lot of pleasure from the patient following of instructions and constant suspense of awaiting the final completion, plus the added joy of looking toward the day when I can take the model out for a test glide.

Many are the times I think I should try to create my own kit, or plane, but the pleasure of using someone else's design and materials—all carefully organized for the hobbyist—is too good of a deal to chuck aside for my own singular efforts!

If only autos, boats, houses, planes, everything came in a kit form, we all might spend more time in sober assembly of recreational hobby items that would calm us (somewhat) and channel our energy into constructive fields instead of some of the haphazard pursuits that are followed today.

J.P.F., Placerville, Calif.

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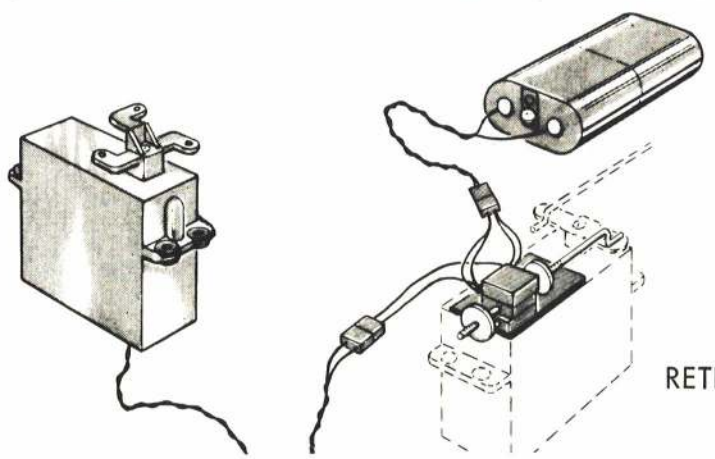

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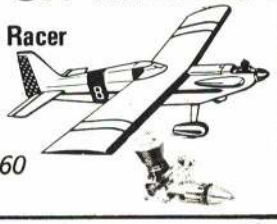

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Total list value $38.15
SALE **$28.00**

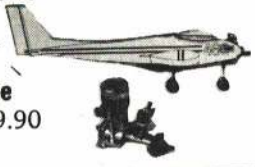
Ace 2T KIT
50" span, stable, 1 or 2 channel
and
Cox Golden Bee .049 Engine
Total list value $22.65
SALE **$17.00**

ACE HIGH Glider
70" span, 1 or 2 channels
and
Cox Babe Bee .049 Engine
Total list value $21.20
SALE **$16.00**

Lanier PINTO A-R-F and
Fox 25 RC Engine
Total list value $65.90
SALE **$45.00**

Dee Bee CARDINAL A-R-F
and
McCoy 19 RC Engine
Total list value $62.90
SALE **$42.00**

World Engines HAWK 460 Foam A-R-F
52" Span, 4 channels
and
Fox 36 R/C Engine
Total list value $49.90
SALE **$35.00**



RCM BASIC TRAINER
50" span, 2,3, or 4 channels
and
McCoy 19 RC Engine
Total list value $50.90
SALE **$38.00**

Midwest TRI-SQUIRE
and
Fox 15 R/C Engine
Total list value $33.90
SALE **$23.00**

Bridi RCM TRAINER
and
K & B 40 R/C Engine
Total list value $81.95
SALE **$59.00**

Midwest SWEET STIK
and
Fox 40 RC Engine
Total list value $59.90
SALE **$39.00**

Sig PIPER CUB J-3
71" Span,
4 Channels and
McCoy 35 R/C Engine
Total list value $48.90
SALE **$38.00**

Carl Goldberg FALCON 56
and
OS 20 RC Engine
Total list value $44.93
SALE **$31.00**

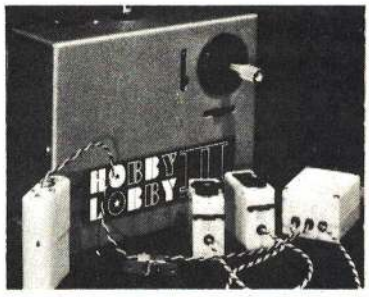
Du Bro "Whirlybird" HELICOPTER
and
K & B 40 RC Engine
Total list value $162.00
SALE **$109.00**

NEW! Goldberg TAIL WHEEL BRACKET – $.40
Easy to mount – just cut a slit in bottom of fuselage.

HOBBY LOBBY 2 Digital Proportional

A complete, ready-to-fly 2 channel digital proportional system with excellent range for demanding uses such as RC gliders, and with the built-in ruggedness that beginners need. **$79.95**

The SINGLE double-axis stick for rudder and elevator will make your transition to 4 and 5 channel control much easier than if you should get used to using your left hand for elevator on a cheaper 2-stick two channel outfit. Outfit includes; transmitter, receiver, 2-world engines S-5 servos (interchangeable with Blue Max Mark II systems), battery box and switch harness, 27 mhz. Outfit uses dry cells (not included). Add $6.50 for 72-75 mhz. band.



NEW! Carl Goldberg RETRACT POWER SYSTEM *List Price $29.95*
Special Price $25.97

This well-designed collection of gadgets enables you to operate retract landing gears from the throttle trim positions on your 4 (or more) channel digital propo.

Outfit consists of a very powerful "servo" 2 pencell battery box, and "trim switch" that fastens on to your throttle servo.

Some nice features:

(1) SLOW and SCALE-LIKE retracting. The servo takes 3 seconds stop-to-stop.

(2) More than adequate POWER for 3 gear retracting of Goldberg, ProLine, KDH, Violett retracts.

(3) 150 degree movement, not 180 degree which can bind pushrods (clever?)

(4) Staggered height servo output levers.

HOBBY LOBBY ILLUSTRATED CATALOG $2.00

TRY US OUT! J. C. did
"I wish to thank you for your fine service. Everything I have ordered from you has arrived in good shape and in a short time. Thanks!"
J.C. Melbourne, Florida

Here's the best deal we've ever offered on a Blue Max Semi-Kit – List price $265.00

Blue Max 6 CHANNEL Digital Proportional SEMI KIT... $168.00

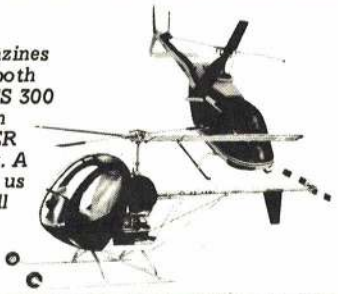
with 4 FULLY ASSEMBLED SERVOS

The Blue Max SEMI KIT is still the least expensive way for you to acquire a multi-channel digital proportional system. Assembly is easy in that the tedious assembly of the small electronic components to the printed circuit boards has been done at the factory.

Outfit includes semi-kits for transmitter, receiver-decoder, charger, and 4 assembled servos. Complete n-cads, factory warranty on all factory assembled P/C boards. Your choice of 27 or 72-75 mhz. frequencies.

HELICOPTERS

By the time this ad appears in the magazines we expect to have both the DuBro HUGHES 300 and the MRC-Kavan BELL JET-RANGER helicopters in stock. A quick phone call to us (615/834-2323) will get you availability information and our low prices on these machines.



Hobby Lobby's

Senior Telemaster

$57.95

HOBBY LOBBY SuperTorque Electric Starter

$19.95

R.E.C. WRITES:

"I am in receipt of your Super-Torque Starter, and in my opinion it is a fine quality unit. I am at a loss to understand the price. After examination of the unit I would have had no objections to paying more for the item."

Your prompt shipment was far better than I have experienced in the past from other houses. And as time permits, I will be ordering further items from your company." *R.E.C. California*

SPECIAL!

Weller 30 SECOND AUTOMATIC GLUE GUN

List price $12.95
SPECIAL **$8.97**
(until June 30, 1973)

Box of 60 glue sticks – $2.59

CHEAP!

HOBBY LOBBY BRAND X WHEELS

CHEAP!

2" pair	$1.40
2¼" pair	$1.55
2½" pair	$1.65
2¾" pair	$1.75
3" pair	$1.95

NEW! Hobby Lobby's COMPLETELY *Ready-to-Fly* 3 CHANNEL AIRPLANE...

Ready Bird 23

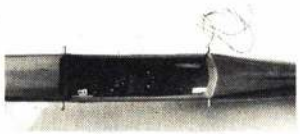
$199.00

The READY BIRD 23 is an almost fully assembled Lanier airplane with an EK Products "Little Red Brick" 3 Channel digital proportional system FULLY INSTALLED, a Fox 25RC engine INSTALLED, and pushrods, wheels, fuel tank . . . EVERYTHING . . .FULLY INSTALLED AND ACTUALLY READY FOR YOU TO FLY!!!

We actually have a problem describing the READY BIRD 23 because THERE HAS NEVER BEEN ANYTHING LIKE IT! The airplane itself is a new 50" span plastic Lanier plane with a symmetrical airfoil wing that gives steady 3 channel handling characteristics even in wind, but retains enough stability to make the plane ideal for beginners. The READY BIRD 23 is designed for 3 channel operation (rudder, elevator, throttle) and your READY BIRD 23 comes with the excellent EK Products "Little Red Brick" 3 channel digital proportional INSTALLED. (You DO need to charge up the rechargeable airborne batteries – sorry about that!!)

The *Ready Bird 23* comes with a Fox 25 RC engine INSTALLED

The correct Sullivan fuel tank is INSTALLED, the pushrods to rudder, elevator, throttle and steerable nose wheel are INSTALLED, and the clevises are even pre-fitted to fit the elevator and rudder horns.

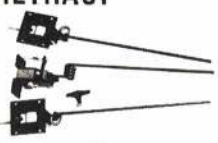


What we're trying to say is that READY BIRD 23 is READY TO FLY—it's NOT an ALMOST-ready-to-fly!

If you were to take the READY BIRD 23 out to the flying field here are the items you'd need that are NOT included in the kit as you receive it from us: Epoxy glue, Can of glow fuel, starting battery and glow plug clip, 9 volt dry cell for transmitter. EVERYTHING ELSE IS IN THE BOX.

NEW! Violett Aero RETRACT LANDING GEAR

3 Gear Set **$39.95**

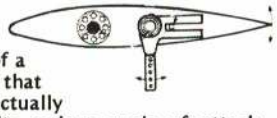


These small retract units are unique in several respects –

1. There is total resistance to collapse—even under varying amounts of retract servo pushrod travel.
2. Main gear units are only 1" high, and no portion of the mechanism projects out of the unit during operation.
3. Construction is red anodized, extruded, and cast aluminum in conjunction with plain and fiber-filled nylon.
4. Installation is very simple due to small size, non-critical linkage requirements, easily removeable struts.

NEW! Violett Aero FLYING FORK

(FLYING STABILATOR DEVICE) **$4.95**



The advantages of a "flying stab" are that the tail plane is actually flying through its various angle of attack changes instead of acting as a deflector and drag device, and zero decalage trim is always available at your transmitter (rather than back in your workshop!) The Violett Aero "FLYING FORK" SEPARATES the stabilator pivot point from the control point. This feature permits STRONG installations as the control point has a terrific mechanical advantage against the pivot point.

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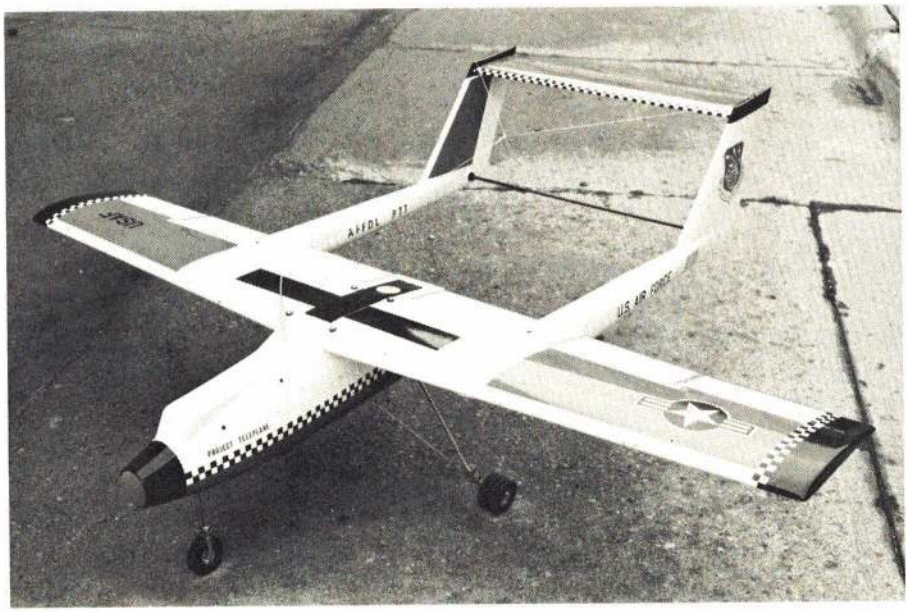
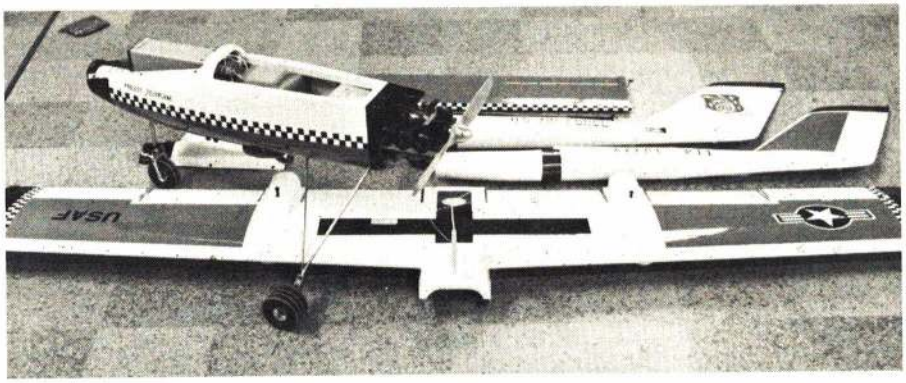




Top: Half-scale Teleplane design called "Sparrow." It will be a full AAM construction project in a future issue for those so inclined toward big models able to carry large loads and cameras. Above: Fuselage center part houses all the electronics systems, TV camera fuel, RC gear, etc. for the "Sparrow." It is mostly fiberglass. Right: Schlueter helicopter tested for certain obvious RPV applications but needs fulltime autopilot for hovering, takeoff, and landing.

Project "Teleplane" was conceived by the Air Force Flight Dynamics Lab, WPAFB, Ohio as an in-house capability for designing, fabricating and flight testing experimental military aircraft concepts in sub-scale form through the use of remote control systems. The availability of an inexpensive, sophisticated modeling technology in proportional control equipment and vehicle construction, plus military drone technology provides the basis for vehicle mechanization.

The name "Teleplane" is a contraction for television and plane and infers the use of miniature television cameras in small, remotely controlled aircraft. In fact, the availability of miniature cameras from the space program and other miniature sensory equipment coupled with modeling technology makes the project feasible and desirable.

The activity is primarily centered around the premise that experimental remote piloting investigations in sub-scale form yield results applicable to larger or full-scale operational counterparts. This is certainly true; however, the program has already yielded results directly applicable to operational systems on a one-to-one size scale basis. Some missions require small remote-controlled aircraft capable of flying a few miles, carrying a few pounds and performing missions such as reconnaissance, target marking, decoys, message delivery, relay, weather sampling, etc. These aircraft then become direct extrapolations of radio-control model aircraft.

Flight data obtained from the small birds applicable to larger scale craft are television characteristics such as resolution, field of view, scanning capability, three-dimensional displays and other flight data such as the need for mechanization and display of altitude, airspeed, heading, etc. In addition, the nature of the ground control system such as TV monitors, controls and cockpit simulation are determined.

Essentially, the project has as an objective determination of the characteristics of vehicle design, sensory equipment and display systems necessary to perform typical military RPV missions.

Aircraft Design

The name of the game in determining the design characteristics of test aircraft in addition to the necessary flight qualities is payload—how much and what does it do? This is a somewhat elusive quantity in laying out a general purpose program since all individual experiments are not nailed down at the outset.

In this project we approached this in a combination fashion. First, we determined in as much detail as possible the known experiments; this formed a sort of lower boundary. We then projected

TELEPLANE

An Air Force program which uses modern RC modeling technology in studying and developing useful Remote Pilotless Vehicles. / by Don Lowe

an upper boundary based on the limitations of technology and our ability to handle the task in-house and perform most flight experiments locally. This resulted in the need for a range of vehicle sizes for efficient operation. It was also found that standard aircraft models could be used for some experiments. Other experiments required very large models and two such special models have been procured and modified.

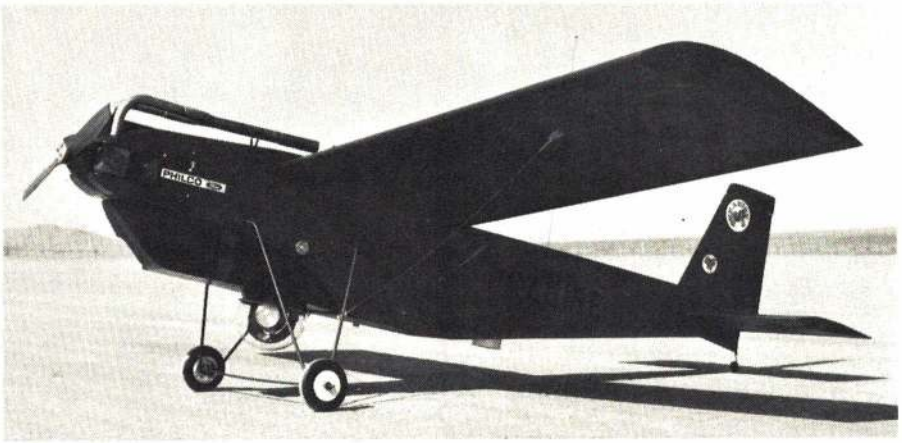
The upper boundary in size is presently conceived as a 200-lb. airplane and is under construction. You might logically wonder how in the world can model control equipment handle such a beast; what do you power it with and how do you build it? Well a 200-lb. airplane is in a class by itself—much bigger than models and smaller than man-carrying aircraft. It turns out that you extrapolate from both directions.

We plan to use standard model control equipment with increased transmitter output for longer range operation and special high torque servos. The structural concept employs fiberglass body parts and a foam, sparred wing covered with plywood. We will power it with a 12 hp McCollough go-cart engine using a soft mount to take out the terrific vibration of the engine. Wheels are a problem; these will probably be light aircraft tail wheels.

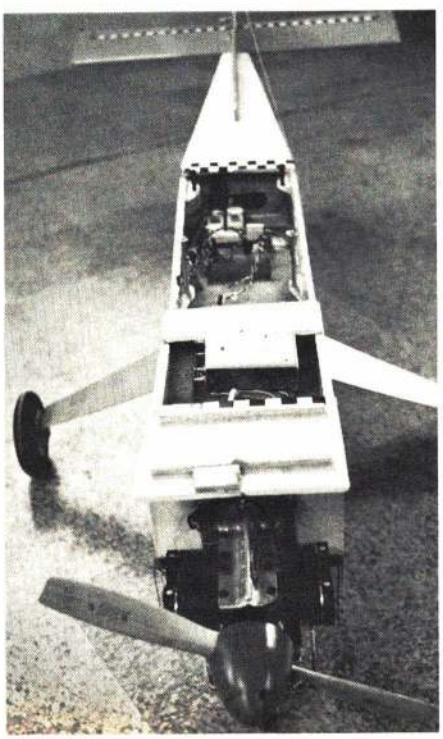
The servo problem has already been solved. We mechanically modified the small military "Bikini" drone servos and added a proportional amplifier. The electronic task was handled by World Engines of Cincinnati using a special form of their standard servo amplifier with added power amplification. So we now have a servo developed at very modest cost, having about ten in.-lb. of torque, which is very fast and has nominal power consumption. We feel that this servo represents a happy marriage of model and military drone technology.

Sparrow: A half scale version of our 200-lb. design, the *Sparrow*, has been built and flown. The aircraft has been flown at 24 lb. weight using Ross four- and six-cylinder engines for power and a modified Sony portable TV camera and small 100 mw video transmitter for RPV experiments. The aircraft is a twin boom pusher design with the camera mounted in the nose. Some form of pusher or a design which clears the nose for a camera is required for most RPV flight experiments.

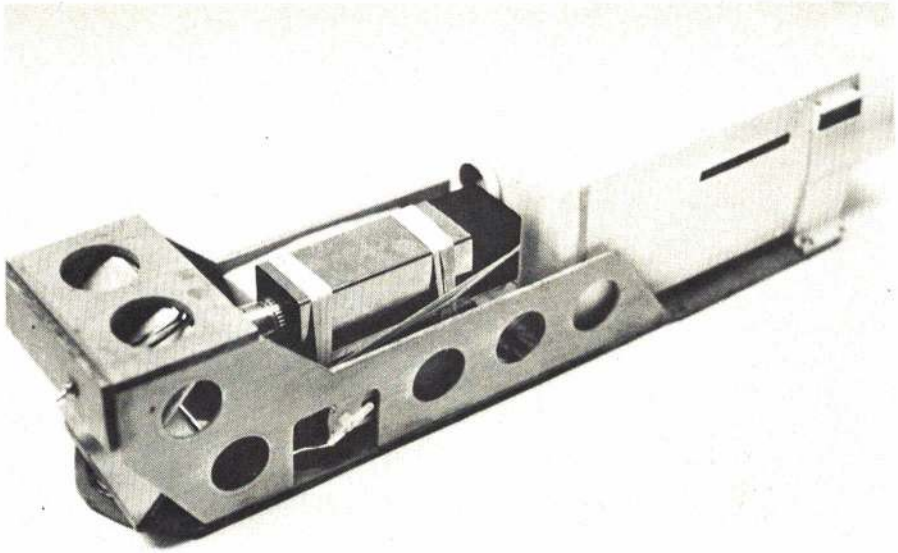
This aircraft has been flown a number of times with good results. It handles and tracks beautifully and makes a good stable test bed for RPV experiments. It incorporates flaps for takeoff and landing and is fabricated of fiberglass, foam, balsa and plywood. It has been flown at 3 lb./ft.^{2} wing loading which is a bit on the heavy side by



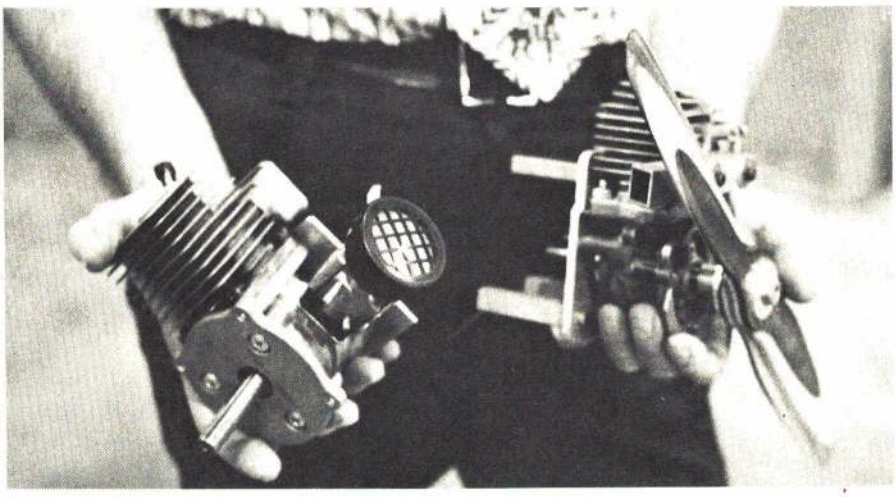
Air Force project "Praeire" aircraft. Designed for target marking, was preceded by feasability demonstrations in Teleplane program.



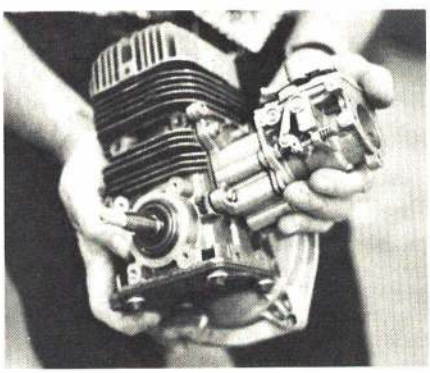
Above: "BOB" is a highly modified 11-ft. span bird used in early RPV experiments and for laser target marking tests. Left: Ross four-cylinder motor powers this heavy "Big Daddy" model. Below: Modified "Bikini" all-metal drone with 4.5 hp ignition motor is flown with Kraft dual-conversion radio. Flown at 44 lb.

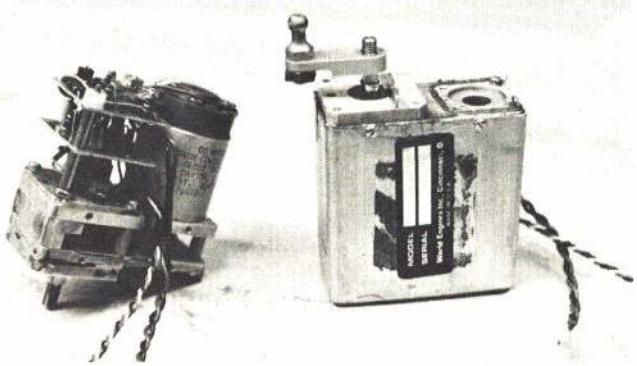


Payload carried by "BOB" includes nine-oz. TV camera and mini laser unit. Gimbled mirror moved in pitch and yaw by a second onboard RC system.



Above: Small industrial engines have been used. At left, a stripped-down O&R two cu. in. engine, and at right a 2.7 cu. in. engine. Right: Best power-to-weight engine is this 12 hp McCollough go-kart motor for use in the full-size 200-lb. "Eagle" RPV. Below: Modified "Bikini" drone servos are equipped with beefed up World Engines amplifier. Gives tremendous thrust and speed.





model standards. It performs very well with the wing design used but must be flown during takeoff and landing by skilled pilots. Full-scale aircraft handling qualities are much in evidence at this wing loading. Ground target tracking experiments via video indicates relative ease in holding cross hairs on a target.

One basic conclusion drawn from flying this bird and an earlier ship by video is that it is not a difficult task with minimum instructions required. In fact it's an easier task for the uninitiated to fly the bird via video than externally in a normal model aircraft fashion.

BOB: Another craft used early in the program was a highly modified 11-ft. wingspan model originally built as an altitude record aircraft. This model was lightly constructed and employed a high lift, high aspect ratio wing design.

It was flown in a variety of configurations, initially as a tractor design with a small TV camera and later modified to accommodate a very sophisticated target marking experiment. In final form, wing dihedral was drastically reduced, the vertical fin much enlarged to reduce yaw oscillations; the engine was mounted over the wing in tractor fashion and a nine oz. Westinghouse experimental camera and an experimental mini-target marking laser were installed. The camera and laser were mounted in parallel and boresighted together. They viewed the scene through a movable mirror system allowing slewing of the field of view in pitch and yaw. The mirror system was controlled by two channels of a second proportional control system operating on a different frequency (27 MHz) than the primary flight control system.

In its all-up configuration the aircraft incorporated a Ross 4 engine for power, a Kraft six-channel control system (72 MHz), a World Engines system to control the mirror system (27 MHz), a nine-oz. TV camera with battery, a 4.5 lb. laser with battery supply and provisions for turning it on and off, and a 100 milliwatt video transmitter and battery to provide the real time video link.

The craft in this configuration was flown many times at 20 lb. gross weight in target designation experiments. In operation one operator flew the aircraft and a second operator independently kept the cross hairs on the target by viewing through the TV and slewing the mirror system. We found early in the program that care must be taken to eliminate the vibration input to the camera since this caused picture smear and jitter. The Ross engine performed this chore beautifully since their four- and six-cylinder engines are almost devoid of vibration. A single-cylinder engine would require a very soft mount to be acceptable. This aircraft was also flown in RPV piloting experiments using the modified Sony camera. The ship flew over 100 times in very fruitful experiments and finally met its demise due to failure of a "buddy box" modification in the transmitter.

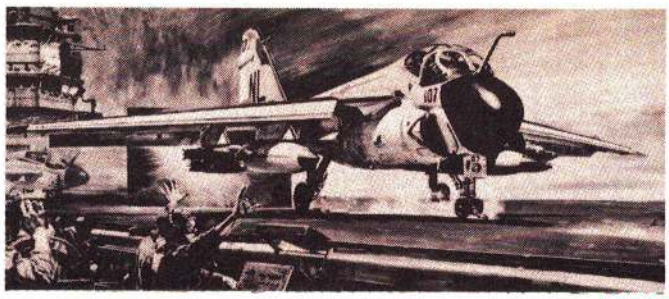
We called this bird *BOB* (the big orange bird) and it served us well. The Air Force has rarely derived as much

(Continued on page 85)

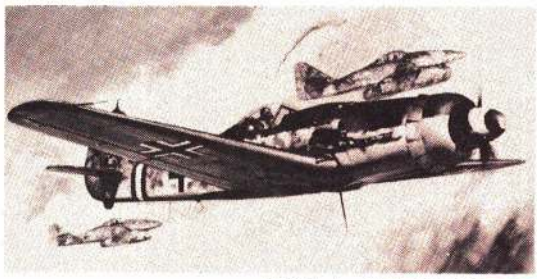
air strike

1:48 SCALE

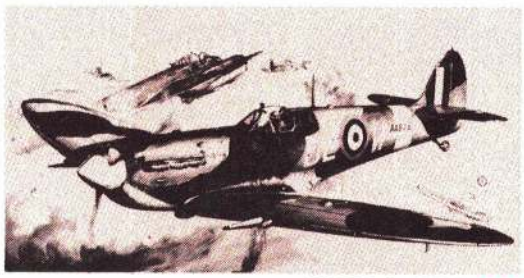
778 U.S.A.F. Douglas F4E Phantom **$6.00**



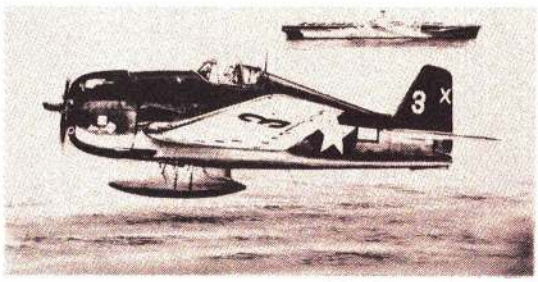
777 U.S. Navy Grumman A-6A Intruder **$5.00**



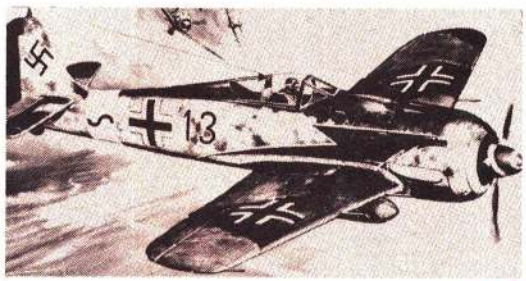
764 Focke-Wulf 190 D-9 **$3.50**



765 Spitfire MK.V. **$3.50**

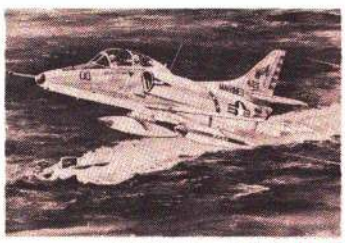


766 Hellcat F6F-5 **$3.50**

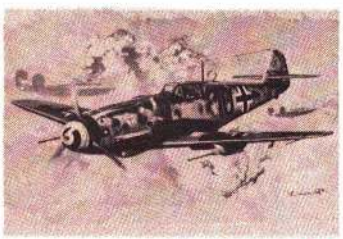


767 Focke-Wulf FW-190A **$3.50**

783 Dassault Mirage IIIC **$3.00**

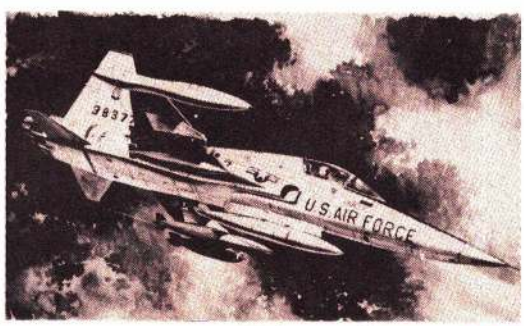


784 Skyhawk TA-4F **$3.00**



785 ME-109G **$3.00**

781 Northrop T-38A Talcon **$2.50**



782 Freedom Fighter F-5A **$2.50**

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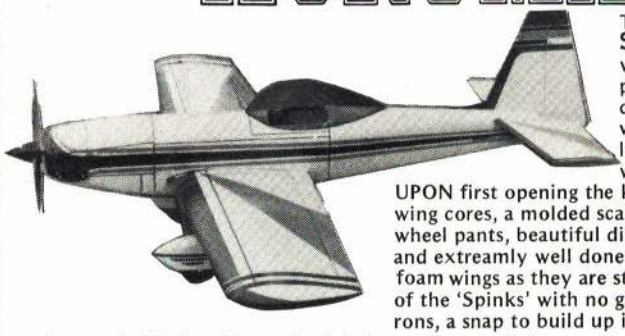
Stand Off Scale
Mid engine size
(.21 to .40 disp)



THE SPINKS ACROMASTER was an American World Championship Class Aerobatic airplane designed for Arestikey manuevers. Because of its good looking lines and great r/c flight handling we felt it a natural for kitting.

UPON first opening the kit you'll spot pre-shaped foam wing cores, a molded scale large canopy, vacu-formed wheel pants, beautiful die-cut hardwood and balsa parts, and extreamly well done easy to read plans. We selected foam wings as they are strong, build true and in the case of the 'Spinks' with no gear in the wing and strip ailerons, a snap to build up in a few hours. Complete instructions to build the wing are included as well as the balsa wood skins. This Spinks Acromaster is perfect for your first "low-winger" or great for those who have been looking for a fast building good looking medium sized (.21 to .40 power) that will perform the whole pattern with ease. It's very roomy inside taking most any r/c gear. The best part is the price – $29.99. If kitted by one of the manufactures for distribution, . . . it would sell for sure at $45.00!

ORDER one today, – if you don't agree it is a really superb kit, then simply send it back for a full refund.

For four channel radio systems.

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Engines/ .21 to .40 disp.
Radio/ Full-house 4 channel system.
Wing span/ 54" foam wing cores.

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- Full size easy to read plans
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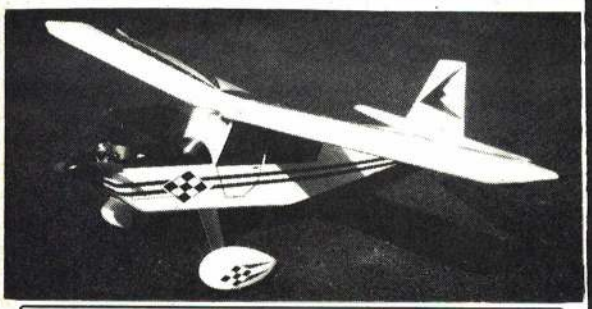

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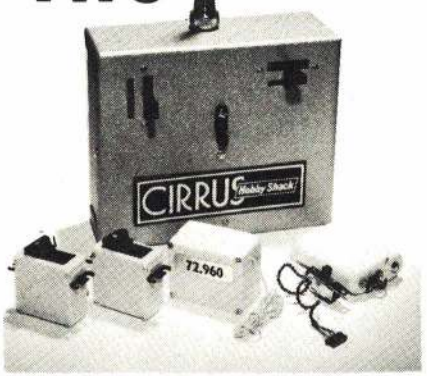

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Kraft KP-2B radio system	$119.95	$102.00
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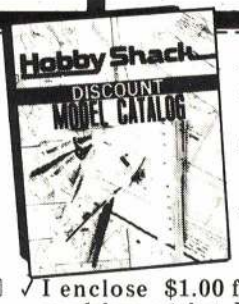

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BOB STOCKWELL ON RC

Editor's Note: *There could not be a finer author for* **AAM's** *column on RC Pylon Racing than Bob Stockwell. He's thoroughly involved in the NMPRA organization and he and his son Whit are very active racers. This column will cover all aspects of RC Racing, Formula I, II, FAI, and Q-Midget.*

No matter what you are doing in racing, building, testing, thinking, or basic questions, do submit them to Bob by writing c/o **AAM.** *Racing interests many, but usually has only a few participants. If you want a lively and involved column, support it.* **AAM** *pays for submitals used including photos, ideas, drawings, etc. —Ed Sweeney*

NMPRA Membership Questionnaire Results: Last month I noted that the Southern California District, for the third year in a row, started the season with an extensive questionnaire to determine what the NMPRA membership really thinks about the various questions of rules, procedures and equipment. Through the courtesy of Chuck Smith, So. Cal. NMPRA Vice-President, I am now able to report the results.

The district voted 56 to 7 in favor of establishing two racing classes in Formula I, to be called "Standard Class" and "Expert Class." The two classes will not fly together: There will be separate heats, separate trophies, and, to a certain extent, separate point accumulation. Initially, membership in the two classes will be by flier's declaration, just as in Pattern. The initial survey of the district revealed that 24 active fliers count themselves as in the "Expert" class, and 31 in the "Standard" class. A flier can move up to "Expert" anytime he chooses to, but he *must* move up after he accumulates ten points in a system where he gets five for 1st, four for 2nd, three for 3rd, two for 4th, and one for 5th. In short, just as in Pattern, he has to move up when he gets too good for the competition in the lower class.

The system of point accumulation is a little tricky. In the district, all experts will automatically accumulate points on the basis of total entries at the contest, with the top "Standard" class flier counting as one point below the bottom "Expert" entry. So in effect, for district standings, the obvious penalty for Standard class entries is that they count themselves out of the championship competition. But for the *national* point standings, only the number of Expert entries will count *at all.* This decision is enormously disadvantageous to the So. Cal. experts in comparison with national point accumulation elsewhere in the country, since their numerous large contests will be cut in half, more or less, for figuring national points. And a flier who is 10th in Southern California under this system could easily end up 50th or 60th nationally, well down the line behind fliers he could beat any day in the week with a worn-out engine.

The logic of the refusal to count the non-experts for national standings is that the experts will not actually have flown against them directly in heat races, so their numbers should not count in figuring the points awarded to the experts. So, unless someone like Bob Smith or Terry Prather wins virtually all of the So. Cal. races, as they have for the last three years, there's no way a Southern Californian will accumulate the points that three or four top fliers in the Northeast or Southeast should be able to. However, offsetting this disadvantage are two facts: In Southern California we are sure to have more exciting races, with all the fast guys together in heat after heat. There is intended to be a National Pylon Championship at the end of the season to determine the *real* NMPRA champion for 1973, and the point system is only an emergency back-up measure just in case something happens to prevent the championship from being determined in such a final selective contest.

Now the big question: How did the Southern Californians vote on the two questions that were posed about slowing them down? One question was whether the speed capability for the future (not this season) should be reduced, by whatever device. The vote among active pilots was two-to-one *against* it, and among the membership-at-large approximately three-to-two against it. The other question was whether *drastic* steps should be taken to slow them down in 1974-75, to times around 2:30. On this question the vote

No surprise at all—Bob Smith overall NMPRA season Champion in Formula I with K&B-motivated Miss DARA. He won first in six out of seven meets!

was two-to-one against it in the membership-at-large, and more than three-to-one against it among the active pilots.

This vote appears to show conclusively what the Southern California sentiment is about speed. They want to go as fast as technology and skill will enable them to go. The slow-them-down-before-it's-too-late gang, including Cliff Weirick, Granger Williams, and myself, have lost this argument for now, at least, and all we can do is retire gracefully and lick our wounds. My own feeling is that the only thing to do now is dig in and compete to the best of our ability, and hope to God that nothing happens to make us all regret this decision. In particular, we must take every imaginable safety precaution, and to the credit of the Southern California membership I am happy to report that they gave strong support to every other safety suggestion that was made. Every airplane is going to be inspected for safety before flying-wing off, radio installation, hinges, everything that an expert can tell by careful examination. And also, the black flag is going to be used *vigorously* for dangerous flying, with a safety officer at every event whose authority, in this matter, *outranks* that of the C.D. In general the Southern California group will insist on more distance to the pits, fewer people out on the course in the danger zones, and more black flagging.

Finally, it appears that we will require pre-entry to avoid frequency conflicts with the 1st 25% on any frequency getting to fly, the rest having to change. That way we'll always have four-plane heats.

JOHN SMITH ON CL

Clean Engines: A couple of months ago we published pictures of the dirt removed from an engine using a Sonic Cleaner. Since then I have received a number of letters confirming our findings, along with suggestions that modelers who have access to such a cleaner work out deals with their fellow fliers to clean parts for them. While attending the Toledo Weak Signals RC Conference in February, Johnnie Brodbeck of K&B thanked me for reporting the problem and stated that K&B is now cleaning their engines before shipment. Credit should be given them for doing this operation.

Glenn Lee with his TWA tuned pipe FAI design at the NATS last year, where he won the Danny Bartley Memorial Award.

So You Want To Fly and Fly and Fly: Come to Cleveland, Ohio on August 25-26 for the 38th annual running of the Junior Air Races. Always a fun contest with over 50 separate CL events in all age divisions, this year's contest looks even better with unlimited flights in CL Speed and Navy Carrier. Simply stated, the more you get in line, the more you get to fly. Flights will be grouped in threes for record purposes. Camping at the field, Saturday night movies, swap shop, auction, special Powder Puff races for your wife or girl, and nine circles to fly from, eight black top and one grass, trophies to fifth place for Juniors. Details from Cleveland Aeromodel Society, P.O. Box 16091, Cleveland, Ohio 44116.

St. Louis Gets FAI Finals: St. Louis has been selected as the site for the FAI CL Finals to pick the '74 CL Team. While it may be too late to enter the program for this year, just attending the meet as a spectator is an experience in itself. The top CL fliers from throughout the United States will be there trying for a place on the team to represent the U.S. in Europe next year at the World Championships. These people are the best there is in Team Race, Speed and Aerobatics. If you're in the area, stop by and watch.

My predictions are that Team Race will be won with at least a 4:05 and Speed will need 162 mph to make the team. Don't know where the new '74 CL shirt patches are, but hopefully they will be on sale by Nats time.

Speed Fliers Unite: Bill Pardue (1201 Surry Dr., Greensboro, N.C. 27408) sent out a questionnaire to many Speed fliers earlier this year regarding new ideas, safety regs, some possible engine size changes, etc. The questionnaire was sent to all parts of the country to get the feelings of a cross section of Speed types.

Many replies were received and proposals were sent to the CLCB. Due to magazine lead time, and the April 1 deadline for rules change and additional proposals to be at AMA, things were done quickly. A note to Bill will fill you in if you are interested in his findings.

Now what is needed is a meeting at the NATS this year of all Speed fliers. New rule proposals for '75 will be due next April 1 (1974) and many things need to be talked over. This should be a *must meeting* for all Rat Race, Team Race, Goodyear and Speed fliers. Every effort will be made to find a suitable meeting place early in the week for this meeting. Notices will be put on the bulletin boards and at each processing table. Look for them, and if you don't see them, ask.

Line Diameters Problems: Every now and then the problem of undersize lines crops up. Not one or two thousandths under, but two or three tenths. Probably not enough to make you go any faster, but enough under the "plus anything, minus nothing" rule in the book. Records have been lost, fliers have not been allowed to fly, and in some cases, like the '67 NATS, a general confusion when it was found that many fliers were undersized.

A discussion with Mattie Sullivan, Sullivan Products, who is a big supplier of control line of Pylon brand, brought out an interesting point. It seems that line or wire manufacturers have a minus .0005" on the die when wire is drawn. This means that a die for .008 wire starts out at .0075 and is run until it reaches or "wears" to .0085. The same goes for all sizes—.012 starts at .0115, .016 starts at .0155, etc. So it seems as if the book must be changed to allow a .0005 minus dimension on all solid control line wire. Stranded or braided will show an undersized measurement after being used or pulled as the individual wire strands will tighten into a tighter bundle under tension. So all you CDs, use some discretion when measuring lines. If one is found undersized, and is less than one half thousandths under, it may have been run through a die with tolerance on the low end. This seems to be a problem we'll have to live with.

Where the Action Is columns are what you readers are doing, making, or flying. Support your columnist with articles, photos, and ideas. Sketch your neat gadget. We'll draft it for presentation. Each item earns you a $5 bill. Submit to the writer, c/o AAM.

A coming Q Midget feature article is this very smooth "MISS DARA" by Loren Jacobson.

MODEL TECHNIQUES

FRED MARKS ON RC

WARNING: Don't use the receiver printed circuit presented in the June issue. The printer cropped the print used to make the page layout and some of the edge lands were removed. We are providing a corrected printed circuit board for the receiver.

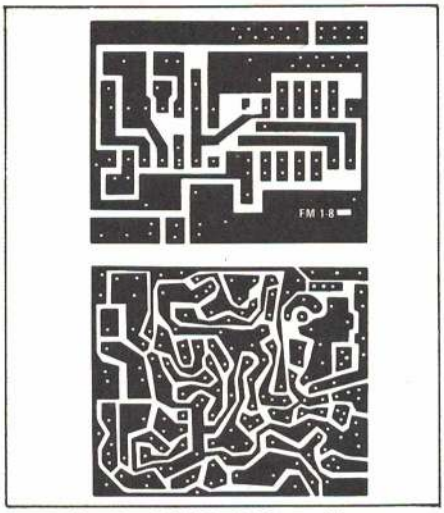
Using the AAM 1-8 Receiver/Decoder for Servos Requiring a Negative-going Pulse: The layout printed in the June issue is intended for use with servos requiring a positive-going control pulse and it is stated that the decoder cannot be used with servos requiring a negative-going pulse. More recent experimentation has shown that the decoder can be used with servos requiring a negative-going pulse.

The investigation of this possibility followed a request from a local modeler for a receiver/decoder to replace an F and M airborne set lost in a fly-away. Since the F & M is no longer available, we looked about for a suitable substitute. Jim Fosgate of Pro-Line revealed that their system still uses a negative-going control pulse from this same SN74L164 shift register IC. It was then found that the AAM 1-8 decoder can function either way with only a change to the printed circuit board. The shift register has the capability for "shift left-shift right." Simply by selecting the proper mode, the flip-flops are set on Q rather then Q-bar until the clock pulses arrive, just the reverse of the explanation presented last month. The decoder pulses are negative-going and reach essentially ground voltage.

The printed circuit for the decoder shown this month is for a negative-going pulse. This is identified by the addition of the "minus" sign after 1-8 on the board. Absolutely no change is required to the component layout—just use this board for negative-going and use the one shown last month for positive-going. In either event, use the corrected receiver printed circuit shown this month.

We wish to acknowledge and express our appreciation to Jim Fosgate for this suggestion. It truly makes the 1-8 a universal decoder and will be of great interest to those who have such sets as the F & M, MAN 2-3-4, and others which use a negative-going pulse.

AAM Commander Servo Performance: We were a bit surprised at the trace of system resolution presented in the **AAM** Test of the ACE kit of the Commander last month, so we made a quick investigation. Our last statement in the 1-8 Receiver/Decoder article was that the builder might wish to make a couple of changes in the servo amplifier, namely, reduction of two 47k resistor values to 33k and increase of two from 15 ohms to 33 ohms. We further stated that it appeared to make no discernable difference in resolution. It apparently does when accurately measured as



we do for the **AAM** Tests! Some 16 servos we use have these values in them. A check with our protractors and pointers shows that it introduces more lag than casual observation indicated. This slightly less perfect resolution is not at all noticeable in flying a model, but does prompt us to state that the change in the two 47k resistors should not be made unless the modeler feels that the servo is tighter than he really needs. Faster transmitter repetition rate, cleanness of pulses, etc. all affect servo resolution. Broader resolution is more tolerant of these variables.

Checks of systems made by two manufacturers, other than ACE, who use the World Engines IC indicate the same characteristic.

Note: Film negatives of the printed circuit layouts for the receiver and for both the positive- and negative-going decoder board are available from **AAM** Plans Service for $1.00.

Who's Listening?: We received a most thought-provoking letter from Walter Clark and have since had the opportunity to converse with him twice by telephone.

Walter's letter was inspired by some problems encountered with the Heathkit GD-19 series transmitter. His problem was caused by the antenna fitting which has troubled many, and for which we have presented at least two fixes. Save the back issues, fellows! He has since solved that problem but was troubled by some advice from Heathkit "that the output transistor may have become weak." He wanted to know if this could be so. The answer: It certainly can be, especially if you make a habit of running a transmitter for extended periods with the antenna collapsed or removed.

This is true for all RC transmitters. The output transistor in a transmitter normally feeds a tuned circuit which provides the proper impedance match and of which the antenna is a part. The impedance match is correct only when the antenna is fully extended. With it collapsed, the transistor must absorb much unnecessary output energy and re-radiate it as heat. The heat can cause a gradual degradation in transistor performance, i.e., it dies slowly.

Walter then states: ". . .are you aware that perhaps your biggest readership is made up of Heathkit owners?" Perhaps so, but don't forget that Cannon, Royal Electronics, and ACE R/C also sell kit systems. Walter bases his comment on (1) the fact that there are so many Heathkit systems in the field, and (2) the intuitive feeling that only people who are sufficiently patient and electronically inclined to build kit systems would take the time to read the material. Again, this is perhaps partly true, but remember, we also cover aerodynamics and other techniques.

He follows with a request to see a number of specific items relating to Heathkit systems (which would be equally appropriate for other specific systems). These include:

(1) Conversion of old servos to non-proportional for landing gear operation.
(2) Converting the servos to 180° operation.
(3) Repair information for typical crash damaged servos and replacements for the older 2N2430 and 2N2431 transistors.
(4) Conversion of the transmitter to a buddy-box system.

Other items included the need for a servo current measurement device which can be plugged in-line and the suggestion that the column be "question and answer."

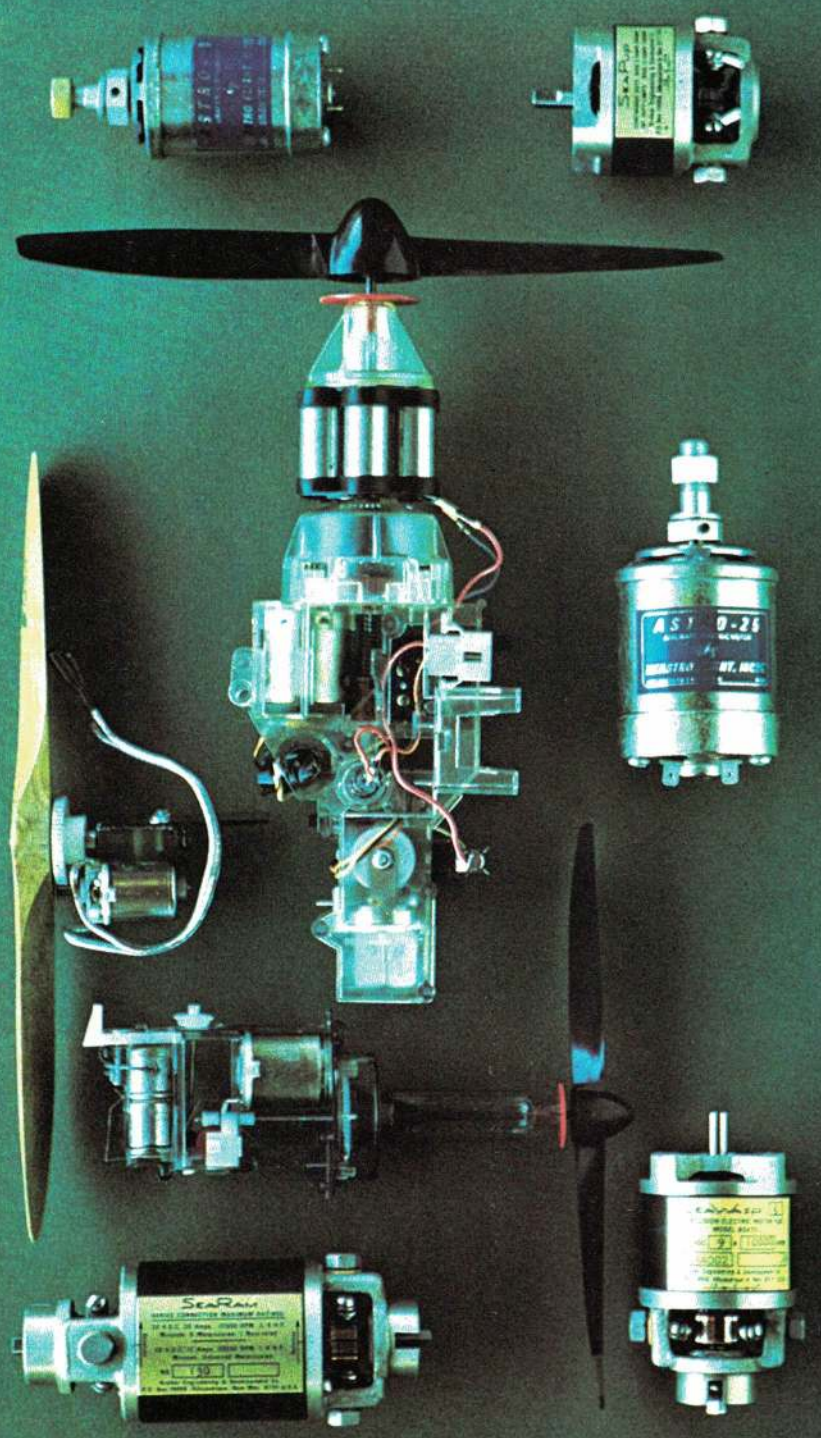
We couldn't agree more with Mr. Clark! This is much of what we have been saying for a long time. There is one hooker, however. Your writer hasn't time to develop all of these things.

We do receive many suggestions for "things" everyone ought to have. Help! We know there are creative people out there who need recognition and the bucks **AAM** pays for good ideas sent to us. I know for a fact that one member of the DCRC rigged up a buddy box for the GD-19; we will dig it up. Others undoubtedly can rig up a switching ammeter to plug "in-line." Further, we are always glad to answer questions and do so in countless numbers of letters we answer personally, although the solution is not often usable in the column. (Many of the letters are on the same two subjects we discussed recently.) Keep those letters coming!

Have you got a technique to share with AAM readers? Here we see the Al Williams "Gulfhawk" Bearcat model by Warren McZura (AAM Annual 1968—still available) started at the first preliminary Scale World Champs. What's your technique for starting an inverted engine such as this model? Send an item to an AAM correspondent. Photo by H. J. Nicholls.

ELECTRIC FLIGHT MOTORS

A new quiet way to fly. Review by Bob Meuser starts on following page.



Cordless Electric Flight Motors

Still no one knows what type of model will be ideal for electric flight. A power pod for use on a semi-free flight design with two- or three-channel radios is quite desirable and the UREI EMF-040, shown here, is to be packaged with this in mind. Timer charging jack and switch are included in the pod.

Flip the switch, and it is up, up the long delirious burning blue, with safe, silent, inexpensive, non-polluting electric propulsion. Gone forever are the greasy kid stuff and barked knuckles associated with the balky glow engine, the impetuous variability of Pirelli rubber, and the mad running through sand and muck to launch a towline glider. Just flip the switch.

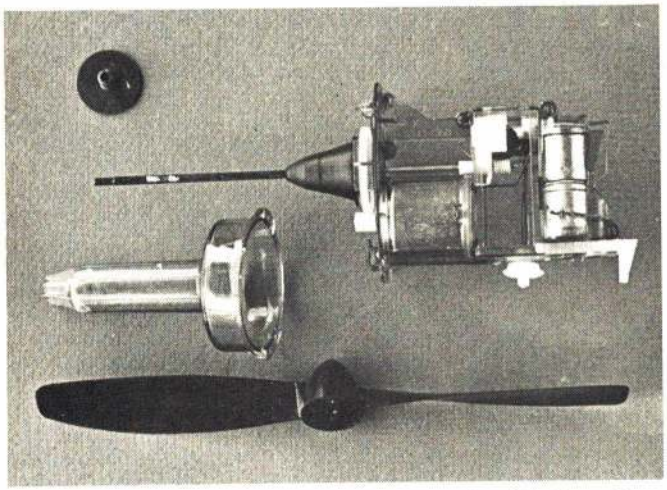
Well, not quite. We shouldn't get too self-righteous about pollution until we examine what comes out of the stack down at the battery works. The inconvenience of greasy kid stuff and balky engines must be weighed against an assemblage of motorcycle batteries, charging cords, meters and the like, although electric propulsion probably has the edge. It can be as inexpensive as a cheapie Half-A. It can also be the most effective money sponge devised by the mind of man if it goes the route of electric-propelled boats in England; there it took the shooting off of $132 worth of short-lived silver-zinc batteries to win the National Speed Finals. It is as safe as a cordless electric toothbrush if the manufacturers' instructions are followed, but before going off on your own, take a good look at a tree—the next one you "see" might be in Braille. And, at best, an electric airplane will not go up the long delirious burning blue very fast, for the best electric propulsion system cannot compete with a mill-run glow engine on a pounds-per-horsepower basis.

Nevertheless, the power can be quite satisfactory for many purposes, and in its simplest form, electric propulsion is as convenient as a doorknob, and as quiet as a clam with laryngitis. The latter is especially important nowadays when RC types, Ukie-jocks, and Free Flighters alike are struggling to find and hold flying sites. It certainly offers a whole new set of enticing challenges, and it deserves the close scrutiny of every serious modeler interested in a bit more than placing Foot L ahead of Foot R along Beaten Path.

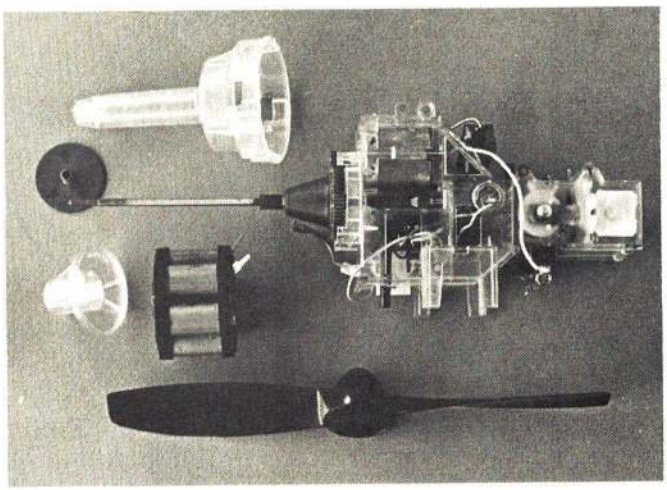
There is now on the market a diverse selection of electric motors, batteries, and complete propulsion systems either specifically intended for model aircraft propulsion or readily adapted to it. In addition, there is a phantasmagoria of untried but potentially useful paraphernalia sufficient to keep anyone with a dash of Tom Swift or J.L. Seagull in him happily frustrated for a lifetime. This article covers the complete propulsion systems that are available—motor and battery combinations, plus auxiliaries.

The table shows the prices and specifications of all of the power units as completely and as accurately as we

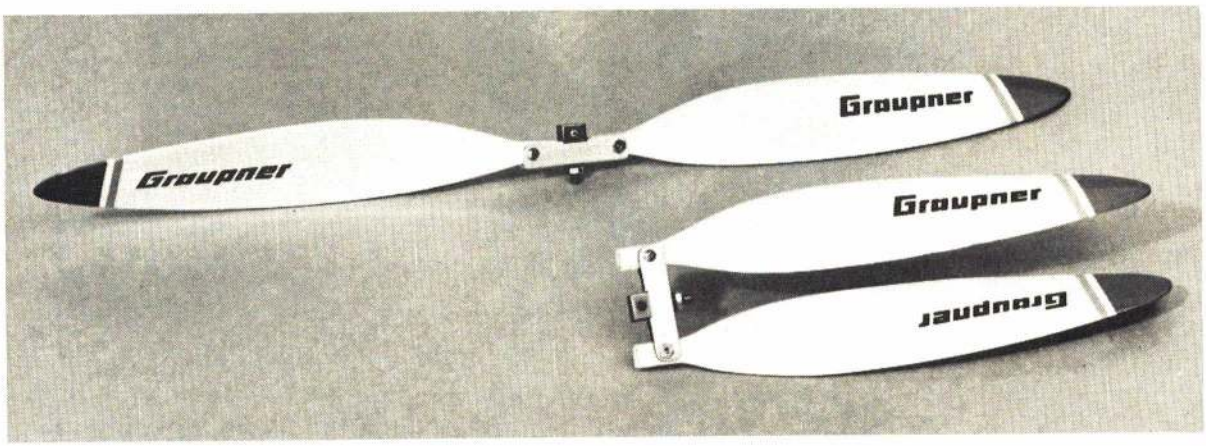
Interested in silent flight? Here's a review of what is available in power systems at this time. The variety is interesting—the performance is good. / by Bob Meuser



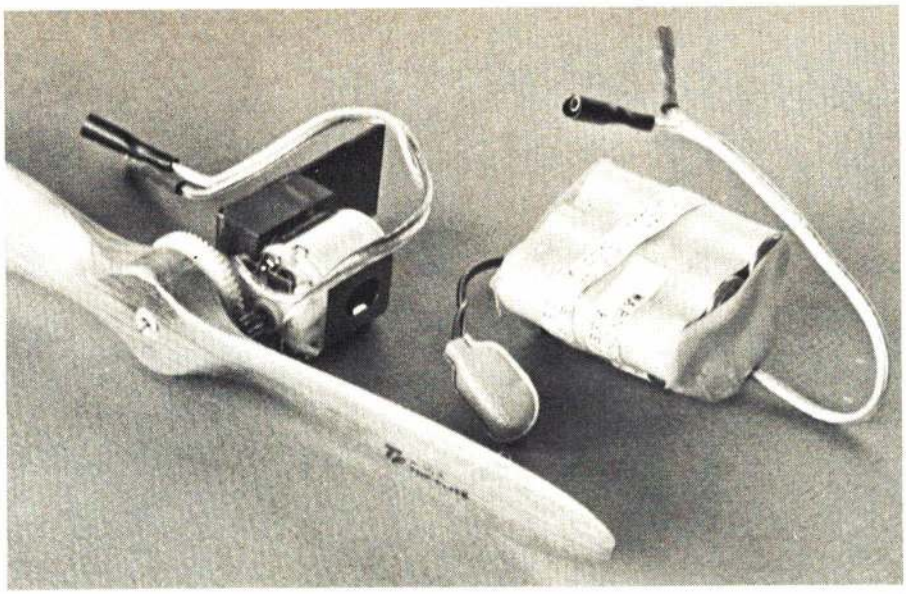
Mattel Super Star free flight model is very popular with all modelers. It really performs. Power unit is separately available from Mattel and adaptable to many homemade designs.



Power unit in Mattel's RC Signal Command is bigger and heavier, but very strong and even self-contains a magnetic actuator and its battery. A cut-down version could power a two-channel RC glider.



Above and left: From Germany comes the Graupner Electro-Prop with its unique folding pusher prop—and it's a geared unit. Battery charger available with it operates from your car battery and is a quick-charge system.



Above: Galler Industries takes a special wound slot-car type motor, gears it, and drives a 10-6 wood prop from a fairly small battery pack. It is a lightweight system and not complicated. Several accessories are available to operate the unit with RC or a timer. Right: From Astro-Flite comes this neat reworked high-performance motor for direct driving standard gas engine type props. Two sizes, smaller unit produces 1/10th hp at peak of battery charge—quite powerful! Larger motor gives 1/4th hp!

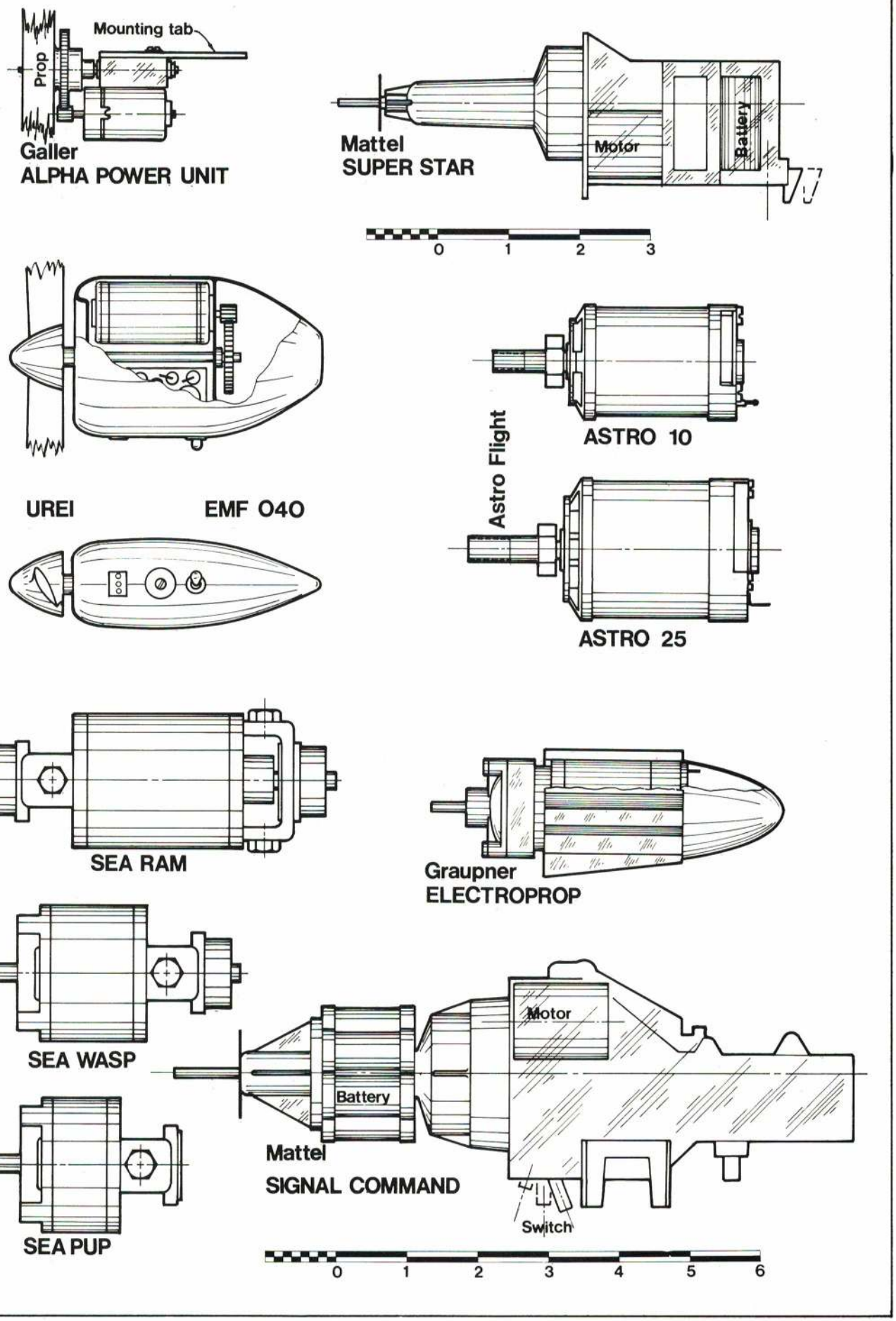
were able to. It was not possible to make the power ratings consistent, however, as some are based on manufacturer's specifications, some are peak ratings from bench tests—in-flight power would be much less—and some are estimated, rather carefully however, from the manufacturer's statement of the performance of the aircraft. The power ratings should be used only as a rough guide, certainly not as an indicator of what you are getting for your money. The power output of any motor can be boosted simply by applying more voltage, or loading with a larger prop, but its life will be greatly shortened.

The aircraft sizes listed are rough guides only. A power glider, where the purpose of the motor is to get the model up to soaring altitude, would have several times the wingspan of a stunt model using the same motor. Duration of powered flight also varies depending on the flight profile—if the model is climbing the whole time, the duration will be shorter than if the model is stunting. In a dive, the motor is acting partially as a generator, and the battery drain is very small.

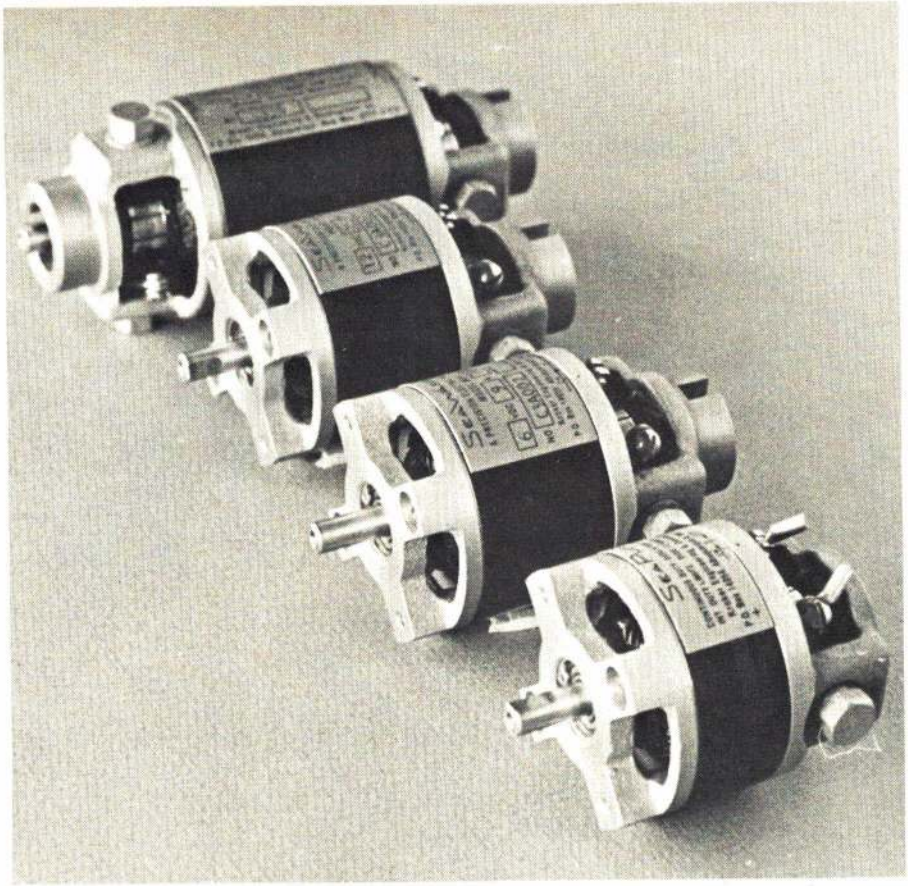
Enter Mattel: The cordless electric airplane has been around since the early fifties, but until quite recently it could scarcely be considered a viable alternative to rubber-powered and gas-powered models. With the advent of the high-rate fast-charge nickel cadmium battery, and the deluge of cordless electric products that followed in its wake—drills, chain saws, lawn mowers, toothbrushes, carving knives, and a host of others—the practical cordless electric airplane became virtually an invention that was waiting for a place to happen. And when it happened, it happened all over the place! Most of the propulsion systems on our list were either on the market or under development before the Mattel Super Star hit the market.

Manufacturer	Mattel, Inc.		Galler Electronic Industries	Johannes Graupner	U.R.E.I.	Astro Flight, Inc.		Kroker Engineering and Development Co.			
System name	Super Star	Signal Command	Alpha Power Unit	Electro-Prop.(1)	EMF-040	Astro-10	Astro-25	Sea Pup	Sea Wasp 6	Sea Wasp 12	Sea Ram
Prices											
Motor or power unit		$28.75	$20.75	Not	Not	$24.95	$39.95	$32.95	$50.00	$52.00	$74.50
Battery		$18.90	$23.95	announced	announced	$34.95	$39.95	$35.55	$31.60	$47.40	-
Complete system	$7.50	$52.65	$45.50			$59.95	$79.95	$68.60	$81.60	$99.40	-
Flying weight											
Motor, bare, oz.	1.1		1	6.4 ea.	-	9.4	14.6	9.0	12.7	12.7	23.0
Power unit, without bats. oz.	2.0	6.2	2.7	7.9 ea.	2.8	9.8	15.4	10.1	14.1	14.5	25.5
Battery, oz.	.5	3.2	3.8	8.8 ea.	3.6 5.3	13.2	16 24	15.5(4)	14.0(4)	27.0(4)	-
Complete system, oz.	2.5	9.4	6.5	16.7 ea.	6.4 8.1	23	32 40	27	28	42	-
Aircraft size, approx.											
Span, in.	26(7)	48(7)	65(7)	90(7)	52	44	55	45	45	55	70
Gross wt, oz.	5	25	22	67	17 to 21	40	60	40	40	60	100
Performance											
Voltage, nominal(2)	2.4	7.2	6.0	12.0	7.2 8.4	14.4	19.2	10(3)	8	16	20
Current, amperes	5.4	7.6	3.8	-	- -	9.2	12.8	11.2	15.0	15.0	20.0
Shaft speed, rpm	3830	3600	3300	-	5000 5200	12500	9000	11650	12250	10700	16600
Torque, in.-oz.	1.45	6.2	3.4	-	5.7 7.8	8.6	25	7.5	9.3	18.2	22.0
Power output, hp	1/180(5)	1/45(5)	1/90(5)	1/40(6)	1/40 1/25	1/9.7	1/4.5	1/11	1/9	1/5	3/8
Efficiency at rated pwr, %	33	30	37	-	- -	-	-	58	70	60	68
Power/wt. of pwr. unit, hp/lb.	1/23	1/18	1/15	1/20	1/7.1 1/4.3	1/5.7	1/4.4	1/7.2	1/7.8	1/4.7	1/4.4
Duration of powered flight, min.	1	4	7	10	3 to 5.5	4 to 5	5 to 8	7 to 11(4)	6 to 9(4)	4 to 6(4)	-

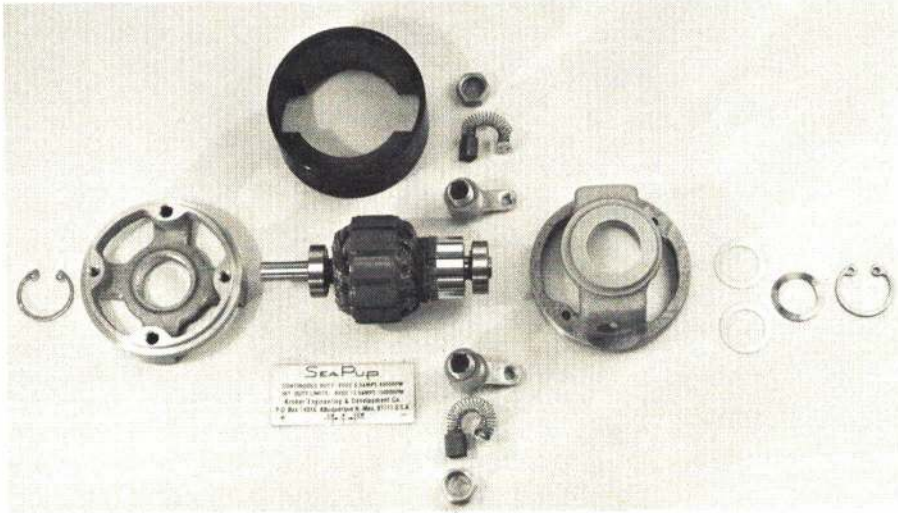
(1) Specifications are for one power unit and one battery. Two of each are required.
(2) Based on 1.2 volts per cell except for Kroker motors which are manufacturer's ratings on motors.
(3) Tentative rating for aircraft propulsion.
(4) For 1.2 Ah SAFT batteries having 9, 8, and 12 cells, respectively. Batteries of 1.8 Ah and 4 Ah capacity are also available, with corresponding increases in weight and flight duration.
(5) Author's tests at nominal voltage. Average in-flight power will be less, especially for systems with short duration.
(6) Per motor, estimated from manufacturer's aircraft performance data. Average during first 3 min. of flight. All other performance data is based on information supplied by the manufacturer.
(7) Aircraft supplied with system. Other aircraft sizes are from manufacturer's recommendations or are author's estimates. Subject to wide variation, depending on type of performance desired.



Drawings by Bob Meuser



The engines from Kroker are specially designed throughout for model application and hold several world electric power boat records. The small Sea Pup is suitable for aircraft use as shown here with a 7-4 prop. A disassembled Sea Pup shows what is involved inside.



But the Super Star is certainly the most apparent manifestation of electric propulsion, and it is of course a complete aircraft, not merely a propulsion system.

Picture yourself, an experienced modeler perhaps, as the president of a large toy manufacturing company. A fire-eyed tousle-haired Idea Man comes in with the Big One for the week. "We take a battery and an electric motor, see?"—with half the power-to-weight ratio of even a rubber-band motor. "And, a foam wing and vacuum-formed plastic fuselage."—with half the strength-to-weight ratio of proper stick-and-tissue construction. "We hold it all together with no-lickum stickum labels, and it will fly right 'out of the box' with almost no adjustment." You cough and fidget a bit. "It will be so simple that even an adult can fly one." You clear your throat to supress a giggle. "And it'll be tough enough to survive the crash that will result when some lad's father decides he is smarter than the instruction book." The giggle makes it. "And, we'll retail it for less than $15." You laugh him half way into next Thursday.

Mattel must be laughing all the way to the bank. Obviously not the brain child of our mythical idea man, but rather a product of careful, skillful engineering and ingenuity, the Super Star flies almost too well, as some sceptics discovered by losing theirs on the maiden voyage. The audacity of a bloomin' toy-monger duplicating or surpassing some of our own best efforts with a chunk of plastic!

The Super Star became a glint in Mattel's corporate eye about five years ago when the quick-recharge ni-cads first appeared, and during the early chapters in the life of the Sizzler car. It also came to pass that half-way 'round the world, in the Land of the Rising Sun, the quick-recharge ni-cad had not escaped the attention of a model aviation enthusiast by the name of Ken-ichi Mabuch, who by a curious coincidence happened to be the president of the world's largest manufacturer of small electric motors. Both the Mabuchi and Mattel companies had progressed quite far with electric aircraft development before they discovered each other's interest; when they did, the Mabuchi-powered Mattel Super Star, and later the Signal Command, were the inevitable results.

The Super Star: At the bottom of the list in both cost and performance, but perhaps at the top of the totem pole in fun-per-buck ratio, is the Mattel Super Star power plant. The motor is a big step up from many of the Mabuchi toy motors found in surplus stores and elsewhere in that it has carbon brushes in place of the usual phosphor bronze sheet metal or wire ones. The battery is a pair of 100mAh General Electric 1/3-AA-size ni-cads—the same cells used in the Sizzler cars. Extensions of the brush arms serve as connections to the battery, charging cord receptacle, and switch.

(Continued on page 101)

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CARL MARONEY ON RC

Sailfish by Vince Bonnema[1]: This glider came about from a memory. Having built and flown several Comet Sailplanes back in the late Thirties, I remembered that slow, floating glide that was characteristic of that excellent Goldberg design, and wondered how a glider design based on that configuration would fare in present-day glider competition.

The *Sailfish* is the end result of all of that wondering. I sent away to John Pond for a copy of the original Comet Sailplane kit plans. After studying the plans, it was decided to use the original size and structure of the wing and stabilizer, keep the tail moment, lower the wing in relation to the stabilizer, add enough nose to balance things out, and make room for RC gear.

Since building this wing and tail from scratch represents a lot of building time, it was decided to keep the fuselage as simple as possible. It is built entirely from 1/8" sheet balsa, with 3/8" triangular stock in the corners to allow some rounding off. The original vertical fin hardly seemed adequate for RC glider work, so a new one was designed, providing more area, with a good sized rudder, for positive directional control.

The whole project helped pass a lot of long, cold winter nights, and ran up an alarmingly high cash outlay in balsa wood. The sheet fuselage was covered with medium weight Silkspan, clear doped, and then color doped. The wing, stabilizer and vertical fin were covered with colored silk and clear doped. The finished job, with equipment installed, weighed in at 44 oz.

More conventional glider pilots might be a little surprised by the rearward position of the center of gravity. The large area, lifting stabilizer dictates this CG position. Don't fool with it—it works there.

Now, after all this theorizing, with the warm breezes of spring, comes the moment of truth. Will it all work?

First flights were off a high-start, after a few hand glides had indicated that trim was reasonably good. We had wondered how that big lifting stabilizer would behave on the tow. The answer: simply beautiful. It went up as though it was on rails. It was quite breezy, and before unhooking, a couple of club members swore the line was vertical over the stake, and being stretched. All of the flights that first day were spent with the nose into the wind, with just enough down elevator to keep the glider from going backwards. Even under these conditions, it could be flown "hands off" for a minute at a time.

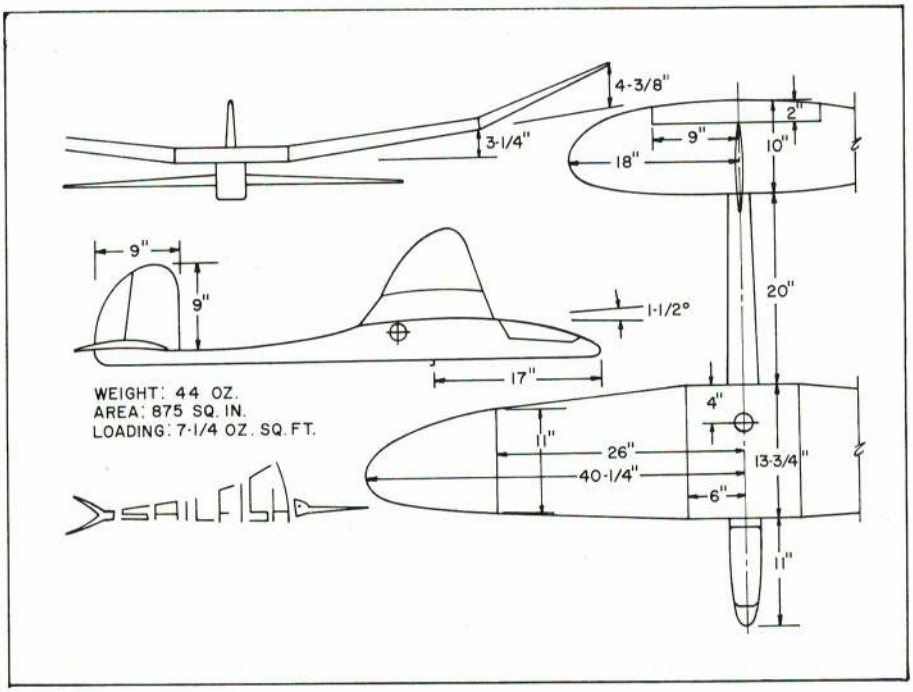
Subsequent flying sessions, under nicer weather conditions, indicated that the *Sailfish* was all that we had hoped for. Now, with another long, cold winter approaching, and a full season of competition behind it, uncounted hundreds of flights under its belt, all it has to show for it is a few scratches on the bottom of the nose. It holds the NJRCC club field duration record of over one hour, and has won one ECSS meet—not bad for an ancient machine.

Quite frankly, I can't remember back to when I've enjoyed a model project more than this one.

[1]The above article is reprinted from the November 1972 issue of SAILPLANE, the official Journal of the East Coast Soaring Society (ECSS). For a free copy of the Journal and membership application write: Clive Sadler, ECSS Secretary, 46 Oakcrest Dr., Dover, Del. 19901.

Here's the son and father team of the Bonnema family with the beautiful Sailfish. As text tells, it is a take-off on the great Goldberg Sailplane, an old-timer power FF model.

From around the world, League of Silent Flight member, Cou Burger of Holland with his Bjorn enjoying a cold winter day soaring around minus 3 degrees(C). Days like these are for lightweight floating gliders rather than fast slope soaring types.



BOB MEUSER ON FF SPORT

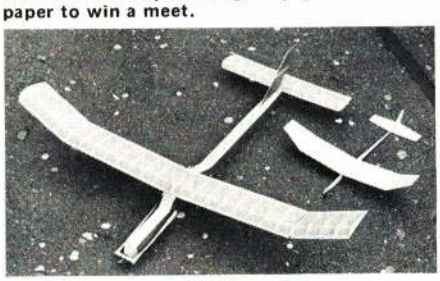
New Free-Flight Products: The only new competition rubber-power kit to be introduced in the last 30 years, the Tyro Combo comes with all of the hard work already done. Prop blades are impregnated and molded to shape; they need only to be glued to the hub arms. The "front end"—shaft, noseplug, folder mechanism, rubber tensioner—comes completely assembled except for gluing the bearings in place. A sliding wing mount and two rear motor peg positions adapt the model to either Coupe d'Hiver rules, with the shorter motor, or the Unlimited Rubber event. A forward-mounted fuse dethermalizer is included, along with all of the necessary hardware. The ruggedly built model requires a bit of ballast to meet the 100-gram minimum for Coupe, and is about five grams overweight with a mechanical timer. Price is $6.45 postpaid from Tyro Model and Supply, P.O. Box 11511, Palo Alto, Calif. 94306.

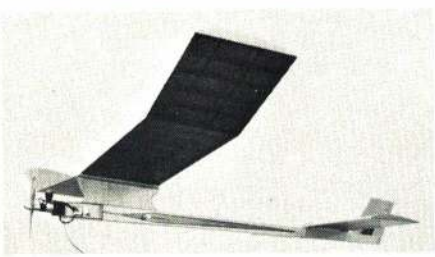
We don't know whether to call the 16-in. Tyro Glider a kit or an almost-ready-to-fly for it comes with the airfoil section, tip taper, and dihedral angles already cut—a bit of sanding and gluing and it is done. It has already drawn blood in local competition and dozens have been used in a youth program under the tutelage of Squire Openshaw. Price is a paltry $1.19; get your dealer to stock them, or order them directly from Tyro Model and Supply, two for $2.75 postpaid.

We presented a three-view of George Fuller's famous Dixielander in the December issue and queried whether there was a source of the British-built kits in the U.S. It turns out that the original kit is no longer produced, but a mini-kit, consisting of plans and pre-cut ribs, is marketed along with all sorts of free-flight goodies by FAI Supply, 10802 North 33rd Ave., Phoenix, Ariz. 85029.

(Continued on page 94)

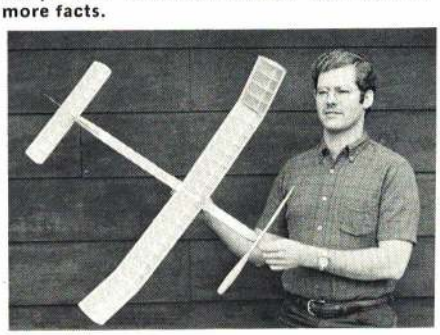
Another view of the Tyro, and beside it a nifty HLG that comes as an ARF (as the RCers call them) needing only glue and sandpaper to win a meet.

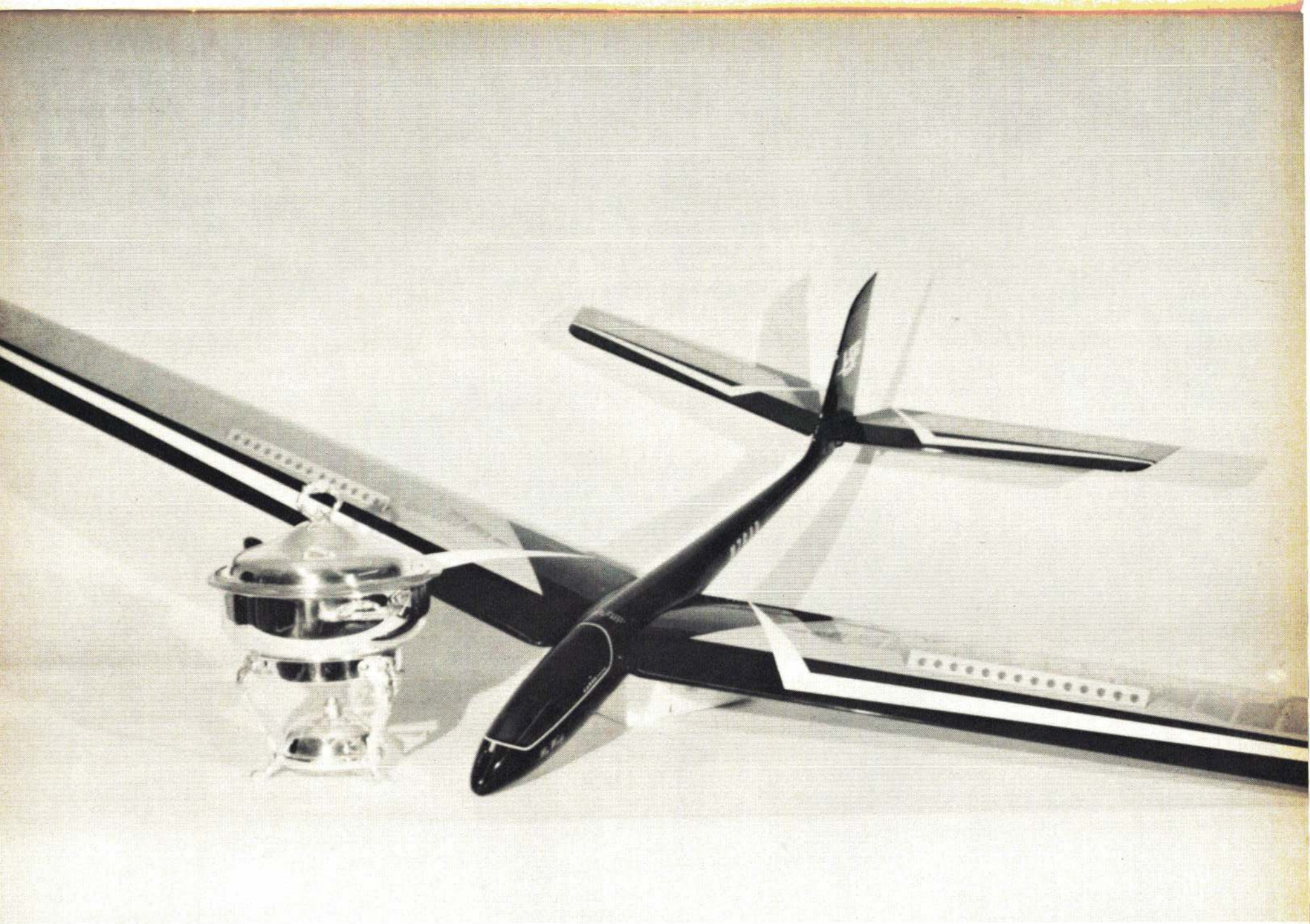




This is the Orbiteer, now available in kit form, see text. It is a British influenced design with that aft tail location.

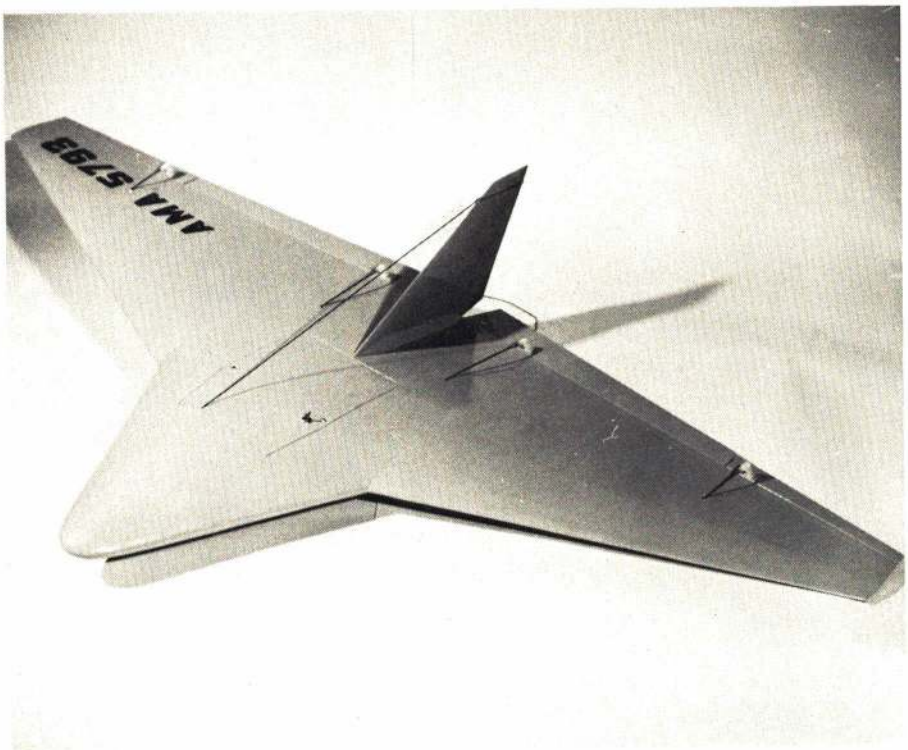
Hooray, the first competition rubber design kit to come out in 30 years! Bill Vanderbeek holds the model called Tyro Combo—for Coupe and Unlimited events. See text for more facts.





The beautiful "BIG WINDY" placed first at Toledo in the Sailplane category for Tom Kelley.

DELTA DIAMOND



Above: A handsome two-channel plane. Might even perform well over flat land with a small engine in nose. Right: Author poses with his highly original design. It is actually among his first RC model planes.

The Delta Diamond was started in November 1970 as a towline glider—Delta No. 1, of the Dyke Delta "JD-2," in platform only. It is a very stable glider, even when carrying extra weights. Delta No. 1 was flown many months to find the balance point, in calm and in winds up to about ten mph. Every time the model came off the 50-ft. towline it would turn and fly with the wind for a short distance then turn back into the wind. On a calm day it would fly in a circle about 150 feet. As this model isn't an A1 or A2 glider, the flights lasted no longer than 15 sec. at the most. I still fly Delta No. 1 but without the extra weights.

Delta No. 2 was an enlarged Delta No. 1 with a 36-in. span. It started out as a towline glider but with additional construction needed for the future installation of the radio gear and controls. It was first flown as a towline glider to recheck the balance point and to see if we could tow it up. It went up at about a 60-degree angle for 15 feet before nosing over into a dive. The tow hook was moved forward one inch and this time it went straight up on a perfect tow. The glide was fast, but not short as with most flying wings.

We towed the Delta up on a 150-ft. line. If the wind was up, the Delta would release with a slight pop-up. As the weight was increased, we had to run faster or wait for the wind to blow. We never did get to the total weight of the RC. Flights were mostly like the flights of the Delta No. 1. The radio was installed after about ten flights. The control setup was coupled aileron and elevator only. Total flying weight came to 28½ oz. which was greater than anticipated.

We tried to hand-tow the Delta up but could not run fast enough, even with the wind helping. I built a powered winch to see if this would help. On the first flight all the winch did was keep the Delta airborne. It seemed as if there wasn't enough power or speed on the winch. We changed the pulleys around and increased the speed of the take-up reel. This time it took off, climbed about 20 ft. and rolled over, doing a spin before releasing. The only damage was a broken rudder. The rudder was glued back on and the tow hook was moved forward another inch. I got in one more flight, only this time the Delta didn't gain any altitude—on release it turned into the ground. Off came the rudder again.

With the rudder reinforced and the tow hook moved back half a inch, we tried it again. Tow off by the power winch this time was good, and the Delta got about 150 ft. up before release. Now I found out I had too much control area in the elevons and landed on the nose this time, without damage. I reduced the elevons to a 3/4-in. wide strip, with a total movement of half an

If Jonathan Livingston Seagull had met one of these in flight, what a pair they would have made! Great flying slope soarer is capable of fancy aerobatics. / by Ed Erfurth

inch on elevator, less on aileron. On the first launch it went straight up again. Only after release and trying to turn did I find I had cut down the controls too much. On landing this time the wing tip hit a small bush causing the Delta to bank up sharply, flip over on its back making contact with the ground while flying sideways, breaking off the rudder. (Delta No. 1 did this same crazy maneuver whenever it hit something on landing.)

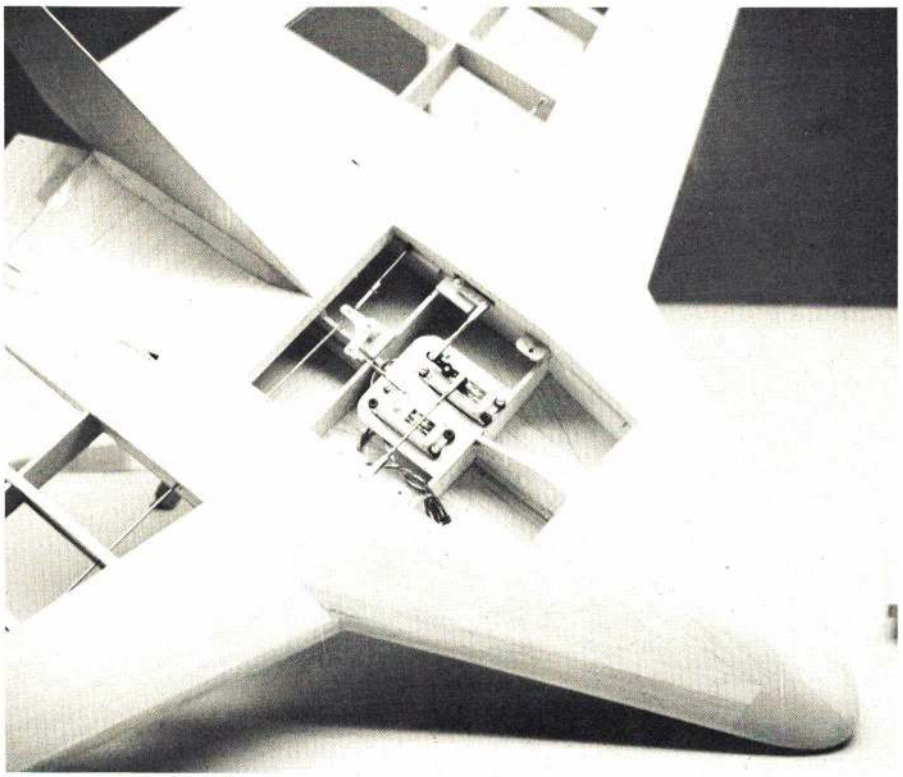
I increased the width of the elevons to 1¼" to see if this would give me more control. This time I took it to a small 20-ft. hill. Launching by myself I found that I could not get on the controls fast enough to keep the Delta up in the lift. It was halfway to the bottom of the hill before I could apply up elevator. This was the first flight with the Delta from a hill. It lasted less than ten sec. On the second flight, the Delta was launched for me so I could keep my hands on the controls. The Delta went out about 50 ft. losing about ten ft. in altitude. The right turn was slow, but it came around alright. I turned the Delta back around to the left to bring it back across in front of me. I kept trying to get more altitude but couldn't. I ran out of air very abruptly and hit a small boulder. The damage was a little more severe this time.

Delta No. 3 is basically the Delta No. 2 with the wingspan increased to 48 in. I also changed the control system to elevator and coupled aileron-rudder. The nose section was also beefed up. I was thinking with the longer wing and the controls set up so I could change them in the field, I would be able to get in more flying time, and the flying speed of the Delta would be less.

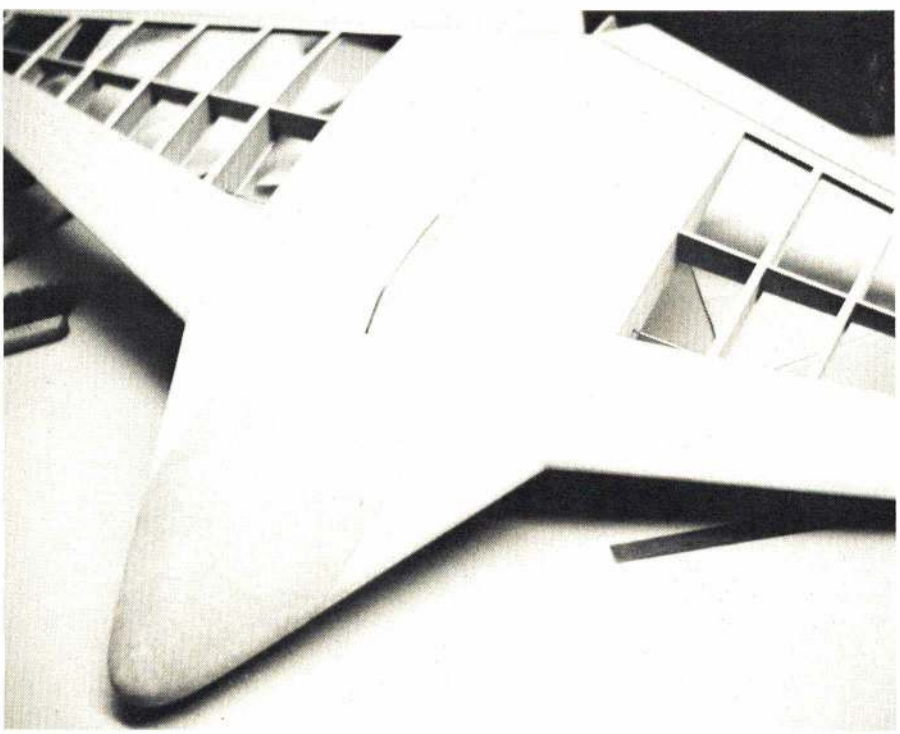
The first flights were at a baseball field on a calm morning. The hill, or slope, is about 15 ft. high. With the nose pointed at a spot about 75 ft. away and a good push, I was able to glide the Delta in a straight line 200 ft. before touchdown. Two oz. of lead weight was added in front of the battery pack before I was able to get a level flight without elevator trim.

Next, the Delta was launched at an angle to the hill to see how the turns would come out. I was able to make "S-turns" before touchdown after five flights. The longest flight that morning was over 300 ft.

We subsequently headed out to the dry lake bed. The launch with the power winch was straight up. On release the Delta was turned back around—or so I thought. It came around fast and dropped its nose at the same time. The only control used was elevator. It turned alright only with rudder trim. On landing I reduced the rudder throw to half an inch either way. Launched again and on release the Delta nosed up into a stall. It just nosed over into a glide. The turn this time was better, but the nose still



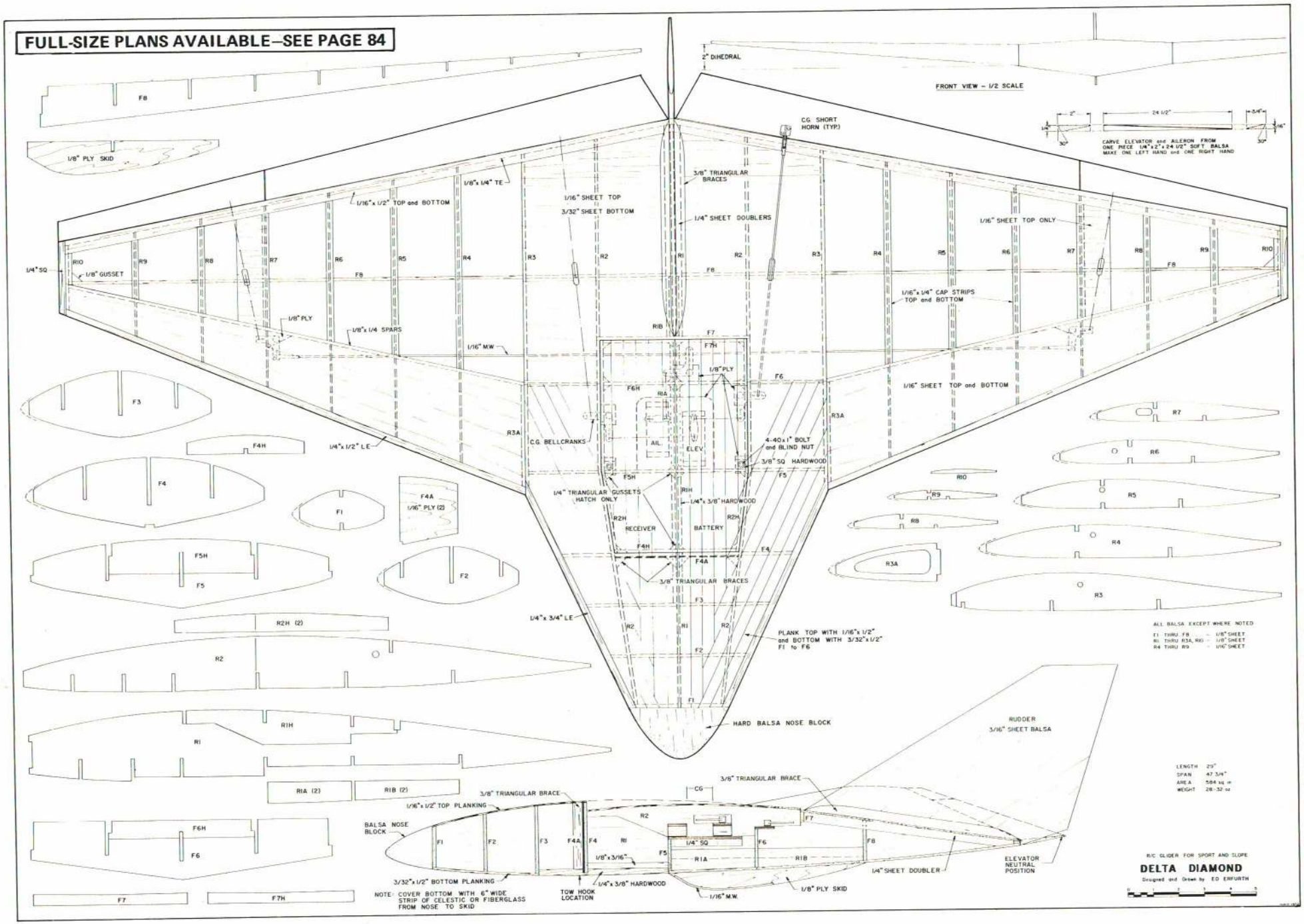
Area below nose is protected by skin of celastic—fiberglass could also be used. Note skid for landing and something to hold onto during launching.



Two servos handle the flight work. A Vector Director from Airtronics could be used to mix servo controls to operate elevon system. (That means two long control surfaces which move collectively and differentially for full control.)

Plans on next page
Text Continued on page 87

FULL-SIZE PLANS AVAILABLE—SEE PAGE 84



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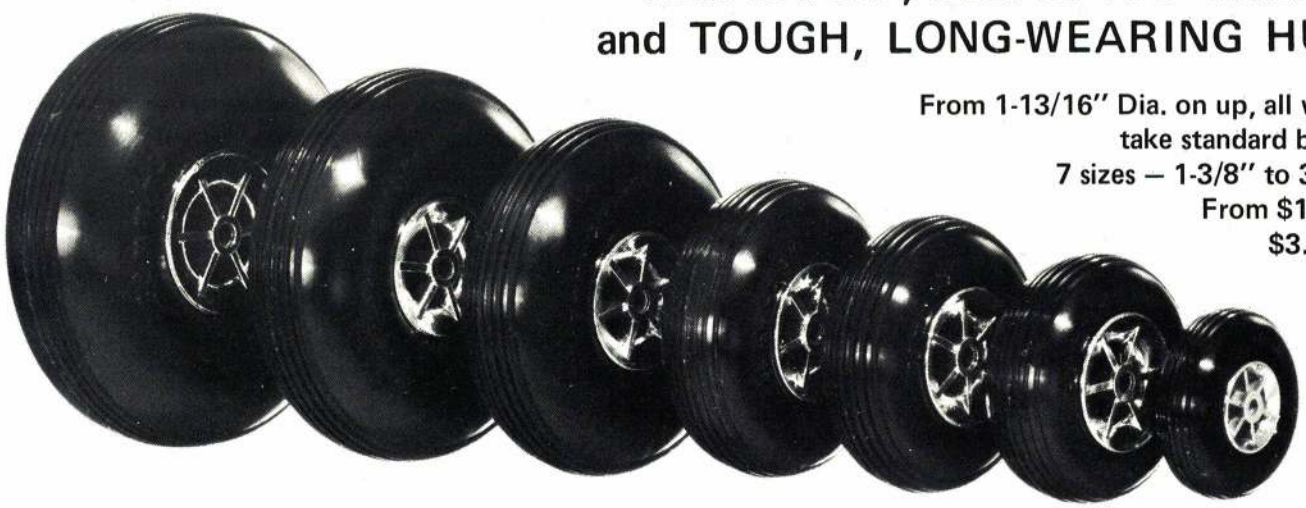

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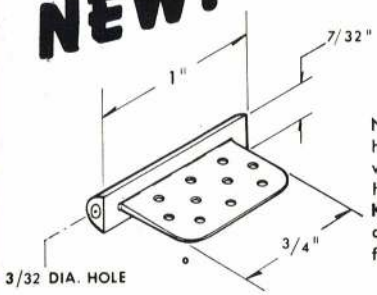

NYLON

Nylon bearing for 3/32" wire aileron horns and elevator joiners. Thin tapered web makes for easy entry into slot, and holes insure good glue joint. Made with **Klett precision,** which means the finest quality in the model world. AB4 75¢ for 4.

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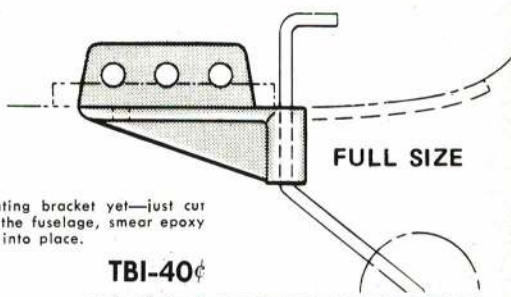
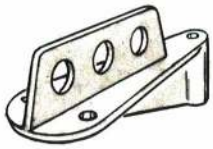


The simplest tailwheel mounting bracket yet—just cut a slot in the rear bottom of the fuselage, smear epoxy on the glue fin, and slide it into place.



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BILL BOSS ON CL

New CL Scale Interest?: For quite some time now, CL Scale modeling has appeared to be dying a slow death. I say this because little has been said on the subject in the many CL-oriented newsletters I have received in the past three or four years, and only a small amount of input has been received for this column. In addition, the CL Scale event has been disappearing from the AMA Contest Calendar.

However, in the past few months several newsletters have been dedicating considerable space to the subject of "Getting Started in CL Scale." Much of the editorializing has been directed toward the beginner and what he should do on that first project. Most say the beginner should start with a kit and a good set of three-view drawings. Some of the old pros might say there is nothing like a scratch-built model; this may be true if you have the time and years of experience required to "engineer" a model. I can't help but feel that it's this attitude that may have contributed greatly toward what appears to be a decline in CL Scale modeling.

For the newcomer, a kit is the way to go, especially with the wide selection of excellent kits available today. A kit provides the beginner with the basic framework, and permits him to apply some of his other modeling experience with a minimum of effort.

An example of applying previous experience might be the Navy Carrier flier who has already mastered the control system for motor control, flaps and dropping the hook. These basic operations are no different in Scale, only the plane is different. As for detailing—well, that has to be learned a little at a time, and can be as simple or complicated as the builder's talents will allow.

To further show what can be done with kits, and perhaps to further substantiate their use, I'd like to present the following review of what was used by the 1972 NATS winners—"Kits vs Scratch-Built." Of the 13 winners, six won with planes constructed from kits, five won with scratch-built planes, while the remaining two built their planes using magazine plans.

1973 NATS, EAA Fly-In: As most of you know by now, the 1973 National Championships are to be held August 6-12 at Wittman Field, Oshkosh, Wisconsin. Wittman Field is also the location where the Experimental Aircraft Assoc. (EAA) holds its annual Fly-in convention which is to take place during the week prior to the NATS competition. For scale modelers who are interested in finding new scale modeling subjects, the EAA Show should represent one of the greatest opportunities for pictures and first-hand information for those future scale projects.

Scale Data Sources: From time to time we come across information sources that might be helpful to the scale modeler. A recent issue of the "Antenna," newsletter of the Penna. Ave. RC Soc. of Brooklyn, N.Y., provided the following data sources. All have a free listing or brochure detailing their publications. Sturgeon Air Ltd., 36 Airport Rd., Edmonton, Alberta, Canada (SAL Aircraft Brochure); Aero Publishers, 309 W. Aviation, Fallbrook, Calif. 92828 (1973 Catalog); Litho Prints, 15353 Tacony, Apple Valley, Calif. 92307 (WW II Listing); Aviation Pub., Box 123, Milwaukee, Wisc. 53201 (Book Catalog);

Joe Harris, at left, helps Ernie Violett tune up the engine of Ernie's fabulous scratch-built Boeing Kadet N2S5 prior to the NATS winning Open CL scale flight.

From the Sig kit, Mike Gretz built this nice Zlin Akrobat and placed fourth at the NATS. It's Enya powered and a smooth flyer.

Anthiel, 2177 Isabelle Ct., N. Bellmore, N.Y. 11710 (Aviation Book List); Aviation Book Co., 565 W. Glenoaks Blvd., Glendale, Calif. (What's New Bulletin). More listings next month.

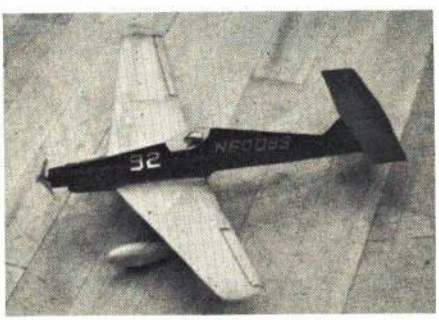
WALT MOONEY OF FF

Tips from Sky Rebels: Bob Stevenson of Marietta, Georgia publishes the *Sky Rebel Yell* the newsletter of the Cobb County Sky Rebels. A recent editorial advocating the use of mufflers is worth noting, as are the schedules of upcoming local events and construction hints.

From their January 1973 issue comes the following finishing suggestions by Les McDonald:

How to prevent bubbles in the paint over fillets.

(1) Be careful not to touch the fillet area before painting. (Body oil on the fingertips even in imperceptible amounts works as a parting agent.)
(2) Try not to let the paint build up in the fillet area when spraying dope.
(3) Just before painting, clean the fillet area with DuPont Prepsol (39195)—other mild solvents will probably work, but make Prepsol your first choice.
(4) Never cover fillet area with Silkspan, silk, tissue, etc.
(5) Experience, Testing, and Observations have proved:
  (a) Commercial butyrate (including SIG) will not adhere to SIG Epoxylite—brush or spray Aero Gloss clear (two coats) over bare Epoxylite.
  (b) No dope will adhere to Titebond in fillet areas.
  (c) Excessive thinner lowers the ability of dope to adhere to fillets.
  (d) Excessive humidity will cause the dope to dry prematurely, not allowing it time to set into its base—use retarder or wait for better weather.



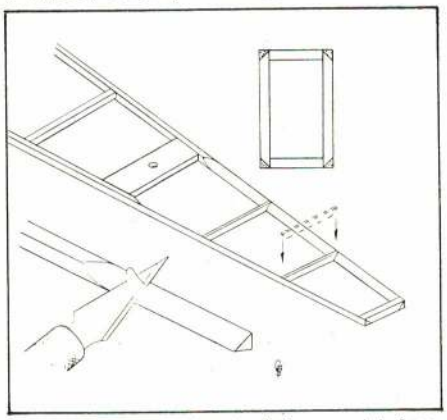
That's a round-the-pole speed model of the Rivets. Model is rubber-powered and did all of 18.7 mph for Rich Castle.

Nifty stick model of the Demoiselle by Doug Mooney.

And More: As an addition to the above, butyrate dope has a much larger tendency to bridge across any joint than nitrate does. Never try to paint over a newly made cement joint. Unless the cement in the joint is completely dry, the residual solvent that is still evaporating will cause bubbles to form under the skin that forms on the surface of the dope. These will gradually increase in size and merge to form larger bridged areas. Sometimes they will break leaving ugly craters along the joint.

Impatience does more to foul up paint jobs than any other lack of technique yet discovered by model builders. Wait until everything is thoroughly dry; try never to paint over a previously wet coat. Naturally, those who are still finishing a model in the wee hours on the morning of a contest are going to be hard pressed to follow this advice. To them I can only say, "Welcome to the Club."

On anything that flies, light is beautiful and tail heavy is a drag. Glenn S. Powers (Portland, Oregon) has a suggestion which can



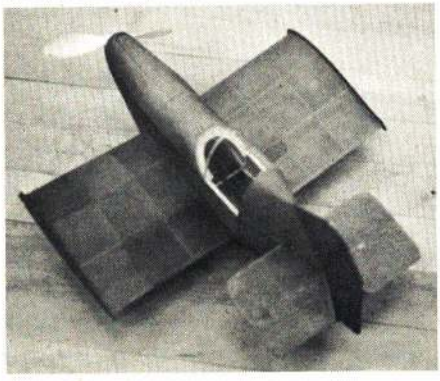
help both ways when building model fuselages. Behind the rear motor peg where there is less load on the longerons he cuts them to a triangular cross section. He also uses uprights and cross pieces that are made from thinner material. By doing this, the fuselage structure aft of the rear peg can be made about half as heavy. The model can then be balanced with less weight in the nose. Because most models have considerably shorter noses than tails, the total weight saving will be about three to five times what is saved in the tail end.

Fly-by-Nite California Contest: The San Diego Orbiteers held their Fly-by-Nite Indoor Scale contest in the Colina recreation center. Along with Rubber Scale and Peanut Scale, there was a round the pole speed event, which attracted a few entrants that had models designed for other events. After all, it's easy to stick a hook through the tissue at the wingtip.

Ernie Wrisley was, as usual, occupied for part of the night with his favorite game, "Poking the model off the light fixture." Ernie took Unlimited Rubber Scale with his

(Continued on page 118)

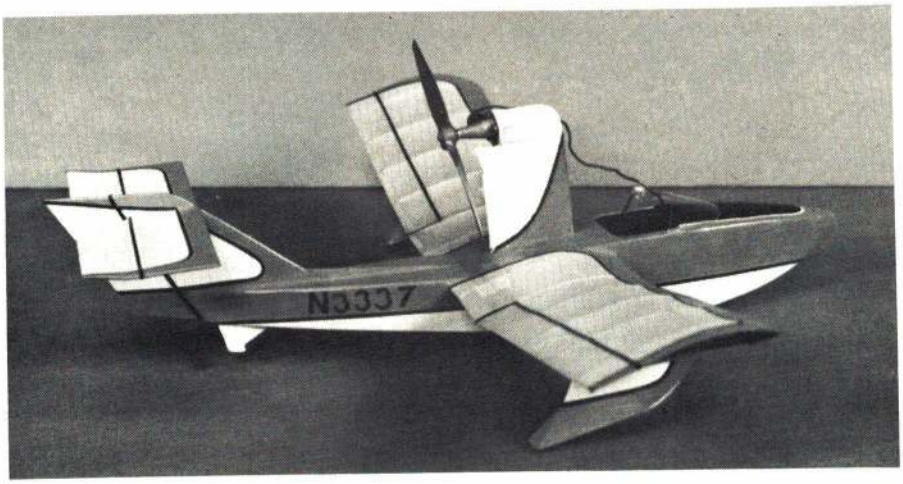
Don't know how it flew, but this Staib peanut scale model by Doug Fronius has plenty of wing area. Real plane was an effort to make the smallest possible one-wing plane, thus its wide, but short, wing.

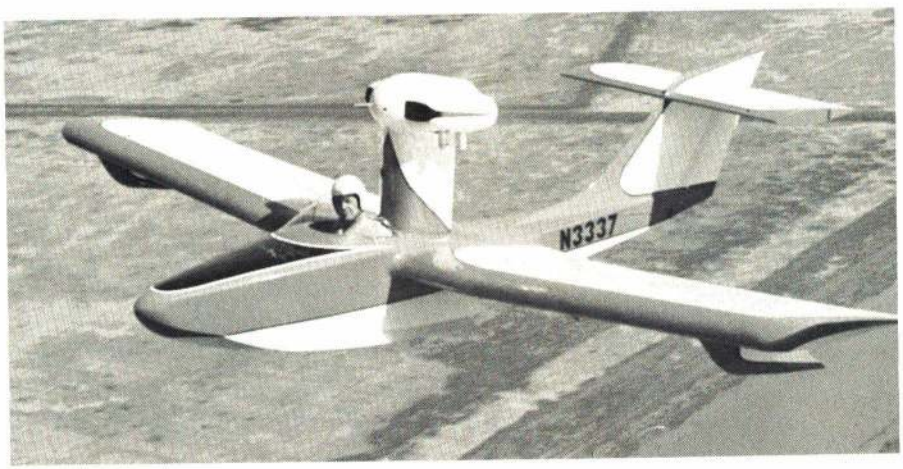


OSPREY

Bob Peck's novel Sport seaplane is the subject of article starting on next page.

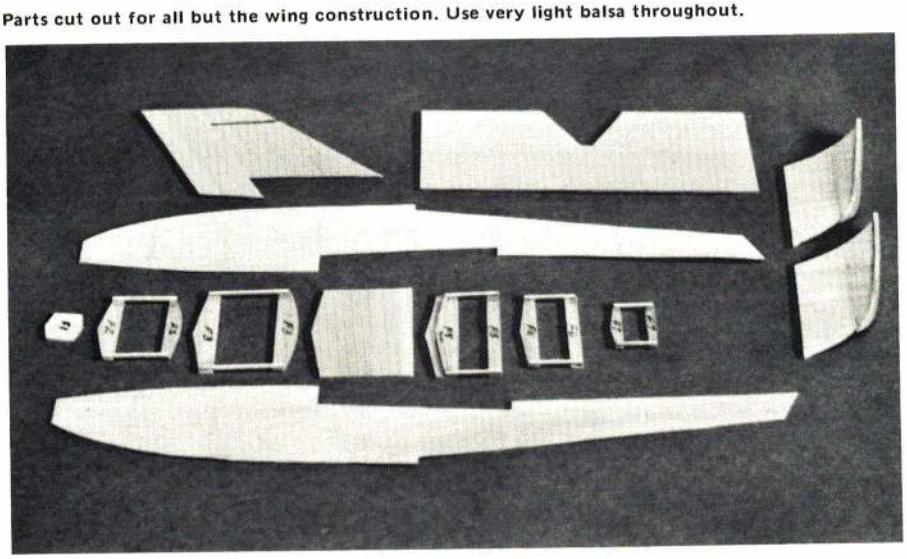
OSPREY





Top: Model is trimmed entirely with colored Jap tissue to avoid unnecessary weight build-up as would occur with color dope. Yet it is nearly waterproof. Above: The original full-size Osprey in flight. Many replicas have been made. It has no wheels, and has only one seat.

Parts cut out for all but the wing construction. Use very light balsa throughout.



The Osprey "1," a homebuilt, sport seaplane designed by George Pereira of Sacramento, California, is powered by a 90 hp Continental engine and has a cruising speed of 125 mph.

Fifteen years ago I designed a similar model seaplane with which I had a lot of trouble—it lacked directional stability. The pusher prop caused too much turbulence over the rudder making any rudder adjustments useless. The problem was solved by adding tip rudders, but I feared that I might have to do this to the Osprey also and ruin its scale appearance. I was happy to find that the Osprey was very stable and reacted normally to rudder adjustments. For this I must give credit to George Pereira for a well-engineered design.

The model lends itself well to the Brown CO_2 engine for a number of reasons. The CO_2 engine will run backwards which is necessary for the pusher configuration. The standard Cox 4½" dia., two-pitch propeller mounted backwards can also be used. The CO_2 engine is also easily started which is a help in the confined area in which it is mounted.

The only deviation I made from the full-sized design was the tip floats. They have been modified to reach down closer to the water so the model will not tip to one side or the other while taking off. This prevents it from taxiing around in circles in the water. I tried several float designs before coming up with the one shown which works quite well. The design shown, with the extended tip floats, is very stable, and I have had hundreds of fine flights with it.

Construction

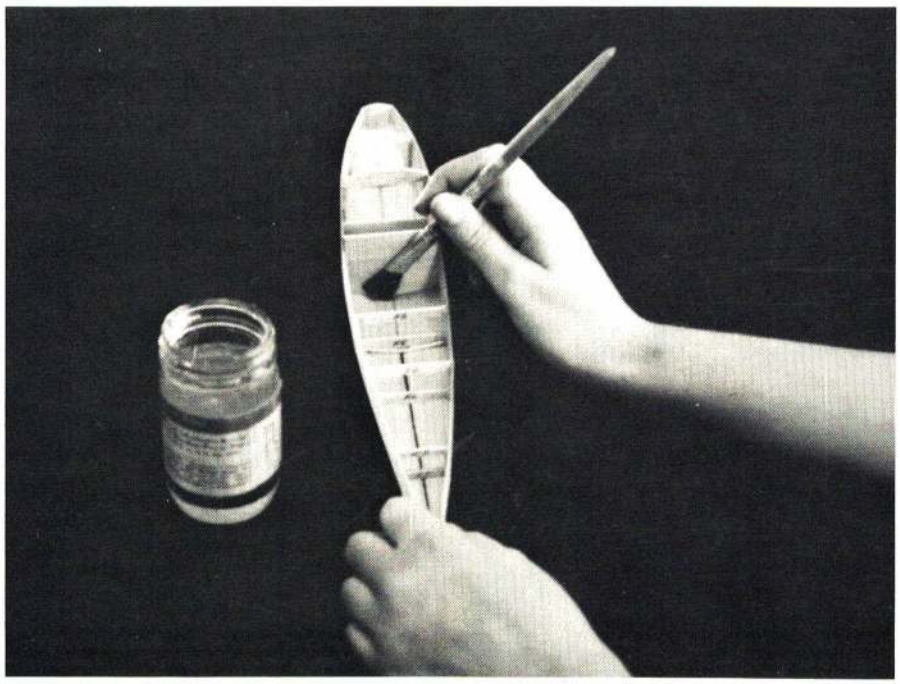
Keep the construction light. It takes approximately twice the power to ROW (rise off water) as ROG. Any excess weight exacts a double penalty and may make ROW impossible. Avoid using white glue because it is not waterproof and the water will dissolve your glue joints.

Start the fuselage by gluing the formers and sides together and then sheeting the bottom. Before adding the top sheet, coat the inside of the fuselage with thinned dope to help waterproof the plane—tissuing the bottom of the fuselage also helps. Do not try to completely waterproof the plane as that much dope would add too much weight.

Do not add the top sheeting until the wing is glued into place. I found that covering the forward decking is easier if you do it in two pieces: from former F1 to F3, and F3 back to the wing, as there is a slight compound curve.

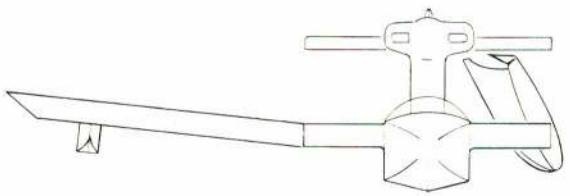
The wing construction is straightforward but be sure to sandwich the motor support in between the center wing ribs before sheeting the center section. The tips are 1/32 sheet glued into place to conform to the top surface of

One of the most attractive seaplanes
ever built, makes the neatest flying CO_2 model.
It will ROW, too. / by Bob Peck

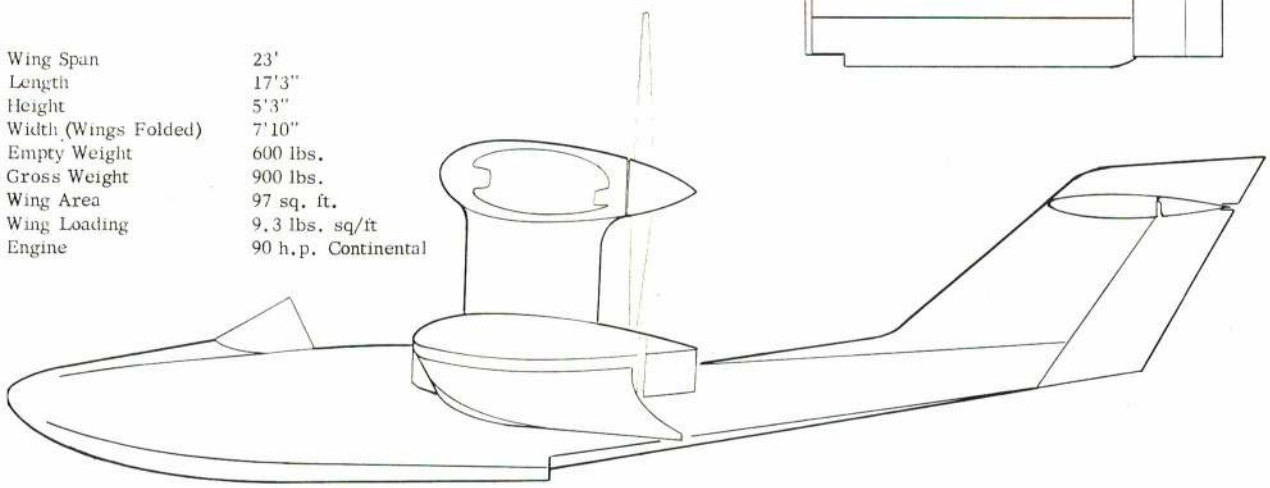


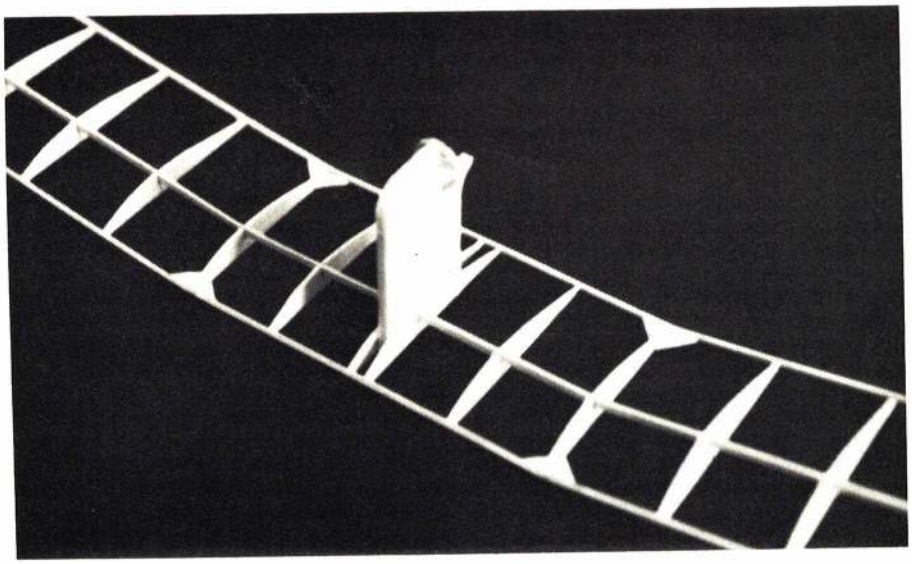
When hull is completed to this stage, apply two coats of thin clear dope to interior for waterproofing.

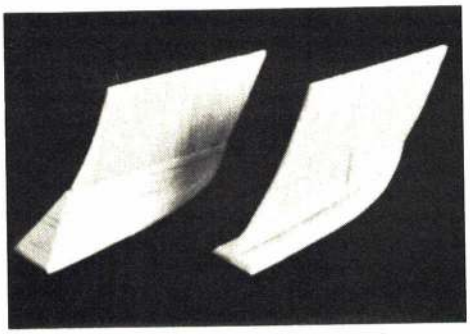
Osprey 1



Wing Span	23'
Length	17'3"
Height	5'3"
Width (Wings Folded)	7'10"
Empty Weight	600 lbs.
Gross Weight	900 lbs.
Wing Area	97 sq. ft.
Wing Loading	9.3 lbs. sq/ft
Engine	90 h.p. Continental







Above: Wing is ready for center section planking, then covering. Right: Tip floats are slightly longer than scale to insure straight ROW takeoff. Assemble in two steps. Finished float at left.

outside wing rib. Cover with jap tissue and shrink with a fine spray of water or carefully wipe with wet cotton. Apply two coats thinned clear dope. Check for warps and steam out any that may have developed. About 1/16 wash-out at each tip helps smooth out stalls but it is not necessary.

The rudder and stabilizer are cut from 1/16 sheet balsa. Just be careful to align them squarely when gluing them into place.

Build the main part of the floats first then add the triangular shaped area made of 1/64 or 1/32 sheet balsa as shown in the photo. If you do not intend to fly your plane ROW, you may want to leave the floats off for improved performance

The color of the original Osprey is white and orange with a thin black strip separating the colors. The deck in front of the cockpit is black with a white line around it.

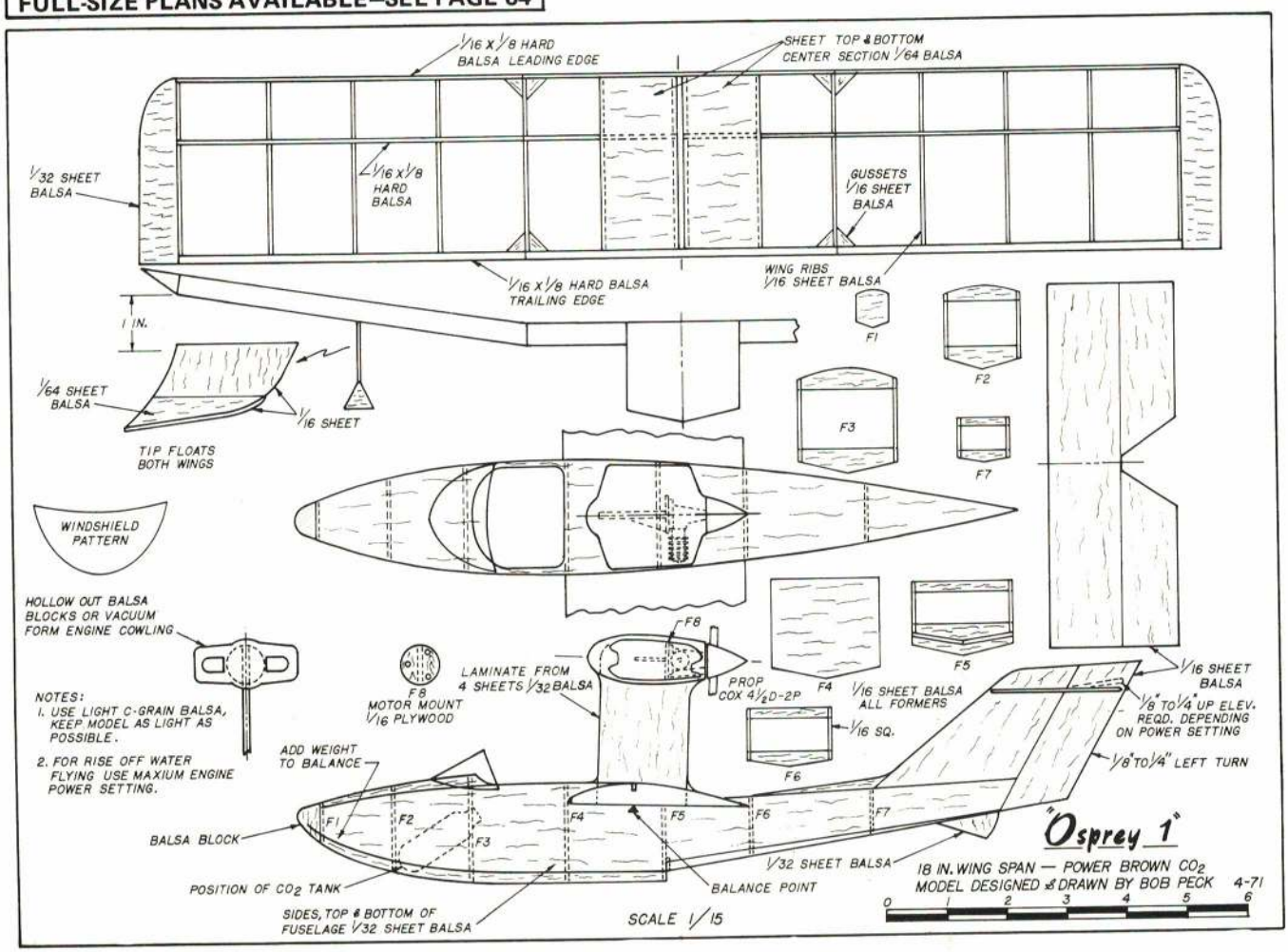
Flying

Start by adding weight to the nose until the plane balances as shown on the plans. Test glide until it is just about to stall by adjusting the elevator. Adjust the plane so that it is nearly stalling in the glide, for under power the high engine mount will try to force the plane down. Adjust the engine for medium power and hand launch the plane until you have it flying well.

You are now ready to try ROW which requires a little experimenting.

(Continued on page 91)

FULL-SIZE PLANS AVAILABLE—SEE PAGE 84



An uncharted flight through the tricky price maze.

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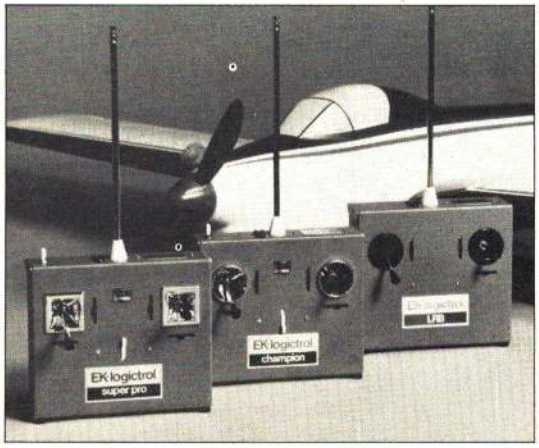

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The Bavarian Woods

A brand new D.VIII in standard factory finish (aluminum dope). Type-tested in January 1918, production models carried a 160-h.p. Siemens-Halske, 11-cylinder, geared rotary. The propellor revolved at 900 rpm counter to the revolving (also at 900 rpm) crankcase and cylinders.

Phalz D.IIIa (Serial 6033/17). The vertical fins of the Phalz D.III and IIIa aircraft were integral to the fuselage. An inverted airfoil on the tailplane gave more rapid dive recovery. (Builder's Note: All struts carry aircraft serial number.)

Photos courtesy of the Smithsonian National Air and Space Museum.

When the Imperial German Military Air Service of the German Army struggled underway in October 1912, not only was it blessed with the usual general staff firmly entrenched in 19th Century military tradition, it had Bavaria, too.

In 1871, after negotiating a generous political and economic settlement to bolster its basically forest and farmland economy, Bavaria entered the German Empire. Also retaining more sovereign rights than any of the other member states, the characteristically independent-minded Bavarians kept control over their own railway, telegraph and postal systems, a separate diplomatic service, as well as their own military administration. Thus, whenever Bavarian soldiers were involved, Germany heard a lot of heavy breathing in the background.

Shortly after the German air arm came into being, the Bavarian Air Ministry—endeavoring to insure control over the equipment its flying service would use—turned to its own industry. And, in a section of Bavaria known as The Palatinate (in German, *die Pfalz*[1]), it found the Everbusch brothers striving to get into aeronautics.

On slim financial footing Alfred, Ernst and Walter Everbusch had hoped to acquire license for production of the Albatros. When these negotiations fell through, the Bavarian government stepped in and helped secure production rights from the Otto airplane works for their pusher biplane. With this initial security plus additional guidance from Gustav Otto, the Pfalz Flugzeug-Werke G.m.b.H. opened its factory at Speyer am Rhein in July 1913.[2]

But pusher aircraft had a limited future, and since the company wasn't ready to produce its own design, Alfred Everbusch looked around for a more promising airplane. In early 1914 he acquired license from Morane-Saulnier of France to produce their Type H monoplane and Type L parasol. Walter, the youngest of the Everbusch brothers, then enrolled in Morane-Saulnier's flying school near Paris. After graduating in July 1914, he served as a test pilot for Pfalz until his death in June 1916.

With the onset of WWI in August 1914, German militarists figured that a swift advance on an unprepared enemy would wrap things up in a hurry, and so the use of aircraft wasn't seriously considered. But, when the enemy unexpectantly dug in its heels, the German General Staff was forced to take another look at its aviation potential. At this time there were 30 German air units plus four Bavarian—all of which looked better on paper.[3] In reality, they were under strength and poorly equipped, having a few airplanes that could be considered "combat ready."

By this time the Pfalz company had built three of the Morane monoplanes, three of the parasols and were nearly

ready to deliver three Otto pushers to Bavarian air units. Although still not ready to produce their own design, they were acquiring a cram course in aircraft construction and beginning timid innovations on the Morane designs.

In the early months of the war they produced the Pfalz A.I and A.II aircraft which differed little from the original Morane Type L. Going into limited production with the A.I (80 hp Oberursel engine) and A.II (100 hp Oberursel), the company expanded and opened a flying school using some of these machines to train Bavarian pilots, while others of the aircraft went into front-line service on reconnaissance or escort duty.[4]

Then, taking the Morane Type H and modifying it to a shoulder-wing monoplane, the Pfalz E.I (with Fokker synchronizing gear) became the first of the company's airplanes to carry a machine gun. In outward appearance its box-like configuration strongly resembled the Fokker monoplane. However, in contrast to the welded steel tube Fokker, the Pfalz E had a completely wooden skeleton. About 60 of these aircraft were followed by a series of variants.

With the production of each airplane, the Pfalz company increasingly injected its own ideas and construction techniques. Ernst and Walter were giving flight demonstrations to combat pilots, while, back at the plant, company engineers were improving on avajlable designs. By April 30, 1916 over 100 of their aircraft were in operational use. But the end of the 'eindecker' contract was in sight.

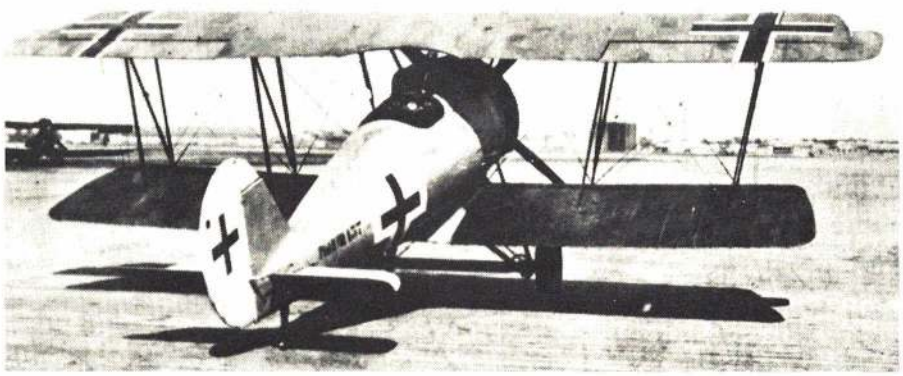
Since August 1914 the exigencies, the attritions, the point-counterpoint needs of war forced design engineers to think in terms other than aerodynamic esthetics and purity. By the end of 1916 (with the era of powered, manned flight but thirteen years old), the immediate need was for engine power and the rugged maneuverability of the biplane fighter.

One of the greatest influences in aircraft design was the appearance of the Nieuport 17 on the Western Front in March 1916. Produced by the French, British, Belgians and Italians, the Nieuport enjoyed an Allied exclusivity until its appearance from the other side of the lines, one day, sporting the Cross Patee. Introduction of the Siemans-Schukert "variant" acknowledged the universality of the Nieuport design.

In the summer of 1916 the Pfalz company built a biplane whose heritage was strongly rooted to past company aircraft. Test flown, it was found to be lacking. However, a few months later the factory obtained license and contract to build the L.F.G. Roland D.I biplane.

Whereas previous Pfalz aircraft had typical flat-sided, fabric-covered fuse-

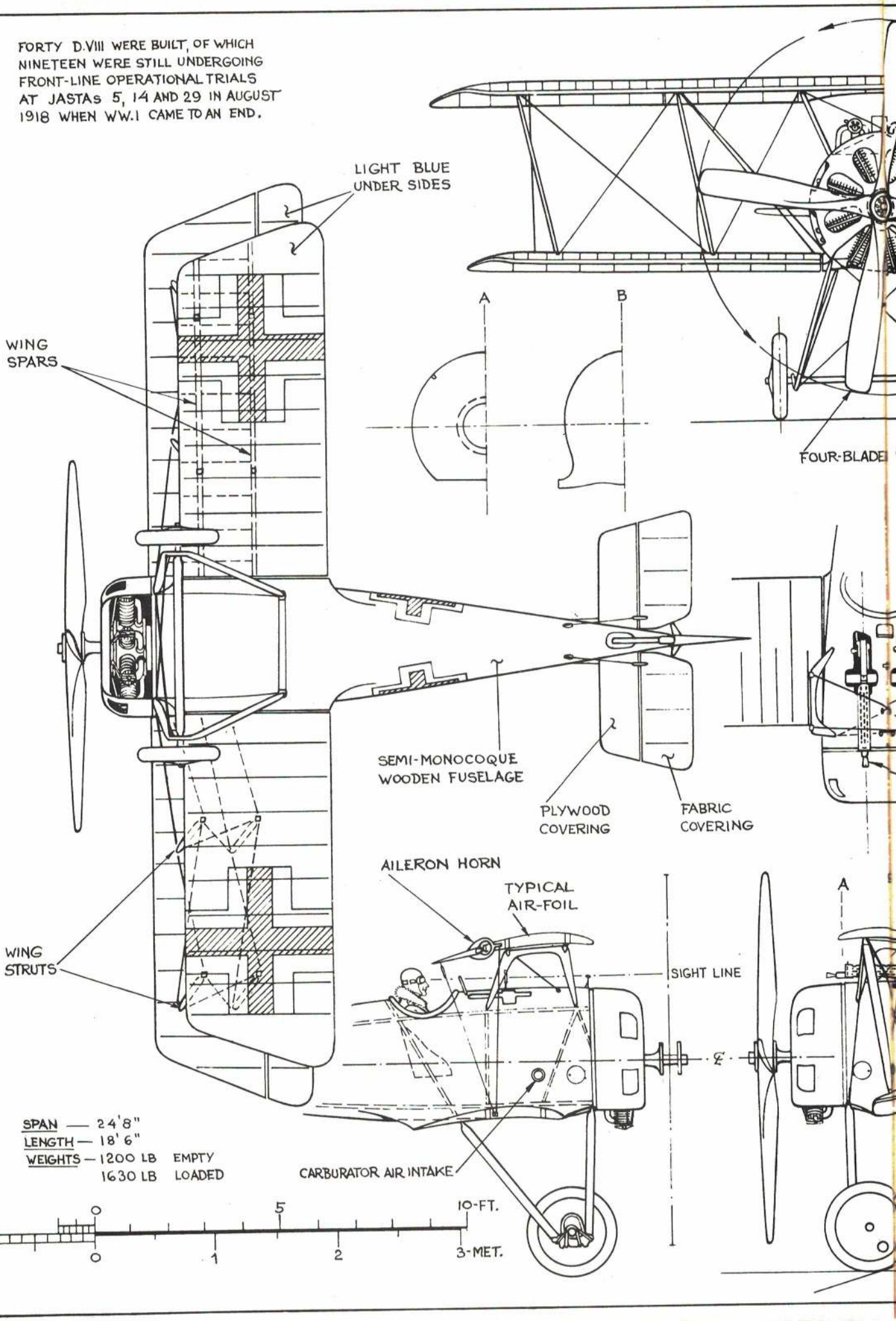
Predecessor to the D.VIII was this single bay strut D.VII entered in the January 1918 Fighter Competitions. (Builder's Note: Cross Patee began to phase out in late March 1918.)

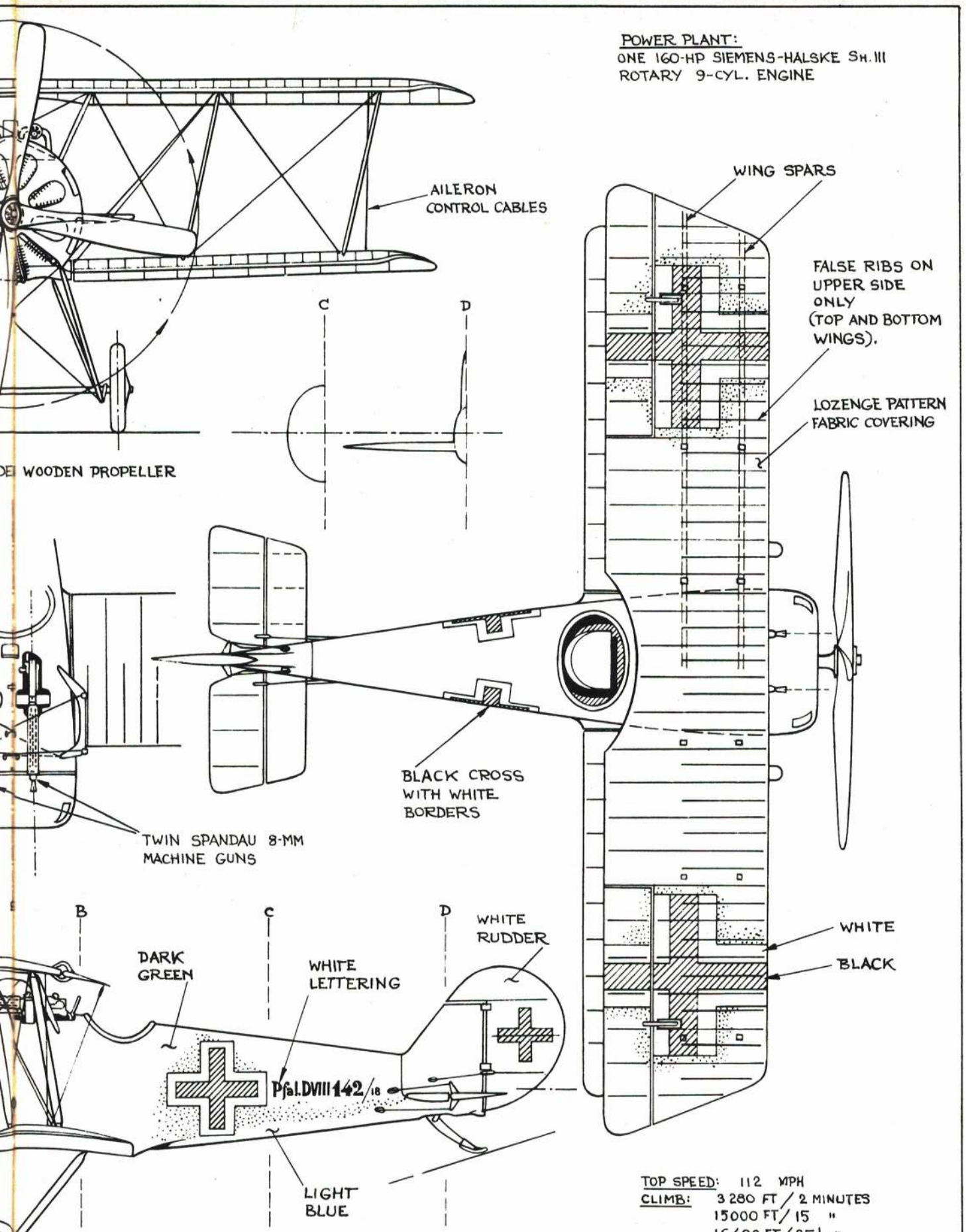


Pfalz D.VIII (Serial 157/18). N-struts and balanced ailerons distinguish this modified D.VIII. (Builders Note: Length of the vertical bars on the Greek Cross paint scheme dates this photo as after May 31, 1918.)

Four-View on next page
Text continued on page 97

FORTY D.VIII WERE BUILT, OF WHICH NINETEEN WERE STILL UNDERGOING FRONT-LINE OPERATIONAL TRIALS AT JASTAs 5, 14 AND 29 IN AUGUST 1918 WHEN WW.I CAME TO AN END.





TOP SPEED: 112 MPH
CLIMB: 3 280 FT / 2 MINUTES
15000 FT / 15 "
16400 FT / 25½ "
ENURANCE: 1½ HR

A PFALZ D.VIII (158/18) FITTED WITH N-STRUTS AND BALANCED AILERONS WAS SENT TO McCOOK FIELD FOR EVALUATION AFTER THE WAR

1918 **Pfalz DVIII** W.W.1

SCALE = 1:60 | DRAWN BY = BJORN KATSTROM

SIXTIETH IN A SERIES

getting started in R/C

MORE QUESTIONS

JIM McNERNEY

How many kinds of RC systems are there?

Every method for transmitting coded information has been used at some time in RC. At present there are two principle types of RC systems manufactured in this country—digital proportional and pulse proportional. Other systems you may find include: single-channel escapement or go-around servo, reed relay, analog proportional and galloping ghost. Each, in its time, was a dominant force in RC. The two that survived did so because, in the case of digital proportional, accuracy, proportional control, high thrust servos, low power drain and reliability are provided, and in the case of pulse proportional, the systems are small, simple, lightweight and relatively inexpensive.

Digital proportional systems use digital techniques, developed for modern computers, to encode and decode the RC commands. Each control on the transmitter has an electronic pulse assigned to it. Movement of the control changes the position of its pulse with respect to the next previous one. The whole series of pulses, one for each control, plus a base or timing pulse, is sent out on the transmitted carrier about 60 times a second. In the receiver, the spacing between the pulses is used to send a reference signal to each servo. In the servo, the pulse information is compared with the servo position. Any difference causes the servo to run until there is no difference.

The pulse proportional system is a little different. In this case, a single, long pulse or square wave is transmitted. The control surface wiggles back and forth in relation to the square wave size. If the positive half wave is longer than the negative half wave, the control surface will spend more time in one direction than the other. If the negative half wave is longer, the control surface nulls (or spends more time) in the opposite direction. This is called pulse width coding. Pulse rate, or the number of pulses produced per second, can also be used to control the null position of the control surface. The combination of pulse width and pulse rate operation is known as "galloping ghost." Pulse proportional systems are extremely popular for single-channel, rudder-only operation. The magnetic actuator used to drive the tail surface has a high current drain because it operates continuously while the system is turned on. Also, magnetic actuators have relatively low torque or driving force and should not be used on large models. They're great for small models though, and the control is fully proportional.

What is a four-wire system? A three-wire system?

These numbers refer to the wires going from the receiver/decoder to a servo. In a four-wire system, one wire carries the control signal for the servo, one is ground or zero volts, one carries plus 4.8 volts and one carries plus 2.4 volts. In this system, servo motor direction is controlled by applying voltage above or below the 2.4 volt reference. In this type of system, losing a battery cell in the airborne system causes the voltage to be unbalanced and the servos will drive to the higher voltage direction, causing loss of control.

The three-wire system eliminates the 2.4 volt wire. This can be done by use of a bridge amplifier in the servo which can reverse the full voltage of the battery to reverse motor direction. In this system, if a cell shorts out, the system will continue to operate, but with reduced range and increased servo transit time.

The trend in recent years has been toward the three-wire system. Special integrated circuits have been designed which provide the more complicated bridge amplifier circuit with fewer actual parts than were used in the older four-wire amplifier.

What kind of batteries are used in RC?

The vast majority of airborne power supplies are nickel cadmium batteries. These use special alkaline rechargeable cells which provide nominally 1.2 volts. They are normally used in a battery of four cells, providing 4.8 volts. A rechargeable transmitter pack will normally contain eight cells with a nominal 9.6 volt output. Nickel cadmium batteries are preferred for RC because they provide a relatively constant voltage under high load, maintain almost constant voltage until fully discharged, provide high current output, are rechargeable, and are more rugged than most other types of cells at comparable price. In normal use nickel cadmium cells will last for several years.

Regular alkaline cells can also be used in some transmitter and receiver packs. These cells provide many of the attributes of the nickel cadmium cells, but are not rechargeable.

Carbon-zinc "dry cells," like flashlight batteries, can be used in 9 volt packs (at 1.5 volts per cell) in transmitters. They should *never* be used in airborne power supplies.

Lead acid cells, "wet cells" (at 2.2 volts per cell) are used to power engine starters and fuel pumps and, with the proper voltage dropping circuit, can be used for glow plug operation.

Batteries are the most unreliable part of an RC system and deserve the most knowledge and care. We will talk more about them in future articles.

new HEATHKIT 3-CHANNEL SYSTEM

goes to 4 channels when you're ready

New Heathkit GDA-1057 Systems, starting at $139.95.

There's no magic involved. Just traditional Heath planning and attention to detail. What appears to be a dandy kit-form 3-channel system, quickly and economically becomes 4 channels with the addition of an optional modification kit. Order 3 now, add the fourth later. It's a system designed to grow as your plans do.

The Heathkit GDA-1057 System uses the flight proven circuitry found in the popular Heathkit GD-19. The GDA-1057-1 3-Channel Transmitter comes with a 2-axis stick assembly. Add the GDA-1057-4 modification and you put 3 channels on the stick with the fourth controlled by a thumb tab. The GDA-1057-1 Transmitter is available on all R/C frequencies, and is housed in a slender new case for positive one-hand action during launch or engine adjustment. Other top-flight features include all nickel-cadmium battery packs with external charging unit, vinyl-covered front panel, adjustable hand strap, telescoping whip antenna, and relative power output meter that doubles as a battery-charging indicator. The new compact GDA-1057-2 3-Channel Receiver has a molded nylon case and connector block for servos and receiver battery pack. It's compatible with all Heathkit servos, and the GDA-1057-4 mod kit converts it to 4-channels too.

SPECIAL SYSTEM PRICE #1 — Order 3-Channel Transmitter, Receiver, Receiver Battery, two GDA-19-4 Standard Servos, pay just $139.95.

SPECIAL SYSTEM PRICE #2 — Order same system as above, substituting either GDA-405-44 Miniature Servos or GDA-505-44 Sub-miniature Servos, pay just $149.95.

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Kit GDA-1057-2, 3-channel receiver, 1 lb. **34.95***
Kit GDA-405-3, receiver battery, 1 lb. **9.95***
Kit GDA-19-4, standard servo, 1 lb **19.95***
Kit GDA-405-44, miniature servo, 1 lb. **24.95***
Kit GDA-505-44, sub-miniature servo, 1 lb. ..**24.95***

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DON LOWE ON RC

Mini-Air Shows: Most of us are hams at heart—we like to be recognized and do our thing, whatever it is. If it's something unique and catches the public eye, then that's even better. Most clubs have been asked to put on flying demonstrations at various kinds of public air shows or gatherings. This kind of event ranges all the way from Transpo '72 to a Boy Scout outing.

I'm as big (or, bigger?) a ham as anyone, and am flattered when someone asks for a flying demonstration. My experience has been both good and very bad in such activities, however. Probably the most appreciated and most gratifying was a flying demo for a group at a local camp for diabetic youngsters. Conversely, the least rewarding experience was a requested flying demonstration at a local airport dedication that never came off. In this instance our club members were turned on and off a number of times, but never flew a demonstration.

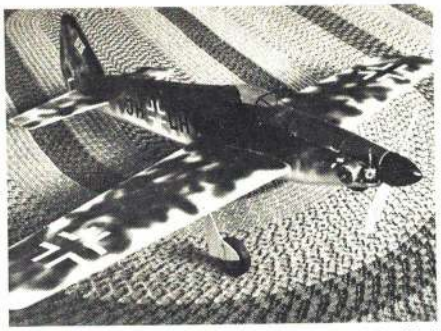
As a general rule, most air show promoters view model aircraft as toys and consider them as gap-fillers between events, or will let you fly if everything else crashes or misses the schedule for some reason.

I agree with those who contend that model aircraft are a versatile air show tool and can rapidly bail out a sagging show. This is alright, but the model show should be a definitive part of the airshow with a definite show time schedule, preferably during prime time. I believe that we have as much to show as anyone and should be so regarded by air show promoters. Very rarely have I participated in a show where we were even listed on the schedule of events! How in the world can we improve our image and gain public acceptance without courteous treatment and the right kind of exposure?! It has been my unfortunate experience at such demonstrations to be stuck in as a "pre-show" or "after-show" or in-between acts.

There is nothing wrong with reacting on a demand basis at such events assuming there is also a definitive advertised time slot as well! Many times I have had comments from people at airshows who are amazed and appreciative of what RC model aircraft will do. There have, unfortunately, also been comments expressing disappointment at missing our act because they didn't even know that we were in the show—due to lack of advertising or a definite time slot.

So, when the local promoter comes calling, don't go hat in hand accepting whatever handout is offered—ask for and accept only equal billing with other acts. If the guy is skeptical arrange a flying demonstration to clinch your argument. An awful lot of people have no conception of the sophistication of RC aircraft—usually they will be amazed.

Photos by James Miura of Honolulu with Juli Kay holding Bob Barne's Dart III and James Kubo's Cutlass.



Jerry Holcomb's original design is hard to find in the grass having a rather effective camouflage paint job. Calls it the "genuine German" and it is for serious pattern flying. Features coupled flaps and is an interesting departure from conventional designs and ideas.

Collapsing Landing Gears: Collapsing, or retractable, landing gears are a fairly common mechanism used these days on pattern and other craft. They are great as long as they work and don't collapse. My experience to date, and, I'm sure that of those who have tried them, is that the largest problems are wear due to engine vibration and collapse due to failure to adequately lock. Wear is a problem of beffy design, balanced props, etc., and collapse is a matter of adjustment. Several designs incorporate a retract arm that moves 90° from full up to full down positions. It will help considerably to assure down lock by slightly trimming or whittling the stop mechanisms to allow slightly larger than 90° travel and allow an "over center" condition especially in the down lock position. Also, adjust the linkage so that the stop is firmly in position in "down lock." Always, of course, use a 180° servo since this provides tremendous mechanical advantage in the up and down lock positions.

(Continued on page 118)

AL RABE ON CL

CL Stunt Tanks: Basically, there are only two types of CL fuel tanks, identified by their vent systems. Conventional tanks have vents located on the inboard side of the tank and vent the empty space as the fuel level drops. The other vent system, called "Uni-flow," vents the outboard side of the fuel tank and the vent is always covered by fuel.

The conventional tank is, by far, the most common tank in use and is the only type commercially available. All commercial tanks have two vents, a "filler" and an "overflow," located on the inboard side of the tank near the front. These vents are arranged so fuel will not run out of the tank through the vents either upright or inverted (Fig. 1).

Conventional tanks, in flight, supply fuel to the engine under a "head" pressure. This pressure is the result of centrifugal force being applied to the fuel in the tank. The in-flight, full tank, head pressure is about the same as holding the tank about eight in. above a bench running engine. As the fuel level drops, the head pressure drops reaching zero with an empty tank. As the fuel quantity and head pressure decrease, the engine tends to run leaner (faster). Good stunt engines are able to overcome most of this leaning tendency by being designed with high fuel suction (small venturi, "packed" crankcase).

Modelers who noticed that the "filler" vent which runs to the bottom of the tank does little, if anything, to improve venting, eliminated that vent (Fig. 2) and often installed the remaining vent from the opposite side of the tank "Oriental" style (Fig. 3). It makes no difference where the single vent is installed as long as it terminates in the top, front, inboard corner of the tank. The primary disadvantage of a single-vent tank is that it makes refueling awkward. You must stand the model on its inboard wing tip to allow the air being expelled from the tank by the incoming fuel to flow through the pickup tube, fuel line, filter, and out of the venturi.

Again, conventional tanks are characterized by atmospheric venting of the empty space above or inboard of the fuel by one or more vents.

Uni-flow tanks have two vents. One of them, the conventional type overflow, is capped after filling. The other vent is the operating, Uni-flow vent. Inside the tank, the Uni-flow vent runs to a point beside the pick-up tube near the rear of the tank so that it will always be covered by fuel as long as any remains in the tank (Fig. 4). In theory, the Uni-flow tank provides for a steadier engine run by eliminating the changing pressure head of conventional tanks. As fuel is used, air enters the tank through the Uni-flow vent and bubbles through the fuel toward the empty space above or inboard of the fuel. The Uni-flow trick is that this empty space is supposed to run at a partial vacuum which offsets the fuel weight to eliminate normal pressure head. For more detailed information on Uni-flow theory see 1960 *Air Trails Model Annual*, page 16-17.

My experience with Uni-flow is limited to one Bearcat and my conversations with top level fliers who have used them with more success than I.

While my opinions and impressions may not be altogether accurate, Uni-flow tanks have the following characteristics: They seem to give steadier runs. Uni-flow tanks tend to richen (slow) the engine somewhat as the tank empties. This is just the opposite of the conventional tank and unfortunate, as a faster run usually helps the vertical and overhead maneuvers located at the end of the AMA Stunt pattern. This tendency to richen may be helped by restricting the airflow into the Uni-flow vent.

Uni-flow tanks should not have longitudinal baffles which would block the path of air bubbles toward the inboard side of the tank.

It appears that the best location for the Uni-flow vent is about 1/2" ahead of the end of the pickup tube and hard against the outboard side of the tank.

Connecting the Uni-flow vent (after filling the tank) to a pressure fitting on the muffler seems to help the operation somehow. Many good fliers are switching to muffler pressure. Additional improvement in Uni-flow characteristics are said to be obtainable by progressively drilling out the orifice in the pressure fitting to adjust the character of the tank run.

Uni-flow tanks may be operated as conventional tanks simply by leaving the cap off of the overflow vent, since Uni-flow depends upon a partial vacuum above the fuel. In this case, capping the Uni-flow vent is optional.

To insure proper operation, all tanks should be at least partially disassembled,

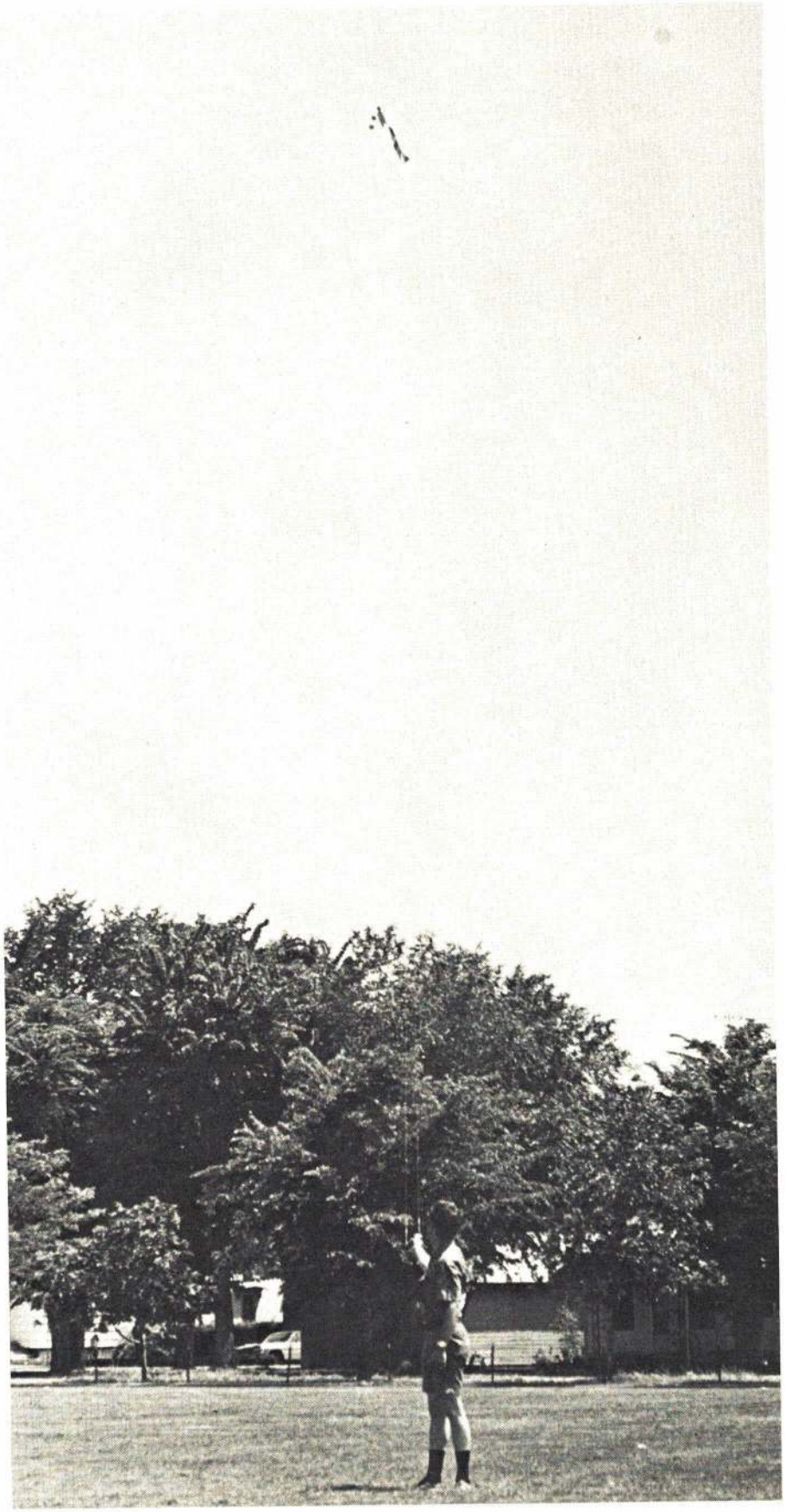
(Continued on page 119)

Semi-scale FW-190 by Mike Guthompson is ST 46-powered and spans 57 inches.

Paul Tupker in the Netherlands has been on his country's FAI Stunt team several times. Now flies this much altered Nobler with completely enclosed engine and muffler.

"THOR X2" was third in best finish at Toledo, by Hubert Kirschbaum. It is an original RC Pattern design.

GETTING STARTED IN



Been going around in circles lately? Here is the cure: Control Line Aerobatics! If you have mastered the art of making a trainer go around, and around and. . .ooooo-oo-oh I am getting sick! Well, it is time to move up to loops, eights and inverted flight.

The goal here is to lead you into aerobatics (stunt flying) at both minimal initial cost and a minimum of crashes. I will go into what is needed to fly, how to set it up, and how to fly it. The cost can be as low as $4.00, if you already have a Babe Bee engine, but larger models are easier to fly. This road can lead you through the pleasure of being able to handle a plane with confidence up to the ultimate of national or international competition.

The first thing to discuss is equipment. You cannot learn to fly stunts with a model that is trying to fall out of the air. The important things are power, weight, wing area, and the control line size. Naturally, one cannot know or describe every workable combination, so Figure 1 presents a wide selection for which the performance is sure to be satisfactory.

On aerobatic models, solid balsa wings are out; for all sizes, beware of building a small, heavy model. You may want to desensitize your ship somewhat. Do it by reducing the elevator throw (longer control horn), or a bit of noseweight—never by making the model heavy. As you progress in skill, you can learn to handle a sensitive model.

To keep the weight down for practice models, cover only with light tissue, and use only clear dope. Use your glue sparingly, and sand all parts thoroughly. On the Shark 15 in the photographs, I removed 2½ oz. in sanding the fuselage to proper contour! I just cannot stress enough how much harm overweight will do to your flying! A heavy model needs more room and loses speed when it maneuvers. Speed gives line tension—in U-Control, that is vital. The lightweight model will have a little less tension flying level, but will keep it even flying eights directly overhead.

Your airplane must be built "true." The wings and stabilizer must be exactly at right angles to the fuselage and parallel to each other. A tilted stabilizer acts a bit as a rudder and causes wobble in the maneuvers. Wing warps are a total disaster to be avoided. Fortunately, warps can be removed at any time by use of heat or steam.

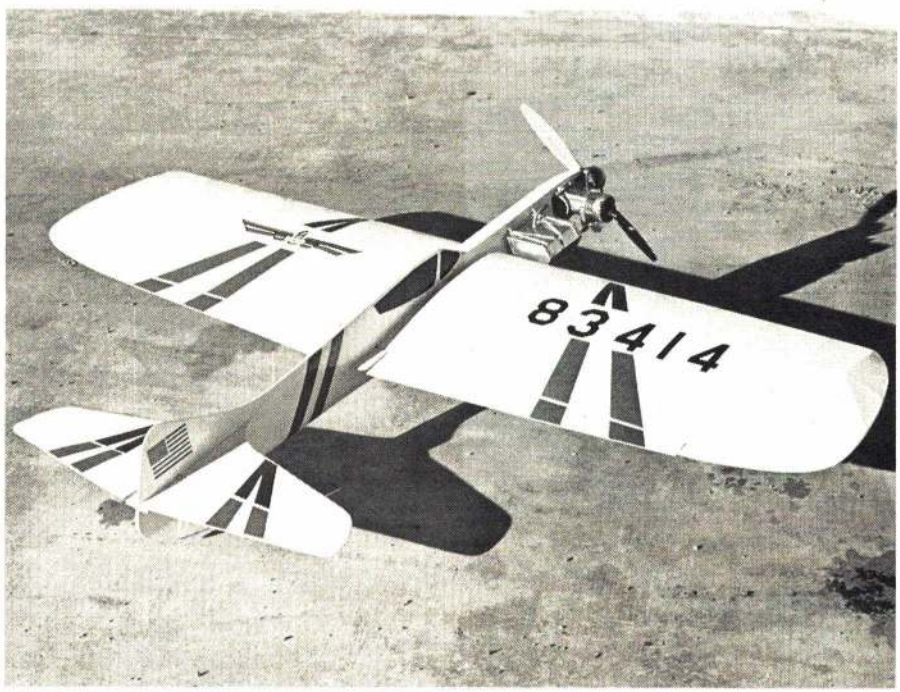
The Babe Bee engine may be easily modified to fly satisfactorily inverted as well as upright. The modifications shown in Figure 2 are a baffle to slow fuel slosh and hold the pickup tube exactly on the centerline of the tank, and a special vent tube which prevents fuel from running out with the engine upside down. The pickup block is a good idea on the Golden Bee engine, too.

AEROBATICS

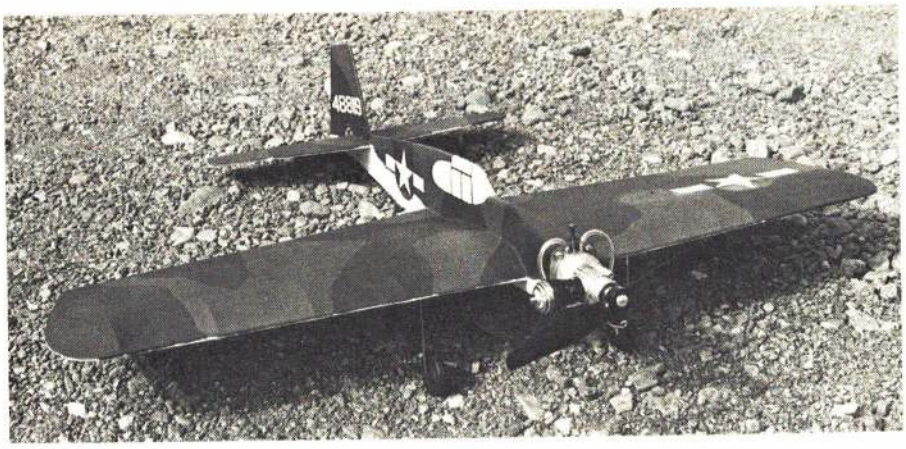
Real fun in Control Line begins after straight and level flight is mastered. Here's a way with the fewest crashes. / by Larry Renger

Engine	Model	Wing Area	Maximum Weight	Prop	Lines	Tank
Babe Bee .049	Baby Flite Streak	135 sq. in.	6 oz.	6-3	.008 x 35' steel cable	½ oz.
Golden Bee .049	T.F. P. 51, Cosmic Wind	135 sq. in.	6 oz.	6-3	.008 x 35'	½ oz.
Medallion .049	Little Tomahawk	135 sq. in.	6 oz.	6-3	.008 x 35'	½ oz.
	Baby Ringmaster	115 sq. in.	5 oz.	6-3	.008 x 35'	½ oz.
	Jim Walker Firebird	175 sq. in.	6 oz.	6-3	.008 x 35'	½ oz.
Tee Dee .049	Jim Walker Firebird	175 sq. in.	6½ oz.	6-3	.008 x 35'	¾ oz.
Medallion .09	Jim Walker Firebird	175 sq. in.	7 oz.	7-3½	.008 x 52½'	1 oz.
Fox 15x	Magician .15	220 sq. in.	14 oz.	8-3 or 8-4	.012 x 52½'	1½ oz.
Max 15	Shark .15	270 sq. in.	18 oz.	8-3 or 8-4	.012 x 52½'	1½ oz.
Enya 15	Junior F.S.	220 sq. in.	12 oz.	8-3 or 8-4	.012 x 52½'	1½ oz.
Cox 15	Ringmaster Jr.	200 sq. in.	11 oz.	8-3 or 8-4	.012 x 52½'	1½ oz.
Max .19	CG Buster	400 sq. in.	30 oz.	9-4	.012 x 60'	2 oz.
Enya .19	Cosmic Wind	400 sq. in.	30 oz.	9-4	.012 x 60'	2 oz.
Fox .25	Shoestring	400 sq. in.	30 oz.	9-4	.012 x 60'	2 oz.
	FS Flite Streak	390 sq. in.	30 oz.	9-4	.012 x 60'	2 oz.
Fox 35	CG Buster	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
Max S35 Stunt	CG Cosmic Wind	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
KB Stallion 35	CG Shoestring	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
	Midwest P51	500 sq. in.	45 oz.	10-6	.015 x 60'	3 oz.
	Midwest Me.109	500 sq. in.	45 oz.	10-6	.015 x 60'	3 oz.
	Midwest Aerocobra	500 sq. in.	45 oz.	10-6	.015 x 60'	3 oz.
	Magician 35	500 sq. in.	45 oz.	10-6	.015 x 60'	3 oz.
	Ringmaster	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
	F-51	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
	Yak-9	400 sq. in.	40 oz.	10-5	.015 x 60'	3 oz.
	Top Flite	390 sq. in.	35 oz.	10-5	.015 x 60'	3 oz.
	Flite Streak	390 sq. in.	35 oz.	10-5	.015 x 60'	3 oz.

FIGURE 1



Above: Steady inverted flight takes plenty of concentration at first—controls are thought of as BOTTOM and TOP, rather than as UP and DOWN. Left: The best size for learning aerobatics is between 15- and 35-powered models. Smaller ones seem to last longer and are much less expensive. This is a Jetco Shark.



Built-up wing profile 049 models are fine for flying in confined areas. Steel lines are a must. Note tank vent modifications described in text. Model is a Top Flite P-51.

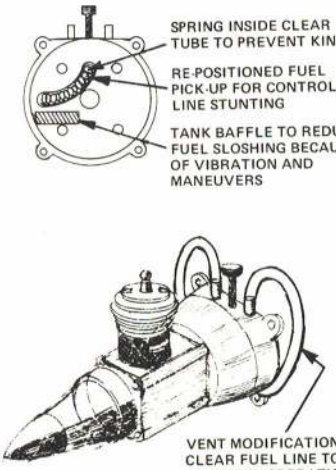
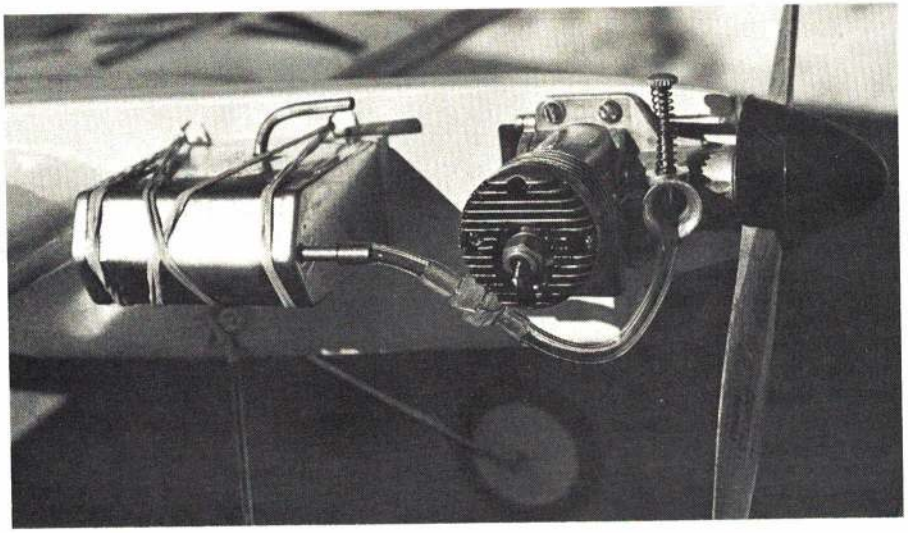


FIGURE 2



No aerobatics are possible without a smooth running engine and this is assured only with a dependable and proven fuel tank system. Here note fuel line filter and forward facing tank vent.

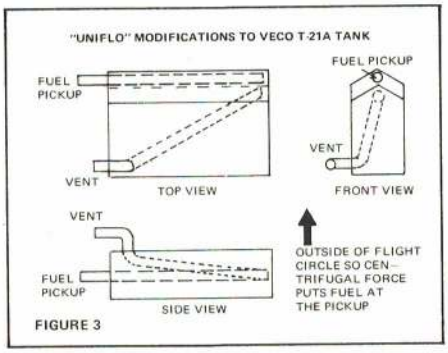


FIGURE 3

All other engines must use stunt tanks; the appropriate sizes are given in Figure 1 and are intentionally short runs to give you time between flights to analyze your mistakes and think through what you want to try next. The tank must be mounted exactly in line with the engine so the run will be the same upright and inverted. Run the engine with the model upside down. If the engine leans out, the tank must be moved toward the bottom of the model; if it riches, move the tank toward the top of the model.

Most engines fly maneuvers best when set to run a bit rich in level flight. When you get into a maneuver, it will lean out to give you more power. It is important to avoid leaning the engine past its power peak, as this can not only cause damage, but power is lost just when you need it most! Use a fuel filter when filling your tank, and a filter between the tank and engine. Keep your flying lines free of kinks and dirt—wipe them with an oily rag after flying from damp ground or grass.

At last! Airplane and tools ready—let's fly! Set up your gear so that the model is pointed exactly downwind as it starts its takeoff run. All maneuvers are done with the wind at your back with the exception of the wingover, which is started facing the wind (you have the most speed and line tension in the maneuver to fight the wind).

Before we get into actual flight instruction, there is an important change you must make in your thinking. So far you probably fly your models "up" and "down"; this costs most new fliers at least one plane! When they try to fly inverted, they get too low and think "I need to go up!" The unconscious reactions take over and pull the up line before the conscious can think it through. *Splat!*

The cure for this is to think of the model as though you were in it: Fly towards the *top* or *bottom* no matter where it is. When you are upside down and the wheels are sticking up in the air, it is no problem to remember that *bottom* control will get you out of it. Try to forget entirely about up and down (known as space axes in engineering) and concentrate on *top* and *bottom* (aircraft axes). You are effectively putting yourself in the cockpit and flying it from there. In addition, a pull on the top line of your handle gives you *top* control.

Figure 4 shows the basic maneuvers to be learned—wingover, loop, figure eight, outside loop and inverted flight. It is important to work on only one maneuver per flight, and fly at least two level laps between attempts. By taking it slow and easy, you avoid getting rattled, which helps eliminate errors.

Start with the basic wingover. Pick a spot directly upwind and start a sharp, but shallow, climb there. Aim to fly straight, and pull out smoothly at the downwind point. Make your pullout at between four and eight feet. You should have plenty of time if your climb was fairly low (about 1/3 of the way to the top of the circle). Work this maneuver up until the model passes directly over

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Patent Pending

MU-795
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Newly styled, hand inspected, top quality tires with treads

REGULAR

NH-1	WHEELS 2¼"	2.59/pr
NH-2	WHEELS 2½"	2.79/pr
NH-3	WHEELS 2¾"	2.99/pr
NH-4	WHEELS 3"	3.19/pr
NH-5	WHEELS 3¼"	3.39/pr
NH-6	WHEELS 3½"	3.59/pr

TREAD OR

Du-Bro smooth surface tires available!

175R	WHEELS 1¾"	2.19/pr
200R	WHEELS 2"	2.39/pr
225R	WHEELS 2¼"	2.59/pr
250R	WHEELS 2½"	2.79/pr
275R	WHEELS 2¾"	2.99/pr
300R	WHEELS 3"	3.19/pr
325R	WHEELS 3¼"	3.39/pr
350R	WHEELS 3½"	3.59/pr

"T" OR "R" **LOW BOUNCE**

Low Bounce "SLICKS"

225S	WHEELS 2¼"	2.59/pr
250S	WHEELS 2½"	2.79/pr
275S	WHEELS 2¾"	2.99/pr
300S	WHEELS 3"	3.19/pr

COMPLETE LEXAN BRAKE AND LINKAGE HOOK UP AVAILABLE FOR ALL DU-BRO WHEELS

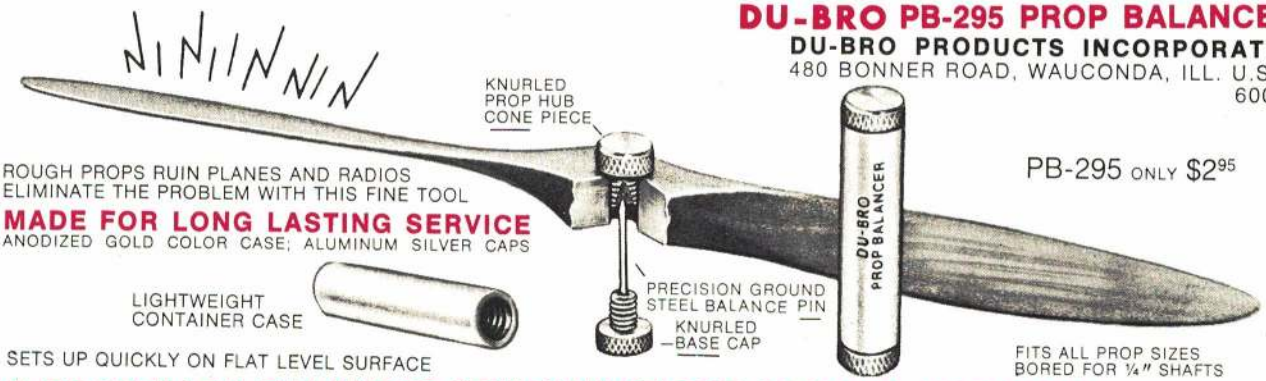
MADE IN U.S.A.

DU-BRO BRAKE

SEE YOUR HOBBY DEALER

DU-BRO PB-295 PROP BALANCER

DU-BRO PRODUCTS INCORPORATED
480 BONNER ROAD, WAUCONDA, ILL. U.S.A. 60084



ROUGH PROPS RUIN PLANES AND RADIOS
ELIMINATE THE PROBLEM WITH THIS FINE TOOL

MADE FOR LONG LASTING SERVICE
ANODIZED GOLD COLOR CASE; ALUMINUM SILVER CAPS

PB-295 ONLY $2.95

SETS UP QUICKLY ON FLAT LEVEL SURFACE

FITS ALL PROP SIZES BORED FOR ¼" SHAFTS

A PROPELLER BALANCER YOU CAN CARRY IN YOUR POCKET!!!
THREE PIECES OF CAREFULLY MACHINED AIRCRAFT ALUMINUM PARTS CONTAINED WITHIN A SMALL CYLINDER 7/16" X 2 1/16" . . . SHOWS BALANCE ON LONG AND SIDE AXIS . . . EXCLUSIVE FEATURES

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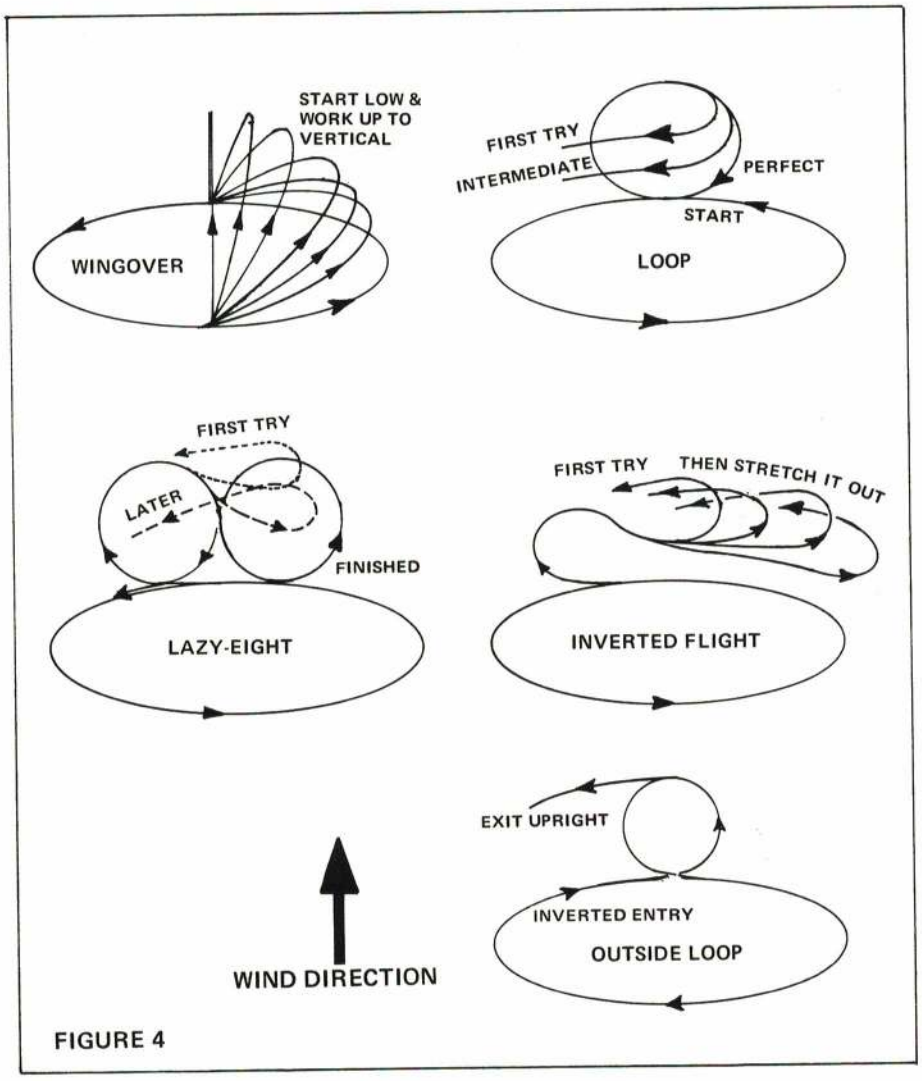


FIGURE 4

Toolbox Checklist

Lines with connectors
Handle
Fuel
Fuel filler with filter
Battery
Battery clips
Propellers
Prop and plug wrench
Glow plugs
Rag
Screwdriver

Pre-flight Checklist

Engine bolts—tight
Glow plug—tight
Prop—tight
Line connectors condition (positive snap)
Line condition (clean, unfrayed, no kinks)
Landing gear mount and wheel retainers solid
Control linkages—solid
Fuel line filters—clean
Check for fatigue cracks on fuselage near wing and tail
Check control surface hinges for tears or separations
Control neutral setting

Post-flight Checklist

Run all fuel out of tank and engine.
Wipe off engine.
3 in 1 oil in exhaust and intakes, flip prop several times.
Cap tank vents.
Wash airplane with mild detergent solution.
Dry off and hang it up.

GETTING STARTED IN AEROBATICS

(Continued from page 50)

your head and corners into steady level flight. At all times keep the pullout sharp and low; adjust the amount of climb to suit your skill level.

In order to learn quickly, only attempt to learn one maneuver in a day of flying! The control you are trying to learn relies mostly on unconscious reactions. These reactions are best learned one at a time and practiced until your muscles will flow through the desired set of movements without error. I know this might seem slow, but it is quicker than building a lot of new models to make up for flying errors.

Next time out fly a practice flight of wingovers to warm up, starting low and working up to overhead on the third or fourth attempt. Now that you are ready, let's try to loop. The secret to a good loop is that it is very open, so the model is going full speed with full line tension throughout. Start your maneuver directly downwind and pull *top* control into a smooth, wide-open climb. Keep the *top* control on until the model is on its back, then pull full *top* control to make a sort of backwards figure 9. It ends up in level flight much higher than the model entered the maneuver. Practice this maneuver; open out the second half until you have a smooth, round loop. Don't forget those two cool-off laps per attempt!

Once you have a good wide-open loop with the top about 2/3 of the way overhead, you can do two or three in a row, but decide exactly how many and stick to it. Many a model has been ruined by the pilot changing his mind part of the way through a maneuver and becoming confused. Remember, you can get about ten twists in your lines before the control begins to get stiff.

The maneuver to learn next is the "lazy eight," actually backwards from the competition maneuver, but much easier to learn. Start your stunt with the model just beginning to come into the wind, and pull *top* control to start a loop. Just after the model starts down the back side, pull full *bottom* control until the model comes upright. The first attempt will look like a backward "S." Work on starting the *bottom* control later and opening out the second half until you have two smooth, round loops at the same altitude connected in the middle. Cool-off laps are still important. (They are part of the competition pattern, so why not get in the habit?)

Now comes the hard part, flying inverted. *Top* and *bottom* control should be automatic by now. You get inverted simply by extending the outside portion of a lazy eight. As the model starts up on the backside of the outside, neutralize control for just an instant, then continue the *bottom* control pullout. Work your way into longer and longer delay before pulling out. Concentrate on the airplane, fly towards its bottom or top as required to fly horizontal.

Most fliers find it easier to turn their palm up during both inverted flight and outside maneuvers. It helps you maintain smooth control as you need not follow the model as accurately with your arm motion.

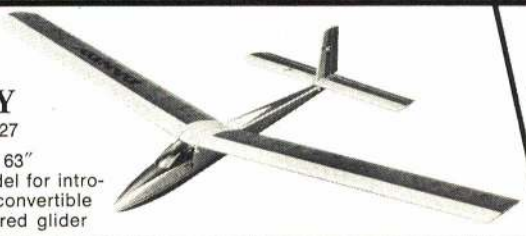
Outside loops are easy by this time. You have been doing them in your eights. Just fly inverted and pull *bottom* control for a loop and a half so you pull out right side up. The competition pattern does not require that you enter the outside from upright flight or pull out inverted, so why bother?

There you have it: The basic elements of all aerobatic stunts. Practice these maneuvers until you can fly any of them without a thought. Once you get to that point, both the fields of competition aerobatics and combat flying are open to you.

Graupner

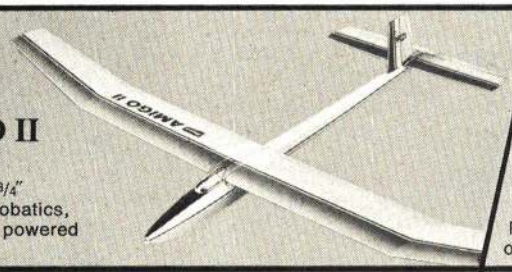
the brandname for top quality!

R/C SAILPLANE MODELS



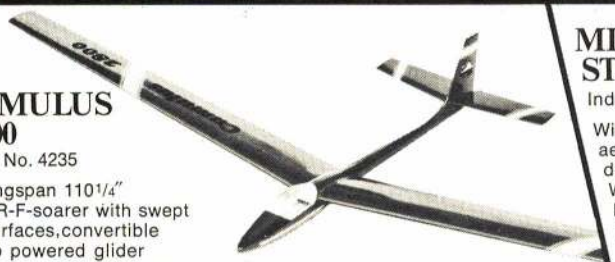
DANDY
Ind. No. 4227

Wingspan 63″ ideal model for introduction, convertible to powered glider



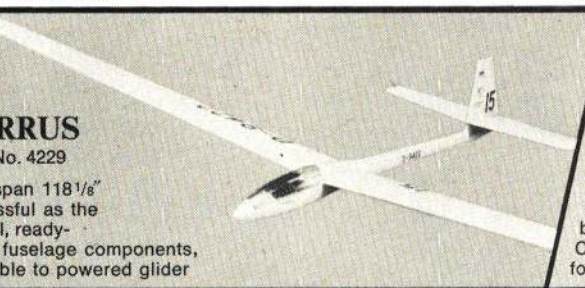
AMIGO II
Ind. No. 4219

Wingspan 78 3/4″ for simple aerobatics, convertible to powered glider



CUMULUS 2800
Ind. No. 4235

Wingspan 110 1/4″ A-R-F-soarer with swept surfaces, convertible to powered glider



CIRRUS
Ind. No. 4229

Wingspan 118 1/8″ successful as the original, ready-formed fuselage components, convertible to powered glider

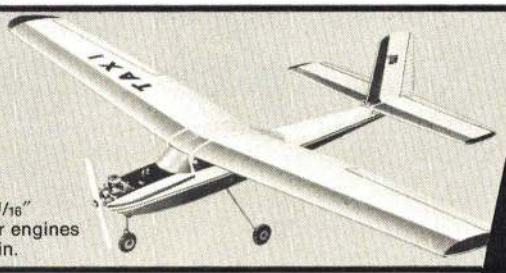
AS K 14
Ind. No. 4237

Wingspan 90 1/2″ ready-formed, powered glider for aerobatics, for engines of up to .15 cu. in.

R/C POWER MODELS

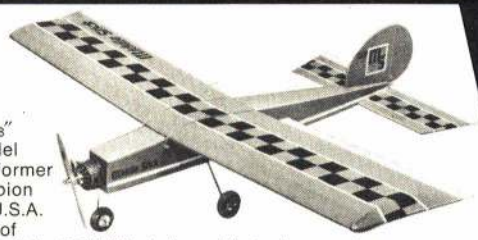
TERRY
Ind. No. 4635

Wingspan 41 3/8″ handy introduction model, for engines of .09 cu. in.



TAXI
Ind. No. 4625

Wingspan 59 1/16″ R/C trainer for engines of .15–.35 cu. in.



MIDDLE STICK
Ind. No. 4631

Wingspan 55 1/8″ aerobatic model designed by former World-Champion Phil Kraft, U.S.A. for engines of .40 cu. in. and the NSU/Wankel model airplane engine

KWIK FLY MK 3
Ind. No. 4629

Wingspan 59 1/ ″ low wing designed by former World-Champion Phil Kraft, U.S.A. for engines of .60 cu. in.

CESSNA 177 cardinal
Ind. No. 4633

Wingspan 61″ for engines of appr. .30 cu. in. semi-scale after the new CESSNA type, ready-formed components

AHM, Associated Hobby Mfrs., Inc.
621 East Cayuga Street
Philadelphia / PA 19120

French Motor Co. Inc.
33, Berry Street
San Francisco / Calif. 94107

Midwest Model Supply Co.
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Chicago / Illinois 60638

Royal Products Corp.
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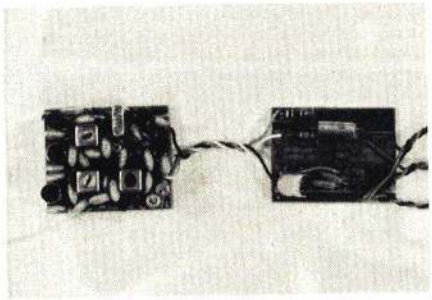
AZ 42/E

ACE R/C digital commander KIT

* Two channel system using IC's and latest state of the art; may be expanded to 4-6-8 channels.
* Receiver-Decoder (2) will work with most modern 4-6-8 channel digital transmitters on same frequency! Reads aileron and elevator signals--ignores the rest.
* Receiver-Decoder (2) works modern digital servos.
* Receiver-Decoder (2) offer inexpensive way to go with your present system for glider, plane, boat or car: use with extra servos you already have. Or use our combo flite pak: receiver-decoder, two servos, etc.
  * Available on the following frequencies: 27.995, 27.045, 27.095, 27.145, 27.195 53.100, 53.200, 53.300, 53.400, 53.500



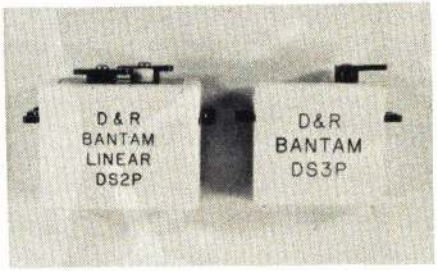
digital commander RECEIVER DECODER (2) KIT

IC's simplify wiring and set up of 2 channel decoder. Receiver is exceptional double tuned front end which uses discrete components for the highest selectivity and greatest range. Complete with detailed step by step instructions. Weight of completed receiver-decoder is 36 grams or 1.26 ounces.

No. 12G20—Digital Commander Receiver-Decoder Kit (2) $27.95
(Less case, connectors, switch)

Please specify frequency

No. 19L50—Deans 4 pin connector set .95
No. 40L252—CW DPDT Slide Switch .59
No. 30L21—Switch Guard for above .39
No. 21K30—Formed ABS case for Receiver-Decoder. (All models) 2.00



digital commander SERVO KIT

Housed in the D & R Bantam DS3P mechanics, uses WE 3141 IC for ease in assembly. Kit contains motor, pot, wiper and all components required, with step-by-step manual.

Weight for the DS3P servo is 37 grams: 1.3 ounces. With the DS2P servo, 44 grams: 1.55 oz.

No. 14G20—Digital Commander Servo Kit $19.95
No. 14G20L—As above, except with D & R DS2P Linear Mechanics (Less connectors) $20.95

digital commander FLITE PAK KIT COMBO (2)

If you intend to use Commander Digital (2) with your multi digital transmitter, all you need are the receiver-decoder and 2 servo kits. Combo offers savings over kits purchased individually. Includes 3 connectors, switch, hookup wire for cabling. Everything you need to make complete 2 channel-2 servo pack for your sailplane, boat or car, except batteries.

Weight of the complete 2 channel Flite Pak, including ABS case and connectors and switch, but less batteries, is 113 grams or 3.9 ounces.

With 225 ma SCL batteries, 160 grams or 5.64 ounces.

As above, but with 450 ma SCL batteries, 190 grams or 6.7 ounces.

No. 12G30—(2) Flite Pak Combo $59.95
No. 12G30L—As above, but with D & R DS2P Linear Mechanics 61.95

Please specify frequency

NEW! NEW! NEW!

digital commander

8 CHANNEL RECEIVER-DECODER

Here is the new Ace Digital Commander 8 Channel Receiver-Decoder Combo. This is the ultimate of the 2 channel system which was developed by Fred Marks, which received a great reception and met with fantastic success in the field.

Now with the new decoder you have your option of going with 2, 3, 4, 5, 6, 7 or 8 servos--whatever your transmitter provides.

The Ace Digital Commander Receiver-Decoder Combo will work with any of the present day transmitters available, provided they are on the same RF frequency. It will not work with the Jerobee, ACL Digilog, or Digitrio.

The unit is just as simple and easy and straight forward to wire as the 2 channel. The secret is the fact of using IC chips which considerably simplify wiring for the homebrewer.

May be used with the Ace Digital Commander servos or any positive pulse servo. Three wire output from the decoder.

Unit in its vacuum formed case measures 1.45 x 1.72 x 1" deep. Weight of the receiver decoder is 1.4 ounces.

Kit is complete for all items, including ABS formed case. No connectors are furnished. Complete building and step by step instructions mean that the experienced should have no difficulty.

Only the highest quality of components used--up to a standard of excellence--not down to a price.

No. 12G18—Digital Commander 8 Channel Receiver-Decoder Kit $34.95

* **Available on the following frequencies: 27.995, 27.045, 27.095, 27.145, 27.195 53.100, 53.200, 53.300, 53.400, 53.500**

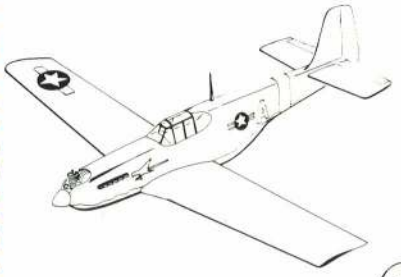
ALL STAR

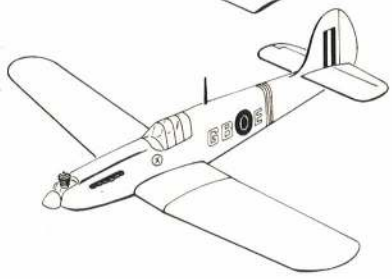
BIPLANE KIT BY ROMAN BUKOLT

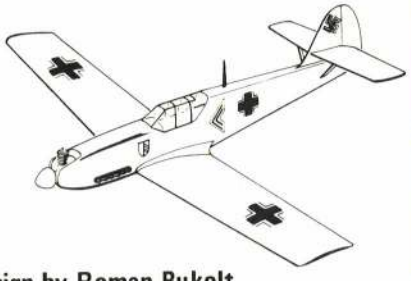
Uses two sets of Ace Foam Wings for ease of building. For use with .09 to .15 power and 2 or 3 channel digital. Do NOT overpower! Beautiful Experimental Aircraft Association type plane.

131200—All Star Deluxe Biplane Kit $21.95

WARBIRDS







Design by Roman Bukolt

PRESENTED IN R/C MODELER

Choose the WW II Semi-Scale bird you'd like to build--the Ace kit will make it a pleasure.

Kit contains precision band sawed and machine sanded balsa and hardwood parts. Some portions of the wood is blank to let you make the variations required for model of your choice. This makes the flexibility to allow you to choose one of the three possible designs. Step by step details are shown on the plans.

Kit features the use of Ace Foam wing--two taper sections, and a constant section--to make for easy construction of any of the three wing configurations.

Each War Bird has a span of 42" and an area of 225 square inches. Designed for docile performance with a Cox Babe Bee or Golden Bee and Pulse Commander Rudder Only. Or use a Tee Dee .049 with a 2 channel digital for commanding characteristics. One secret to the War Bird is: Do NOT over power--for scale-like and realistic flying.

No. 13L110—Ace War Bird Kit $17.95

Builds either P51B, Hurricane Mk IIc or ME109E

OUR 21st YEAR

ACE R/C INC.
HIGGINSVILLE, MO. 64037

R/C EXCLUSIVELY

ACE R/C INC.

Have Fun--
Fly the Simple System:

pulse commander

--WITH Nicads and Charger
--From 2.5 Ounces

RUDDER-ONLY PULSE IS:

* LIGHTEST WEIGHT--2.5 oz. for Baby.

* LOWEST COST--WITH airborne nicad batteries and charger--begin at $69.95!

* SIMPLEST--only one moving part, easily serviced and maintained; noise free.

* VERSATILE--Arrange to suit your particular installation. You can go up or down in size without obsoleting receiver or transmitter--simply change battery pack and actuator.

* FULLY PROPORTIONAL

PULSE COMMANDER R-O SYSTEMS

Completely wired, tested and guaranteed. With airborne nickel cadmium battery pack and charger; less transmitter battery.

10G15—Baby System	$69.95
10G15T—Baby Twin System	$72.95
10G16—Standard System	$71.95
10G17—Stomper System	$74.95

26.995, 27.045, 27.095, 27.145, 27.195
Please Specify Frequency

NOTE--Here are the new weights for the new model of the Pulse Commander. For the Baby, weight is 2.5 ounces, Baby Twin, 2.7 ounces, Standard, 3.7 ounces, Stomper, 4.1 ounces.

TRY YOUR DEALER FIRST—if he does not have it, order direct using coupon for fast and courteous service.

DICK'S DREAM KIT
Highly Recommended for Beginners

† 34" Foam Wing sections. † Top grade die-cut wood parts. † For .020 engines. † Commander Baby or Baby Twin. *Owen Kampen design.

13L100—Dick's Dream Kit $6.95

ACE HIGH GLIDER KIT

† 70" Foam Wing sections. † Precision machine cut and sanded wood. † For .049--Power Pod parts supplied. † Recommended for Rudder-Only--Standard or Stomper. *Owen Kampen design.

13L104—Ace High Glider Kit $14.95

SKAMPY KIT

A Goodyear scale type racer for the experienced rudder only flyer. † 30" foam wing. † Top grade machine cut sanded wood. † For TD .020. † Baby Twin Pulse Commander recommended. * Owen Kampen designed.

No. 13L103—Skampy Kit $6.95

2T KIT

† 50" Foam Wing, 3 Moulded Sections. † Precision machine cut and sanded wood. † For .049. † 2 Channel Trainer, use with bricks or servos. † Works beautifully as Rudder-Only Pulse Proportional ship with Commander-Standard or Stomper.

13L106—2T Foam Wing Airplane Kit $14.75

Add Another Command! --
Ace Digi-POD SERVO

EXTRA: May be used with ANY modern digital system available--2, 4 or more channels.

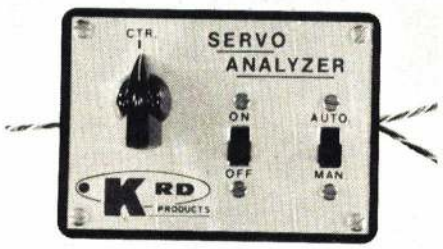
Been wishing you had another function with your digital? It's simple and easy with the Ace Digi-POD servo.

The Digi-POD is a pulse omission unit, which is triggered when the pulse train from your digital transmitter is interrupted approximately .25 seconds. A 3 position sequencing device, going from one position to the next. Response is smooth and quick. Easily hooked up.

Transmitter modification is simple and full instructions are supplied for the Commander Digital 2 along with a kit of needed parts. NOTE: Kit also contains theory and procedure to enable experienced to make mods for other transmitters. Factory conversion of your transmitter is also available at nominal cost.

The Ace Digi-POD is available only as a completely assembled unit. Housed in D & R Bantam case. Weighs 39 grams, less connector.

No. 15G3—Assembled Digi-POD Servo	$28.95
No. 11G2—Digi-POD Parts and Instructions for Transmitter Conversion	1.75
No. 11E3—Digi-POD Factory Conversion of your Transmitter.	6.00



KRD SERVO ANALYZER

Designed to check and adjust any three or four wire, negative or positive, servo. Comes adjusted to operate servos that use a 1 to 2 mSEC time base with 1½ mSEC center. Takes care of majority of servos on market. Simple adjustment required to operate other servos requiring different time base.

In manual position, pointer knob may be used to check servo centering and travel, binding or dead spots, throughout its travel. This may also be used while installing servos in your airplane without using transmitter and receiver.

In auto position, analyzer will drive servo back and forth from one end of travel to other automatically. This is useful for breaking in new servos, motors and gears.

No. 31K19—KRD Servo Analyzer $24.95

KRD RETRACT LUBRICANT

This excellent lubricant protects your favorite retract landing gear by giving it the right kind of lube. Works with any freon operated system. A 2 oz. package with spout cap.

No. 25L55—KRD Retract Lubricant $1.49

KRD RETRACT VALVE TOOL

This tool is designed for removing the fill valve in a freon retract system prior to lubricating.

No. 25L56—KRD Retract Valve Tool .49

R-O PULSE HANDBOOK
WITH
UPDATED CATALOG
Only $1.00
Refundable First Order

Handbook has expanded data on How Pulse Works, Installation, How to Fly and much more. Most complete information on Pulse Rudder Only available anywhere.

New catalog is completely updated. Includes many items from major manufacturers.

Price is $1.00 via THIRD CLASS BULK MAIL. If you wish faster delivery, add 50¢ for turn around FIRST CLASS service.

ACE RADIO CONTROL, INC. * BOX 301 * HIGGINSVILLE, MO. 64037

NAME _____

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CITY _____ STATE _____ ZIP _____

QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

Master Charge or
Bank Americard No.

Add $1.00 shipping-handling for direct mailorders except catalog

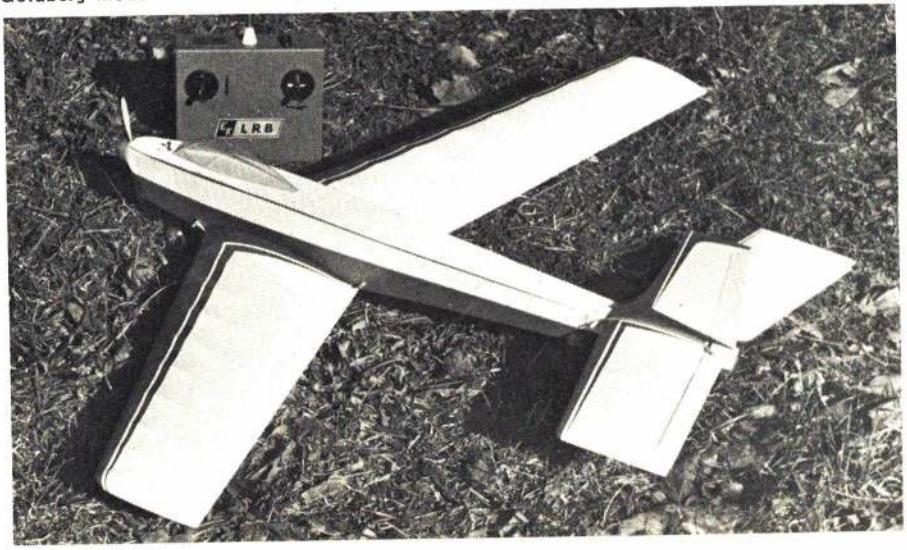
SKYPHONIC

PLANE ON THE COVER
Swept wing sport flyer performs easily on one or two channel radios. Builds up like a Jr. Falcon. / by Mike Saponara

Photo by Julian Delarosa

Sylvia Rivo poses with the model in front of the Unisphere at the site of the New York World's Fair of 1965-1966.

Suitable for single- through three-channel systems, but author prefers two-channel brick-type equipment such as the E.K. LRB set. Canopy and nose gear are available on order from Goldberg Models for 50 cents each.



The Skyphonic is a sport swept-wing model with clean lines. It is very simple to build and, as important, easy to fly. The model is designed around the relatively inexpensive two-channel proportional units but it may be flown using single-channel proportional, the ACE Galloping Ghost, or, for the more experienced, the model will accept three channels with a Cox .09R.C. Medallion. If, on the other hand, your funds are limited, you need not install any RC gear. Fly it free flight using a 15-sec. engine run.

Skyphonic means "sky sound"; there is a double meaning here. The sound of a Cox 049 in the air needs no explanation, but also, this ship is extremely stable and forgiving, truly a sound flyer in the sky. Unlike other swept-winged designs I've read about, this model has no bad tendencies.

Construction techniques used are those used by Carl Goldberg in his .049 RC kits. I used his techniques because they produce a quick building and strong model.

The plane is so stable I would highly recommend it for a beginner, even as a first plane, as long as he has the building experience of one or two planes behind him. The only unusual tool needed is a coping saw for cutting out the hardwood and this can be bought for about one dollar including blades in any hardware store.

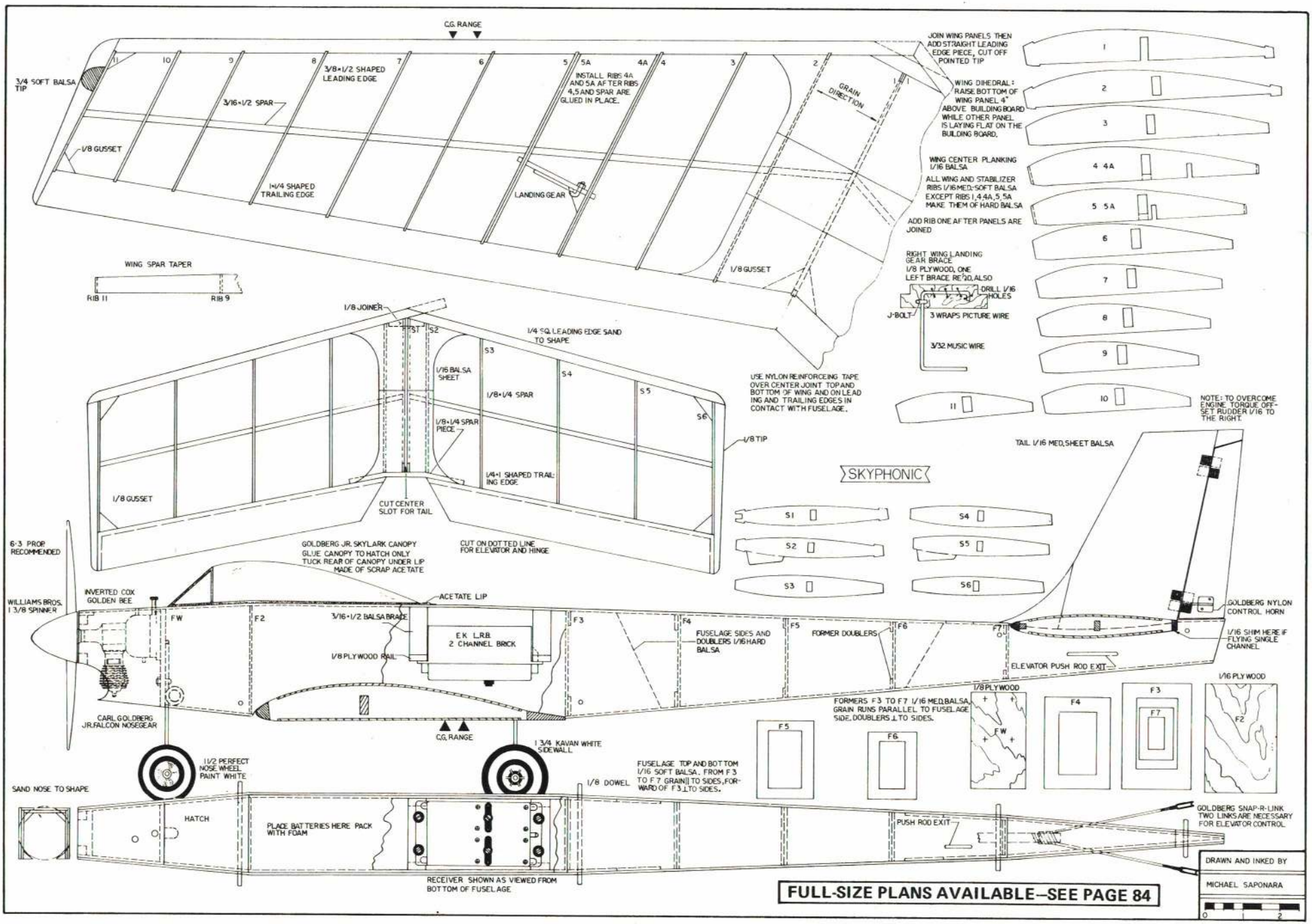
Construction

I will assume you are a beginner, but even if you're not, read through as there are some tips you'll find new. First, using a razor blade, not scissors, cut out the ribs, formers, etc. from the plans. Next, buy a stick of rub-n-glue and apply the glue to the back of the ribs.

We'll start with the wing first. Lay the ribs on the balsa sheet and rub the ribs with the other side of the rub-n-glue stick. Now trace the rib pattern with a soft sharp pencil or a fine tip ball point pen. Using the rub-n-glue allows you to trace the rib without holding it in place and it can be easily peeled off from the balsa without ruining the rib pattern. Make two of each rib and be sure to make two 4a & 5a ribs (rib doublers). When you're through using the rib patterns, put them in an envelope for future use. Next, using a single-edge razor blade cut slots for the ribs in the shaped leading edge and trailing edge. Make sure you make one left and right trailing edge.

Lay the wing plan on your building board and lay a piece of waxed paper over the plan, then pin down the trailing edge over the plan making sure the notches line up. Glue ribs 3 and 10 to the trailing edge and pin the ribs to keep them in position on the board. Cut three strips of 1/16 x 1/4 x 1" balsa and lay down next to ribs 3, 6 and 10. Lay the leading edge on top of them and fit

(Continued on page 91)



FULL-SIZE PLANS AVAILABLE—SEE PAGE 84

TOWER

P.O. BOX 543 CHAMPAIGN,

Send self-addressed stamped envelope for current special sheet and free "Tower Power" pressure sensitive labels.

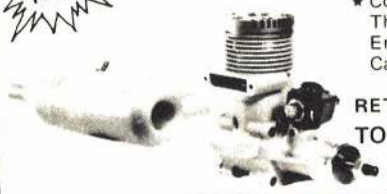
All prices in this ad and in our current catalog are subject to change without notice.

IT'S NEW

H. B. .61 R/C ENGINE

- ★ Made in West Germany
- ★ Perry Carburetor
- ★ Complete with muffler

This is the finest .61 Engine Tower Hobbies Carries.



RETAIL $100.00
TOWER PRICE $64.00

RADIO CONTROLLED HELICOPTERS

DOMESTIC MANUFACTURER MEANS READILY AVAILABLE PARTS

Du-Bro "HUGHES 300"

RETAIL $350.00
TOWER PRICE $299.00
Complete with O&R Engine

RC Helicopters Inc. Bell Jet Ranger

NEW RETAIL $400.00
TOWER PRICE $350.00

SUPER MONOKOTE

6 FOOT ROLLS

NO MINIMUM NO LIMIT!

		ONLY
OPAQUES: Red, White, Orange, Yellow, Clear, Aluminum, Gray, Blue, Dark Blue, Black, Chrome, Olive Drab	Retail $8.10	$5.00
TRANSPARENTS: Yellow, Red Orange, Blue (NEW!)	Retail $9.00	$5.60
ALL NEW FLAT FINISH: Olive Drab, Dove Gray, Aircraft Aluminum	Retail $9.00	$5.60
METALLICS: Plumb crazy, Green, Blue	Retail $10.50	$6.50

SOLARFILM

6 FOOT ROLLS

		ONLY
OPAQUES: Dark Red, Bright Red, Dark Blue, Light Blue, Orange, Yellow, White, Black, Silver	Retail $6.60	$4.50
TRANSPARENTS: Yellow, Orange, Blue, Red	Retail $7.50	$5.00
METALLICS: Green, Gold	Retail $9.00	$6.00

GRAUPNER

CUMULUS Here is the king of sailplanes, by the king of quality: Graupner. Designed for towline and slope soaring, or power assisted thermal flying, 2 channel: rudder and elevator. Wing span 110¼", weight (ready to fly), 56 oz. Foam wings are already balsa covered and sanded, fuselage is one piece of plastic ready to paint, all other parts sanded, and ready for "film" or paint.

RETAIL $169.95 TOWER PRICE $92.50

The Cirrus is a 1/6 scale model of a full size sailplane manufactured in Germany. Wing span of 118 inches, overall fuselage length of 49 inches. Fuselage is basically composed of three high impact molded plastic pieces. Wings, tail and stabilizer, are built up in the conventional manner. A high performance soarer for 2 channel R.C.

CIRRUS

RETAIL $79.98 TOWER PRICE $39.00

KWIK FLY MK III

This is the world champion model designed by Phil Kraft for acrobatics. Wing span of 59½ inches and will take up to a .60 for 4 channel RC equipment. This model is easy to build due to its extensive prefabrication.

RETAIL $95.98 TOWER PRICE $41.00

MARK'S MODELS

WINDWARD

Span 72 Length 41 Area 532

RETAIL $25.95 TOWER PRICE $19.50

WINDFREE

Span 99 Length 41 Area 555

RETAIL $34.95 TOWER PRICE $24.50

BRIDI RCM BASIC TRAINER

- ★ 50" Wide Span — 410 Sq. Inch Wing Area.
- ★ .09 to .19 Engine Displacement.
- ★ 3 lbs. Total Weight (with 4 channels).
- ★ Machined Parts and Hardware Included.

RETAIL $27.95 ONLY $20.50

SOARING . . .

	RETAIL	TOWER PRICE
AIRTRONICS:		
Olympic 88-99	$ 39.95	$ 32.00
Mini-Olympic	19.95	17.00
Questor	26.95	21.50
Grand Esprit	119.95	92.50
Super Esprit	149.95	115.00
Skyhook	29.95	24.00
Cumic	49.95	40.00
ASTRO-FLITE (AFI):		
ASW-17	$ 69.96	$ 53.00
Monterey	34.95	24.75
Malibu	25.95	19.25
Fournier RF-4	29.95	21.50
DUMAS:		
Hi-Pro Glider	$ 39.95	$ 29.00
J&J:		
American Eagle	$ 36.95	$ 26.00
MIDWEST:		
Lil "T"	$ 16.95	$ 11.75
Ez Juan	29.95	20.50
JP MODELS:		
Dart	$ 44.95	$ 36.00
Dart II	55.50	43.00

RC ENGINES . . .

ENYA:		
.09 III TV	$ 17.25	$ 12.95
.15 III TV	19.25	14.50
.19 V TV	21.98	16.50
.19 BB TV	33.98	24.50
.29 IV TV	25.25	18.95
.29 BB TV	31.75	22.50
.35 III TV	26.75	20.00
.45 BB TV	45.50	32.75
.60 III BB TV	68.25	44.50
FOX:		
.15 RC	$ 16.95	$ 12.00
.19 RC	20.95	14.75
.25 RC	20.95	14.75
.29 RC	24.95	17.00
.36 RC	24.95	17.00
.40 RC	26.95	18.50
.60 RC Falcon	37.95	25.50
.60 RC Eagle	53.95	35.50
.78 RC	69.95	45.50
K & B:		
.40 RC W/Perry	$ 37.00	$ 25.75
.15 RC W/Perry	37.00	25.75
NORTHFIELD-ROSS		
Twin Cylinder:		
Aluminum finish	$125.00	$106.00
Black Anodized	145.00	124.00
O.S. MAX:		
Pet .099 RC	$ 10.98	$ 9.50
.10 RC	14.98	12.00
.15 RC	19.98	16.00
.20 RC	21.50	17.75
.25 RC	23.50	19.00
.30 RC	24.50	20.00
.30 RC Wankel	87.50	68.00
.35 RC	24.50	20.00
.50 RC	42.98	31.50
.60 RC Goldhead	59.98	43.50
.80 RC	85.00	61.00
SUPERTIGRE:		
G 15 Diesel RC	$ 33.98	$ 27.00
G 21/29 RV ABC	33.98	27.00
ST 51 RC	37.50	30.00
G 60 RC Bluehead	59.98	47.75
VECO		
.19 RC	$ 31.00	$ 21.75
.61 RC W/Perry & new muffler	74.95	52.50
WEBRA:		
.40 RC Blackhead	$ 68.50	$ 45.00
.61 RC Blackhead	98.50	63.00

HOBBIES

ILLINOIS 61820 PHONE 217–356-4294

POWER . . .	RETAIL	TOWER PRICE
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RCM Basic Trainer	$ 27.95	$ 20.50
RCM Trainer	44.95	35.50
RCM Trainer Wing Kit	21.95	17.50
Kaos	49.95	39.00
Kaos Wing Kit	24.95	19.75
Super Kaos	57.95	42.50
DUMAS:		
Triton	$ 39.95	$ 29.00
Mod Pod	16.50	13.00
Evolution/2	14.95	11.00
Sport Evolution	21.95	16.00
Hi-Lo Evolution	22.95	17.00
GOLDBERG:		
Falcon 56	$ 19.95	$ 13.95
Senior Falcon	36.95	25.50
Skyland 62	36.95	25.50
Skylark 56	22.95	16.75
Ranger 42 ARF	19.95	13.95
Shoestring 54	29.50	20.75
HOTLINE:		
Me-109	$ 59.95	$ 38.00
Comanche	54.95	35.00
Mooney Chaparral	54.95	35.00
Sierra Trainer	44.95	28.50
Cassutt Racer	29.95	19.50
Mini-Comanche	29.95	19.50
Cricket	16.95	11.75
J & J:		
Mark V Eyeball	$ 54.95	$ 42.50
J-Craft	45.95	32.00
¼ Midget Mustang	29.95	21.50
Banshee	54.95	38.00
JENSEN:		
Das Ugly Stick	$ 49.94	$ 39.00
Wing Kit	18.95	16.00
Fuselage Kit	21.95	18.00
MIDWEST:		
Mach 1	$ 49.95	$ 34.00
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Tri Squire	17.95	12.25
Lil Tri Squire	11.95	8.25
Sky Squire	33.95	23.00
Esquire	15.95	11.00
Lil Esquire	11.95	8.25
TOP FLITE:		
P-39 Airacobra	$ 49.95	$ 33.50
P-51 Mustang	45.00	30.00
P-40 Warhawk	49.95	33.50
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Corben "Super Ace"	$ 32.50	$ 22.50
Navajo	39.95	27.00
Cherokee	39.95	27.00
Cherokee Babe	27.50	19.25
Nieuport 17	44.95	31.00
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ELECTRIC HEAT GUN

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Small	1 oz.	$ .90
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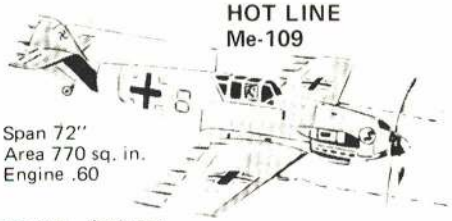
SEALECTOR SEALING IRON

- Adjustable From 300°F To 550°F

DELUXE MODEL	DELUXE MODEL WITH ROBART SUPER SHOE
Retail $14.95	Total Retail $17.93
ONLY $11.50	ONLY $13.50

– NEW STANDOFF SCALE –

HOT LINE
Me-109



Span 72"
Area 770 sq. in.
Engine .60

RETAIL $59.95
TOWER PRICE only $38.00

IT'S NEW

TOP FLITE
All New Stand-Off Scale
P-39 AIRACOBRA

60" Span 600 Sq. in. Area
Engine .40 to .60

Retail $49.95

TOWER PRICE only $33.50

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MODES IN APPEARANCE

All about those beautiful, light, but durable finishes seen on CL stunters at the '71 Nationals. / by E.K. Stocksdale

There is a trend in finishing that is reaching unbelievable excellence in Stunt circles, as is evidenced at the Nats. For my own information, I wanted to talk to some of these sophisticates and pseudo-sophisticates that fly at the Nats to see if I could trick them into revealing their little secretive finishing techniques.

To my amazement, I found two errors in my thinking. First, every contestant I approached was genuine—a true modeler in every sense of the word. Second, they had no secrets, they would tell me everything they knew with the utmost pleasure. Some just couldn't be turned off. Another thing which astonished me greatly was the similarity of their applications. Only a small percentage deviates from what is now the norm.

I did not seek out the top two or three Stunt winners, but rather interviewed those whose planes did the talking. When I saw a superb Stunt model being admired by everyone, I would join in the admiration and attempt to corner the builder.

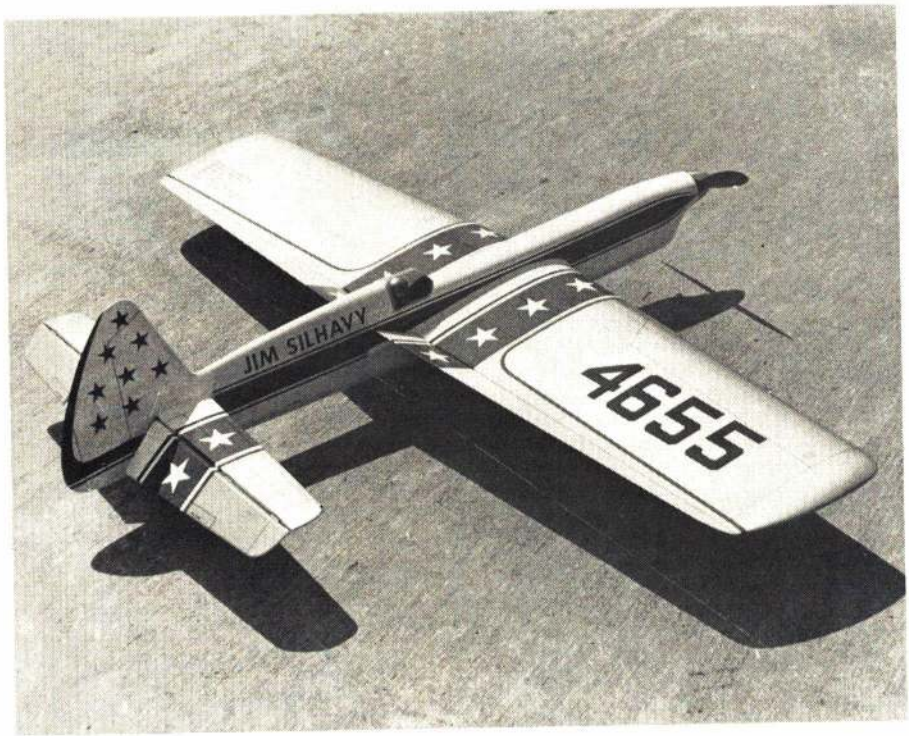
Jim Young had the nerve to tell me his plane was *not* one of the best finishes. How humiliating! I know a good finish when I see one. Jim uses tissue throughout; other than brushing on the filler coats, he uses a spray exclusively.

The tissue application on a plane is the base or substrate for the finish itself. We usually think of the covering material as the wing covering or skin, not in the context of the finish. A sport plane which you will use for everyday knocking around requires a finish which withstands punishment yet looks good. Using fabric for the wing skin prevents weeds from puncturing the underside, not to mention fingers. Light tissue is applied to the remainder after a satisfactory job of sealer or filler on the balsa.

New methods are welcomed and tried by most of us. However, many of these are nothing but new reasoning. For years I always thought of tissue covering on wings as light weight—logical reasoning if you deal with free flight. For the stunt flier, tissue serves a two-fold purpose: lightweight but, most important, ease in finishing. Most fabrics require quite a job to fill and finish; tissue cuts the work in half.

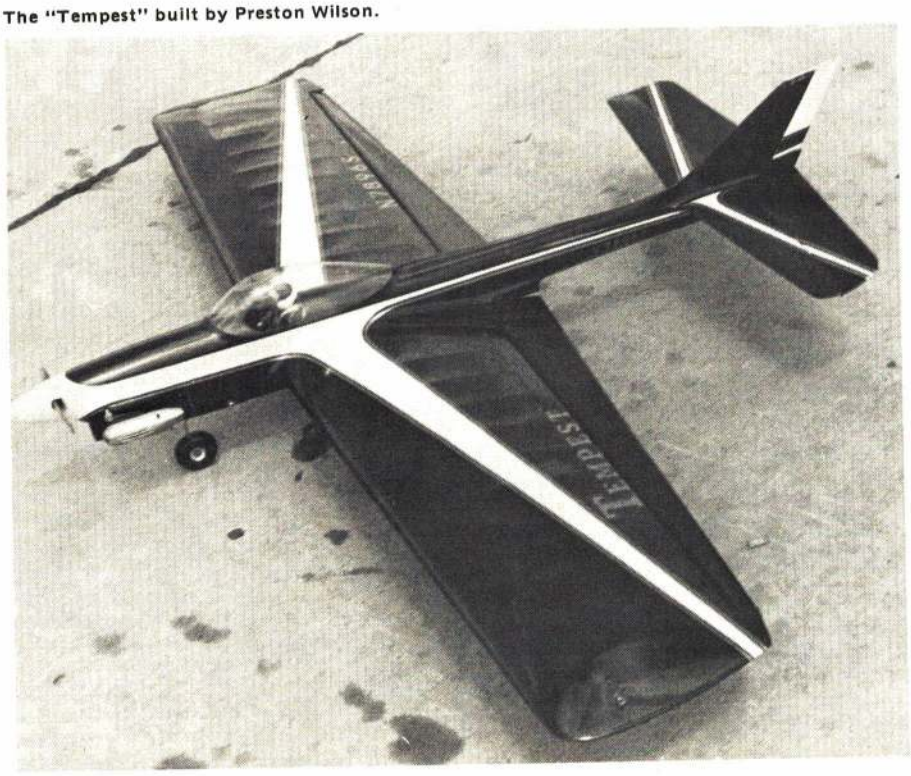
Another bit of tissue reasoning is this: a stunt ship is not a run-of-the-mill, knockabout type of plane. It is built to perform and is a specialized machine. It does not get thrown into the trunk of a

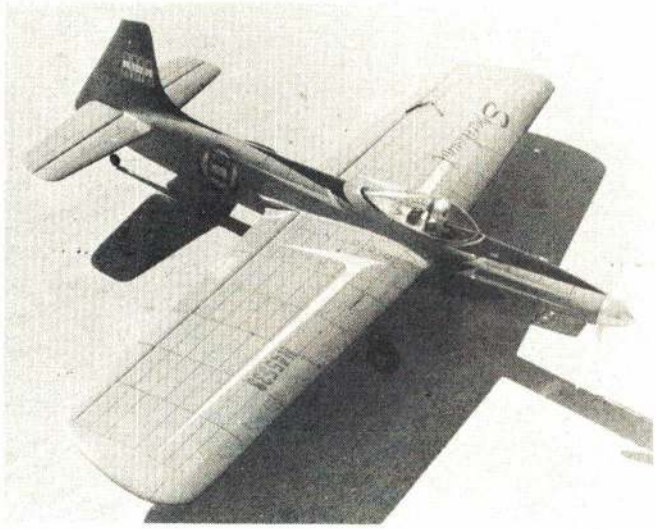
(Continued on page 94)



This fine bird by you-know-who.

The "Tempest" built by Preston Wilson.

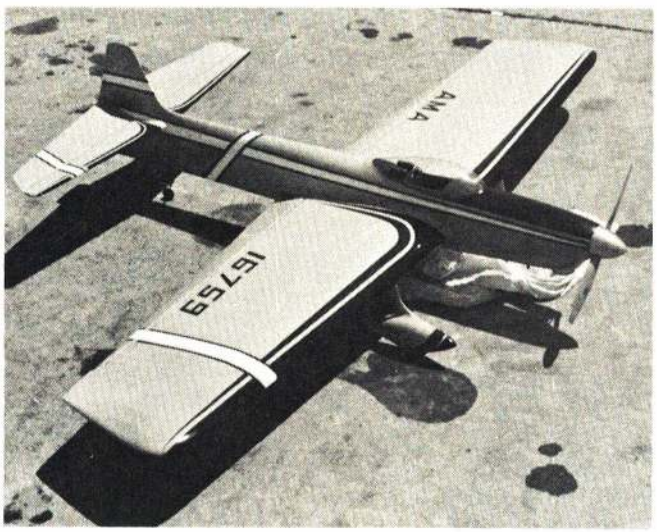




Well detailed by Neal Thompson, salmon orange in color.

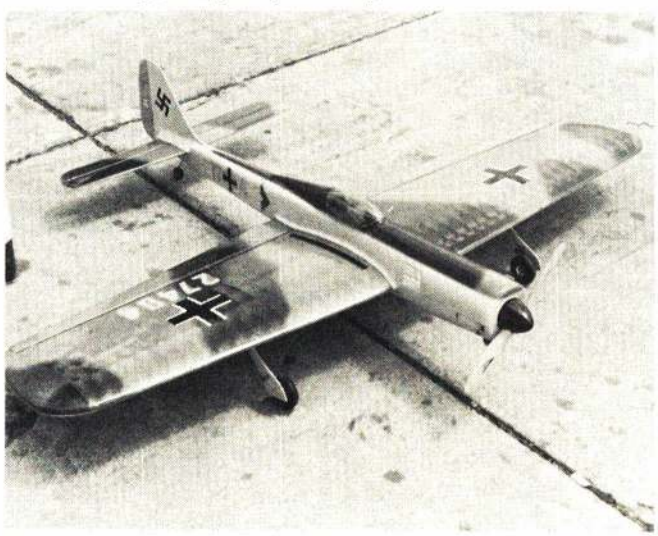
Les MacDonald with his "biege" Tropicaire.

Done in cub yellow is Jim Young's bird.



Bob Whitely makes use of butyrate aircraft lacquer.

FW 190 built by Jim Lynch (semi-scale).



Bill Simons cranking up a pale blue beauty.

NEW SIG KITS IN C/L, R/C

SUPER CHIPMUNK

THE ULTIMATE IN CONTROL LINE ST

DESIGNED BY MIKE STOTT

- New Look Molded Plastic Cowling
- Sleek Bubble Canopy With Molded Framing
- Smooth Formed Plastic Wheel Pants
- Handy Printed Sides - Build Directly On The Wood
- Heavy Duty Bellcrank
- Colorful Decal Sheet
- Formed Torsion Bar Landing Gear
- Complete Hardware Pack Including Molded Nylon Hinges
- Die Cut SIG Balsa And Plywood
- Detailed Full-Size Plans

$14.95

THE LATEST VERSION OF THE FAMOUS AEROBATIC AIRPLANE FOLLOWS THE LINES AND COLOR SCHEME OF THE MODIFIED FULL-SIZE CHIPMUNK FLOWN BY SKIP VOLK. THE UNIQUE LINES OF THE COWL AND CANOPY SETS THE MODEL APART FROM THE AVERAGE STUNTER. DESIGNER MIKE STOTT HAS INCORPORATED EASY CONSTRUCTION WITH STRENGTH AND DURABILITY TO PRODUCE A HIGH PERFORMANCE BEAUTY.

SIG KADET

THE IDEAL R/C TRAINER

SIG
KIT RC-31

$23.95

WING SPAN: 57"
LENGTH: 42"
WEIGHT: 4 LBS.

UP TO 3 CHANNEL RADIO EQUIPMENT

EASY TO BUILD

Sturdy, built-up balsa construction and light wing loading combine in the Kadet to produce a perfect sport or beginners' model. The flying performance of the high-lift, flat-bottomed airfoil is responsive to control and inherently stable. A tricycle landing gear helps ground handling, take-off and landing characteristics. We predict that this compact bundle of dynamite will quickly become THE standard RC Trainer.

Designed by
CLAUDE McCULLOUGH

FOR .19-.29 ENGINES

Handy Printed Fuselage Sides — Build Internal Structure Directly On the Wood.

Molded Plastic Engine Cowling.

Formed Nose Gear with Shock-Absorbing Coil.

Torsion Bar Main Gear.

Hardware Package Includes Nylon Nose Gear Bearing, Nylon Control Horns and Molded Nylon Surface Hinges.

Die-Cut Plywood and Balsa Parts.

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Mr. Mulli

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"Models That Really Fly"

$2.95

Wingspan: 20"

A FULL-SCALE MODEL WITH

Sig's Classic Series kits give you three important features that assure you of successful flights:

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Complete Building and Flying Instructions
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Wheels Included
Sig Contest Rubber Strip for Maximum Turns and High Flight Performance
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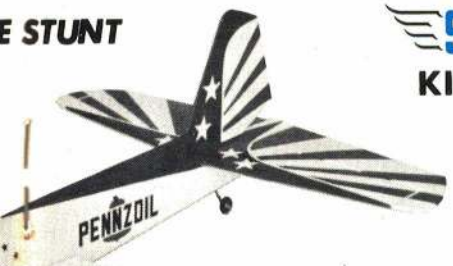
Full Set of Decal Decorations

C AND F/F

E STUNT

SIG

KIT CL-19

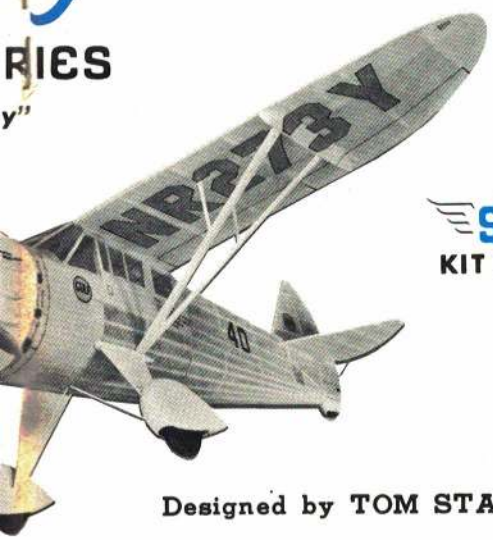


53½" WINGSPAN

ligan

RIES

y"



SIG

KIT FF-23

Designed by TOM STARK

TH CHAMPIONSHIP FLYING ABILITY

1972 NATIONALS WINNER

1st Place - Free Flight Flying Scale

Winner of both the 1935 Bendix and Thompson trophy races, Mr. Mulligan was one of the most famous racing planes of all time. The attractive lines have made Benny Howard's classic creation a favorite of modelers everywhere. Tom Stark, 1972 Nationals Scale Category Champion, has added the triumph of a Nationals victory to his fine rubber-powered version.

This is a scale model that really flies and its contest-proven construction has built-in durability. Builders of other Sig Classic fliers will have no difficulty with the scale structure of this racing beauty. The 8-page instruction book provides step-by-step guidance in building and includes tips for competition flying performance.

SIG

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AUGUST 18 - 19, 1973

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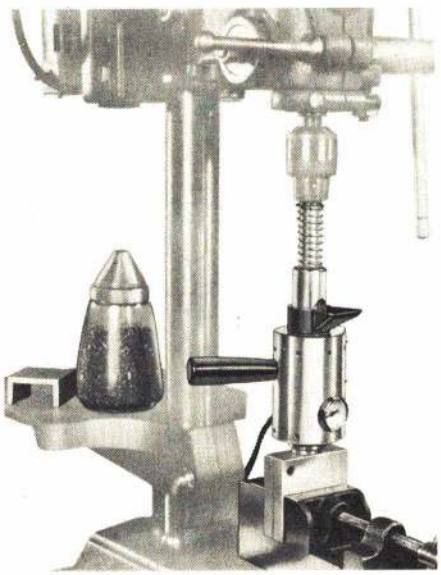
401 S. FRONT STREET MONTEZUMA, IOWA 50171

TELL THEM YOU SAW IT IN–

NEW PRODUCTS CHECKLIST

ERIC W. MEYERS

Hi Johnson/Auto-balance spinner. This all machined spinner uses enclosed free-wheeling balls to automatically balance entire power train. Spinner makes a much smoother running engine and consequently increased rpm. Available with or without propeller cutout for $11.50 and $11 respectively. Presently available only in two-in. dia. Hi Johnson Model Products, 1669 Twelfth St., Santa Monica, Calif. 90404.



Haygeman/Injection molder. For those modelers wishing to create quality small molded plastic parts, the Quick Shooter drill press molder should fit the bill. This is a compact plunger injection machine which is heated by three cartridge heaters spaced around a center heating cylinder. Shots up to 1/3 oz. can be obtained and epoxy molds can easily be made, or aluminum molds can be machined. Molder includes one experimental mold, a purging block and a pouring container plus a quantity of conventional molding plastic pallets and instructions. Haygeman Machine Corp., 2175 South 107th St., New Berlin, Wisc. 53151

Testors/*BD-5.* A revolutionary ready-to-fly U-control model has the Testor's McCoy 049 engine mounted midships just like the real airplane. Model is stable enough for a trainer, and the 26-in. span wings will separate in case of a crash. With the removal of the nose weight, the airplane becomes aerobatic. $19.98. Testor Corp., 620 Buckbee St., Rockford, Ill. 61101

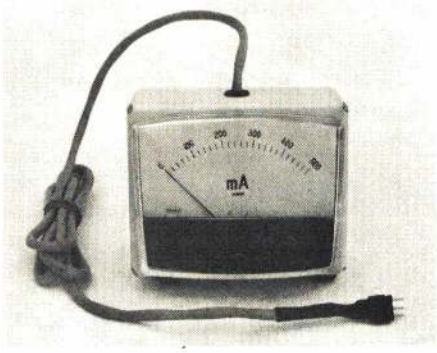
AHM/Ready-to-fly. A completely assembled RC model plane for the beginner and experienced RC flier alike, this new ship has a foam core wing covered with balsa and the fuselage is all balsa. The plane has been covered with silkspan and painted with fuelproof paint. Ship uses a four-channel T-45 Space Commander radio and includes an engine. All that is needed to fly is fuel. $400. Associated Hobby Manufacturers, 621 East Cayuga St., Philadelphia, Penn. 19120

Model Air Products/Res-Klean. An equipment cleaner designed for clean-up after polyester or epoxy resins. The non-flammable cleaner will also clean up castor oil from engine parts and remove contact cement from hands and brushes. 32 fluid oz., $3. Model Air Products, Box 8085, Canton, Ohio 44711

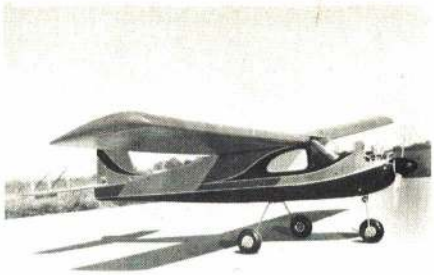
MALco/*Der Flug.* A training, fun-fly type of airplane has 60-in. span and uses 40 size engine. Has a built-up wing using two spruce spars in each section for high strength. The balsa fuselage is partially pre-built from a jig and uses Hallco landing gear and fiberglass cowl. $45. MALco, P.O. Box 508, Hamilton, Tex. 76531

House of Balsa/Q.M. decals. A new quarter midget accessory is designed to dress up appearance of quarter midget racers with the use of these self-adhesive, fuelproof decals. $1.49. House of Balsa, 2814 East 56th Way, Long Beach, Calif. 90805

Top Flite/*P-39.* Now available, this new stand-off scale airplane has an all-balsa construction and is very close to the full-scale airplane, yet is easy to build and has pattern ship-type flying characteristics. Extra detail such as retract gear, flaps, etc. can be included for added scale effect. $49.95. Top Flite Models, Inc., 2635 S. Wabash Ave., Chicago, Ill. 60616

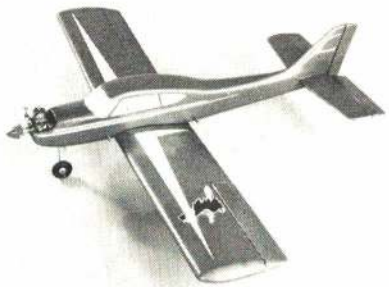


Pro-Line/Test meter. This new system accessory plugs into the system by the charging jack and reads the battery voltage to determine approximate state of charge of the airborne battery pack. Unit uses a two percent accurate jewel meter movement and can also be used to test battery for capacity. A handy item for contest and sport flier alike. This item should save many crashes due to battery pack failure. Price is $19.95. Pro-Line Electronics, Inc., 10632 North 21st Ave., Phoenix, Ariz. 85029



Sig/Kadet. A new RC trainer now available from Sig uses a sturdy built-up balsa construction and light wing loading to produce an ideal beginner's model. Kit includes hardware package and molded plastic engine cowling. Ship has a flat-bottomed airfoil and trike gear for easy handling. For 19 to 29 engines and up to three-channel radio equipment. Sig Manufacturing Co., 401 South Front St., Montezuma, Iowa 50171

Mini-Flite/*Cutlass Supreme.* The new updated version of Don Coleman's popular pattern ship, this kit is entirely balsa constructed. 64-in. span for 60 engines, kit includes hardware package, spruce bars, precision-cut balsa parts and new plans. $54.95. Mini-Flite Co., 48 Princeton St., Red Bank, N.J. 07701

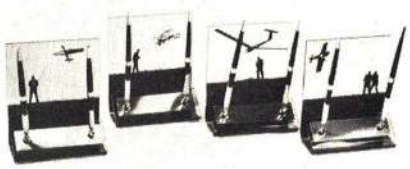


Aristo Craft/*Blue Fire.* This 41-in. span plane is a "Flyro-Foam" model kit being constructed of a rigid lightweight foam. The kit has a very quick building time and is for one to four channels and 09 to 19 engines. $24.95. Aristo Craft Distinctive Miniatures, 314 Fifth Ave., New York, N.Y. 10001

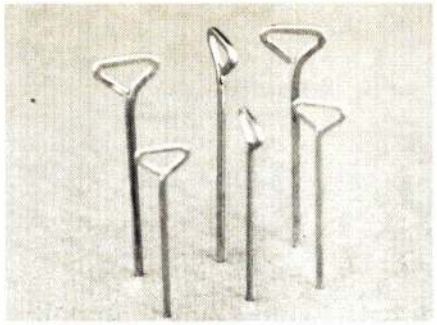
Estes/Convertible line. Three cold propellant rocket kits, the *Shark, Marauder, and Yankee 5* are easily converted from cold propellent to the standard model rocket engines. Each kit includes a rocket launcher, launch control system, solid propellent converter, and a can of cold propellant fuel. Rockets have 17 to 19½ in. lengths. $6.95. Estes Industries, Box 227, Penrose, Colo. 81240

Dumas/Atlas Van Lines. A new scale model of the big pickle forked unlimited hydroplane in a 40 engine size. The boat is for all out racing and uses a poplar and birch plywood construction with a plastic cowl. Boat has a 36-in. length and 14½-in. beam. $26.95. Dumas Products, Inc., 790 S. Park Ave., Tucson, Ariz. 85719

Ship Shapes/*Tarpon* **racing yacht.** This six-ft. height sailboat has a high impact ABS hull in which 85% of the hull weight is ballast. Sails are two color panel complete with rip stops. Only a short time is required to launch the *Tarpon*—attach fittings, install your RC system and rig yacht. All hardware plus the metal display stand are included in this 50-800 class yacht. $88.95. Available with light or heavy ballast hull. Ship Shapes, Division of Frolic Friends, Inc., 7863 Enterprise Dr., Mentor, Ohio 44060

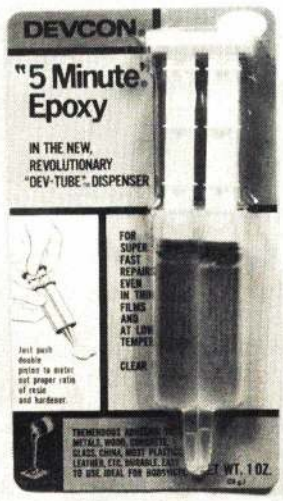


Cheslock Designs/Pen sets. These unique awards are made of tinted Plexiglass and contain pictures relating to Pattern, Scale, Soaring and Pylon. Center plate is removeable for engraving. Don't wait to win a contest to get one—they make fine gifts. $16.00 each. Wall plaques are also available. Cheslock Designs, RD 1, Box 130, Lincoln University, Pa. 19352



Sonic-Tronics/Nif"T"y Pins. A new concept in modeling pins, these high-strength steel, chrome-plated pins have a new rectangular shape resembling a carpenter's cut nail which reduces splitting effect in wood. The shape also increases holding power and the point is very sharp making insertion quite easy. Head is triangular to make for better handling. Pins are available in two sizes—1½ and 1¼ in. lengths. 59 cents per package of approximately 40 pins. Sonic-Tronics, Inc., 2 S. Sylvania Ave., Philadelphia, Penn. 19111

deBolt/*Live Wire P-51.* A multi-purpose "Live Wire" kit has been three years in development and is designed for sport flying, stand-off scale or Formula II with a full racing engine. Kit is all balsa featuring some prefabrication and all hardware included. Wing span of the plane is 57 in. with 605 sq. inches of area and is for 29 to 50 engines. $44.95. deBolt Model Engineering Co., 3833 Harlem Rd., Buffalo, N.Y. 14215



Devcon/Two-in-one. This new dispenser of Devcon five-min. epoxy automatically meters the proper ratio of resin and hardener through double piston compartments. As little as one or two drops can be dispensed at a time with exact proportions measured. A single unit with a net weight of one oz. of epoxy is $1.50. Devcon Corp., Danfords, Mass. 01923

You don't have to **STAND OFF** *to admire this*

CITABRIA

SPECIAL THANKS

The beautiful Citabria is manufactured by one of the oldest and respected names in American Aviation, The Bellanca Corporation, who so graciously provided us with the plans, photos and details of the full size aircraft. With this illustrious lineage, it is not surprising that the Citabria is just about unbeatable as a fun plane. Primary trainer, or for Aerobatics.

CITABRIA IS FOR YOU

If you're a Sport Flier, if you have a feeling for Scale, if you love R/C*, then this is your ship. It's a beautiful machine that builds easy — goes together fast — plenty of room for any equipment — rugged for hard use — flies great — and is just about the right size.

KIT FS31
29.95

Span 54" Area 415 sq. in. Length 36" For Engines .23 to .35 Scale: 1.61" Equals 12.0"

ABOUT THE KIT ITSELF

This kit is a real joy . . . Balsa Wood is the finest grade, density-selected and sanded to micrometer tolerance; as is the imported Finland Birch Plywood. Every part is numbered to insure fast and accurate assembly as shown on the easy step-by-step plans.

* Can be flown Control Line too—instructions on plan.

THE FUSELAGE

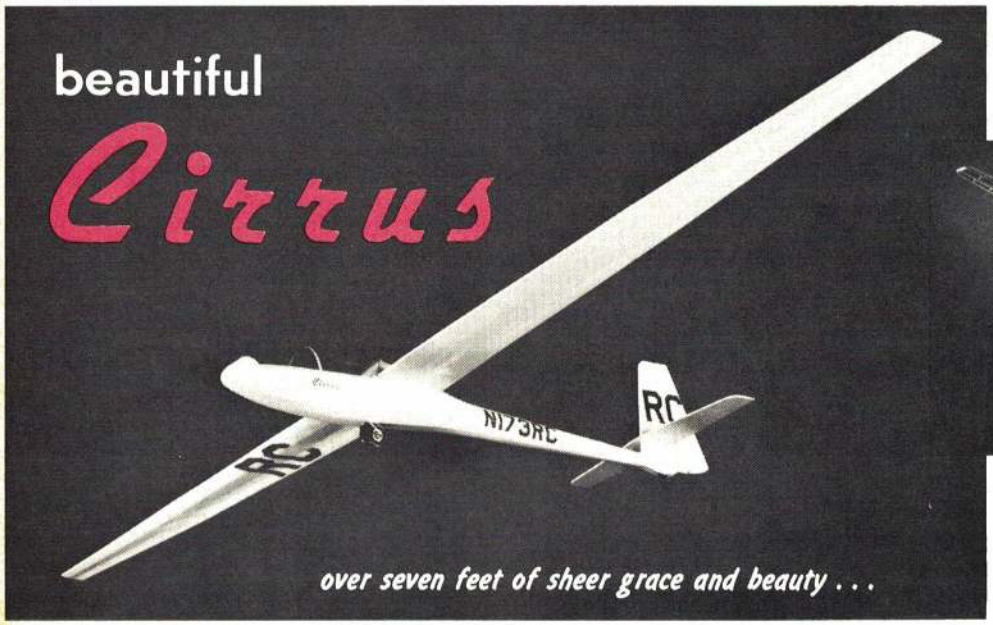
Fuselage sides are die cut full length. Cabin sides and inner doublers are plywood as are the firewall and landing gear bulkheads. It's easily assembled with die cut balsa bulkheads, nose block, formed music wire landing gear, custom dural engine mounts, etc. Cowling and wheel pants are rugged plastic.

WING AND TAIL SURFACES

Complete wing is built on work bench without having to remove it — so it's flat and warp-free. Parts are die cut and carved. Balsa sheet cover makes for tough wing. Wing is installed like it ought to be — with dowel pins and nylon screw in wood nut-block. No unsightly rubber bands to deteriorate, break or slip. Rudder and Stab are die cut sheet for simplicity and no warp. Included is all the linkage hardware: pushrods, aileron and elevator horns, bellcranks, clevis, connectors, etc., plus giant authentic decals, plastic windows, etc., etc.

beautiful

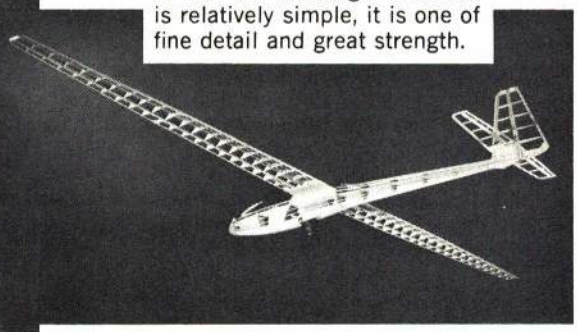
Cirrus



over seven feet of sheer grace and beauty . . .

STRUCTURE

Frame Photo reveals the excellence of the design engineering of the kit. Although structure is relatively simple, it is one of fine detail and great strength.



SPAN: 87 5/16"
LENGTH: 37 3/4"
WEIGHT: 12 oz.
SCALE: 1.5" Equals 12.0"

KIT E7
10.95

GREAT FLIGHT PERFORMANCE

A real soaring machine is this model Cirrus. Eiffel 400 soaring wing section seeks out and takes full advantage of every thermal current. Can be flown Tow Line - Free Flight, Single Channel or pulse R/C for Slope and Thermal Soaring. Large Cockpit area provides ample room for R/C Equipment.

A FINE KIT

Top quality Balsa used throughout. All parts accurately die cut and numbered to insure fast accurate assembly, as shown on the detailed plan. Also included are shaped trailing edges, finished nose cone, giant clear canopy, authentic decals, full size plans with step-by-step drawings and instructions, etc.

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If no dealer available, direct orders accepted—with 10% additional charge for handling and shipping. (60c minimum in U.S., $1.25 minimum outside U.S.)

- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories; etc. 25c enclosed.
- ☐ "Secrets of Model Airplane Building." Including design, construction, covering, finishing, flying, adjusting, control systems, etc. 25c enclosed.
- ☐ "Secrets of Control Line and Carrier Flying." Including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints and control line installation instructions. 25c enclosed.

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PHILA., PA. 19144, USA

The Great Age of Sail . . . Lives Again
in these Authentic Scale Model Kits

THEY'RE EASY TO BUILD

We know it seems unbelievable, but it's true. New techniques in the heretofore difficult rigging installation and ratline making, are simplified so that almost anyone can produce a craftsman-like job. Density selected prime balsa wood is a real pleasure to work with, and the step-by-step plan is simple and complete.

Sterling MODELS INC.
PHILA., PA. 19144, USA

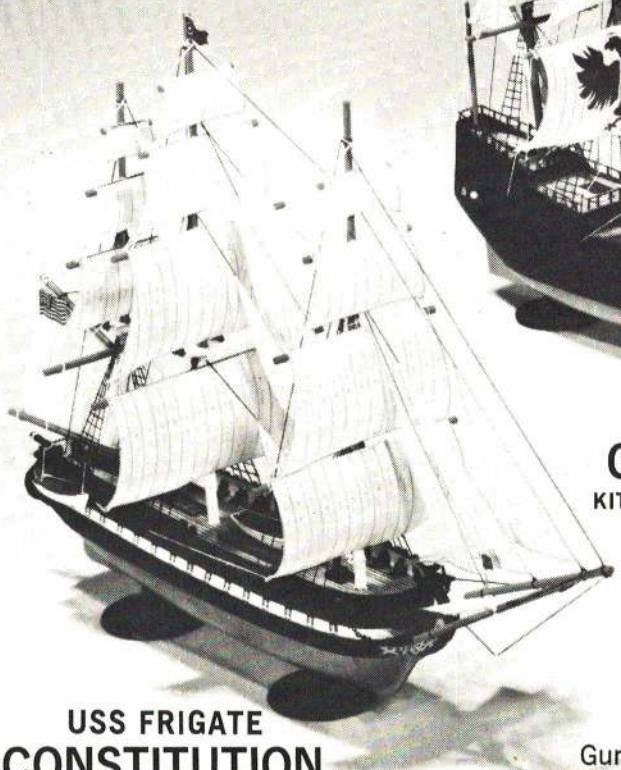
THEY'RE COMPLETE*

With machine carved hulls, that require only a little trimming and sanding. Kits include many finely detailed cast metal fittings (as required for each kit) such as: Cannon, Life Boats, Windlass, Anchors, Steering Wheel - Wheel House, Water Cask, Lights, Stern Castles, Figure head, etc. Brass Chain, Black and Tan rigging line, Printed Cloth Sails, Decals, Display Pedestals and much more . . .

* Dry Kit, paint and cement not included.

SCHOONER
BLUE NOSE
KIT G3 — Length 11¼"

SPANISH
GALLEON
KIT G1 — Length 10"



USS FRIGATE
CONSTITUTION
KIT G2 — Length 11"

THEY'RE UNIQUE

Because such amazing detail and authenticity is achieved in kits that are relatively easy to build. Plans include full size, as well as assembly drawings for each step of the way. Authentic color scheme shows on full color kit box lid.

THEY'RE HISTORIC

Plying the Spanish Main, the Galleons carried the treasures of the New World back to Spain. Outfitted with cannon they were used both as merchant men and warships . . . The Blazing Guns of the *Constitution* helped to establish our Nation. Now enshrined in Boston Harbor, it is the oldest commissioned vessel in the U.S. Navy . . . Built by Angus L. Walters the *Bluenose* was one of the finest Schooners to take the water. It came to world-wide fame racing against the *Gertrude L. Thebaud. Bluenose* captured the hearts of U.S. and Canada to such an extent, that today it is on the back of every Canadian Dime.

THEY'RE ONLY

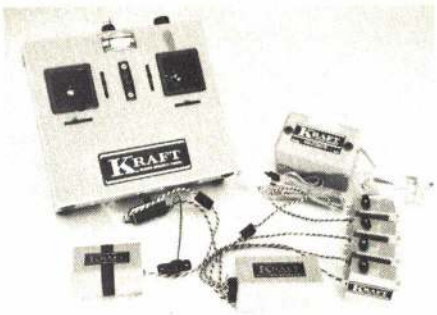
6.95 ea.

- CARVED WOOD HULLS
- CLOTH SAILS
- CAST METAL FITTINGS

AND THEY'RE AT YOUR DEALERS NOW

GET OVER AND SEE THEM . . . BUY ALL THREE!

KRAFT SERIES 73 KP-5B
DUANE LUNDAHL



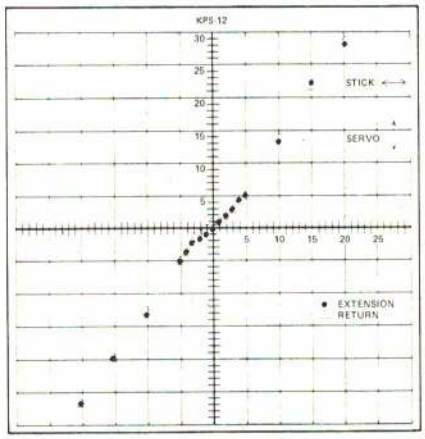
The Series 73 transmitters will not be confused with radios of previous years because of new gimbal covers for the stick assemblies (or a lack of same on the open gimbal sticks, optionally available on the seven-channel system only). The Series 73 Kraft has an added channel so that it is either five or seven channels, as opposed to the previous four and six. The fifth channel is toggle switch controlled, as most modelers use the fifth channel for two-position functions. The control stick has been relocated for a more comfortable feel, and the "Buddy Box" switch has also been moved to a safer spot. All of the features introduced in '72 are retained, i.e., retractable antenna, Bourns stick pots and half watt transmitter output.

The set tested included a dual conversion receiver. The receiver section is unchanged from that reviewed in detail in the December 1972 **AAM**. This receiver was specified since the system will be used in electric-powered aircraft and we felt the extra noise immunity important. The decoder is totally new for 1973 and utilizes two integrated circuits. The resultant decrease in number of components on the decoder is significant. This new decoder should offer higher reliability due to the low parts count. The IC decoder is used on all of the Series 73 radios. Though not a part of this test, the standard Series 73 receiver, i.e., not dual conversion, had a modified RF section which upgrades its performance considerably. Another new feature of the Series 73 receivers is the use of a permanently mounted pigtail for the aileron channel.

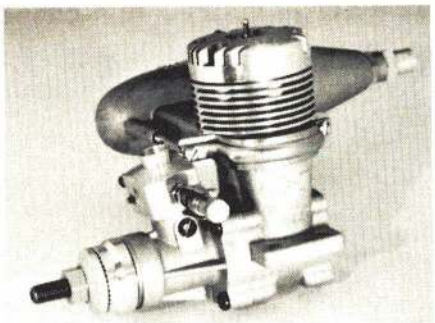
Batteries and charger remain uncnangea from the hi-rate, hi-capacity ones introduced in 1972. This allows the system to be fully charged in less than six hours. The flight pak is rated at 550 mah.

The set tested included KPS-12 miniature servos. The only change for 1973 is a modification to the integrated circuit which results in a lower current drain. There are three new servos available for 1973. These all use the same servo amplifier as tested here. These servos will be tested in an upcoming issue.

Specifications (all manufacturer's data except servo output torque): **Transmitter** (KPT-5B)—6¾ x 6 x 2", R.F. output power 500 mw; **Receiver** KPR-7D—2.77 x 1.29 x 1.32", sensitivity 2-3 micro volts for .5v detected; **Servo** (KPS-12—1.90 x 1.38 x .73", output torque 18 in.-oz. (4 lbs. @ 9/32"); **Airborne System Weight**—11.8 oz.



ENYA 60 IIIB
CLIFF TELFORD and DON JEHLIK



In outward appearance the latest version of the Enya 60 has changed very little from its predecessors. Inside, however, almost every part has undergone some modification to make it more powerful than ever. The most notable changes are a larger throat area in the carburetor and increased port area in the cylinder liner. The exhaust stack has been redesigned so that the muffler may be attached without putting undue stress on the crankcase. While the muffler is relatively less noisy than some, it does cost 600 rpm or about .2 horsepower with an 11 x 7½ prop.

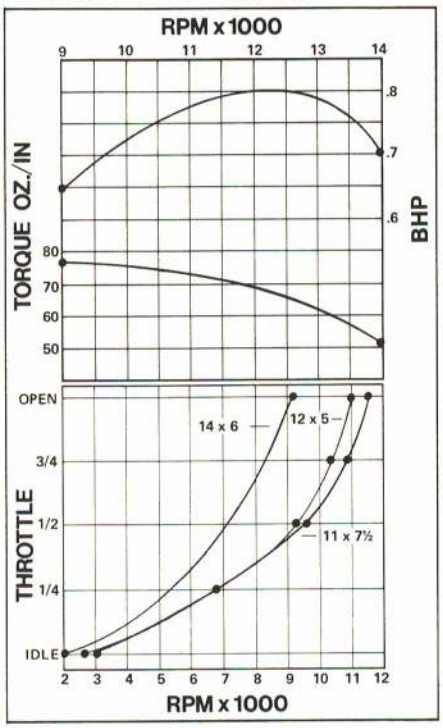
Our test engine was run in for one hour, at which time the throttle was adjusted for best idle and transition to peak rpm. Lowest reliable idle obtainable was with a 14 x 6 prop at 1900 rpm. A typical pattern propeller (11 x 7½ Power Prop) idled at 2700 rpm. Peak rpm on the 11 x 7½ yielded 11,800 with the muffler installed.

Cold starts were quite good with a slight prime in the carburetor. Hot starts were not quite so fast but could be accomplished with exhaust prime plus the carburetor prime.

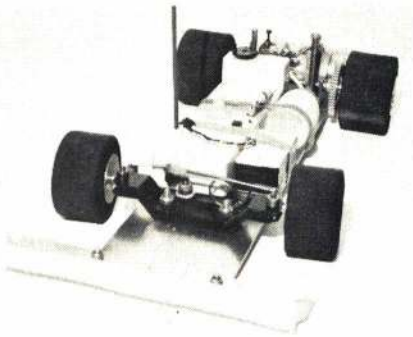
All tests were performed with muffler installed, Supersonic 100 fuel and Fox idle bar plug. Duke's fuel gave similar results. Top Flite and Power Props from 9 x 6 to 14 x 6 were used to obtain torque and horsepower curves.

While this engine is not the most powerful 10 cc RC engine we have tested, it is well made and should give smooth, reliable performance. More power could be obtained by using one of the flow-through type mufflers. In fact, our test engine picked up 200 rpm simply by removing the screw-on tail pipe which is supplied with the muffler.

Specifications: Enya muffler; Fox RC plug; Supersonic 100 fuel; Temperature, 80°F; R.H., 40%; Bar press., 30.0" hg.



MACH 12 RC CAR
ED SWEENEY



Only two evenings were used in building the Mach 12 RC car. The instructions are excellent and the assembly is only a matter of using screwdriver and pliers. It is an 049-powered 1/12th scale racing machine with a Lexan body. The philosophy of the design is to be as absolutely reliable and durable as practical. The components seem to be over-designed but in racing that's what's necessary.

All parts are cut, drilled, and tapped. The soft sponge tires are as wide as allowed under the 1/12 scale rules and come mounted and trued to the wheels. Wheel attachment to axle is by set screws to flats on the robust axle. There is no fabrication needed by the builder —just assemble.

Power unit is the same as on the Jerobee cars—a reed valve Cox 049 with recoil starter. Our kit, at $49.95 included the parts to convert any Cox Dune-Buggy or Baja Bug's 049 to suit the racing car application with clutch, flywheel and gear. The instructions show how to make a heat sink for the tank and cylinder head. We have a KRD heat sink on the head and have drilled the tank for heat dissipation so a separate tank is needed.

The car uses no suspension as such. It is all solid but the aluminum chassis flexes somewhat to handle minor road irregularities. A large but legal wing fits on uprights from the chassis for increased downforce when at high speed and to locate and mount the body. With the body and wing mounted there is full access to the engine for fueling and starting.

Our car differs from the instructions in that the Jerobee radio used (and recommended by the kit) is mounted off center to the right. A one-oz. round fuel tank and nickel cadmium battery pack are on the left side of the chassis. This arrangement balances the car laterally. Also, an aluminum bumper is mounted in front in such a way as to protect the car, mount the body, fit the rules, and satisfy Ralph Nader.

In racing, the Mach 12 is just as reliable as its competitors but is slightly heavier. The weight means better and faster cornering but slightly lower top speed. A taller gear is used too. The Mach 12 does not exhibit the Jerobee's excruciating understeer, rather it is nearly neutral and more skill is demanded for faster lap times. After all, that's what winning is all about.

P-63 KING COBRA
MIKE HELSEL

As with most of my racing I had no airplane and a race coming up in seven days. I chose the Skyglass P-63 to build because it met one very important criterion—it builds fast! The P-63 has a fiberglass fuse with molded fin and firewall installed. The wing is cut from foam.

I built the wing first by covering it with 1/64 plywood and added LE and TE combo of ¼" strip and TE stock for strip ailerons—they build fast. I added the wing tips and did some shaping with a block plane and the wing was ready to join. All this was done in one evening with the use of five-minute epoxy, and reinforced the center section with FG cloth and Hobbypoxy Form II.

While waiting for the wing to dry, I started the fuse. The firewall location gives enough room for a front or rear rotor engine. I chose an ST 15 and Tatone mount. The firewall is pre-drilled for nose gear blocks, although it is somewhat difficult to install, you need very small hands. Engine installation is easy if you take your time. I placed the mount on the firewall and then put the engine on the mount and attached the spinner. I taped the spinner to the fuse and located the motor mount on the firewall, marked its position and installed blind nuts in the appropriate position. I then bolted in the motor mount and marked position of the engine and drilled and tapped the mount. If all this is done correctly, the spinner fits about 1/16 away from the fuse all around—if you're lucky!

After the nose gear and engine are installed, I cut the stab, elevator, and rudder from appropriate balsa and sanded them to final shape, installing the stab with resin to form a good bond with the fiberglass fuse. Next, I hinged the surfacees and attached the wing. For the wing I used a fiberglass dowel pushrod for leading edge and one 10-32 nylon bolt threaded into a hardwood block which was attached to the fuse.

I spent the next two days finishing the P-63 with K&B Super-Epoxy. This is really great paint.

On Saturday I installed the radio. The plane came out quite tail heavy, but by putting the servos as far forward as possible the plane balanced just slightly tail heavy. I decided to give it a try.

The first takeoff was something to behold. My Coral Cobra streaking skyward after a 125-ft. take-off run. My first lap of racing told me to make the P-63 nose heavy. Any application of full up elevator causes a snap roll! I put five oz. of lead in the nose and reduced the elevator travel. This resulted in satisfactory flight performance. My P-63 came out a little over 3½ lb. which is slightly heavy for a ¼ midget, but once the P-63 gets "on the step," it goooooooes!

CONFIDENCE
Orbit flyers have it.

Orbit® ELECTRONICS

John Simone, former Army helicopter pilot demonstrates his precise control of an R/C model in a confined space.

Unretouched photo of actual demonstration flight.

John says, "I WOULDN'T FLY ANY CRAFT, FULL SIZE OR MODEL, IF I DIDN'T HAVE COMPLETE CONFIDENCE IN EVERY PART OF IT. I SOMETIMES THINK THAT HELICOPTER PILOTS ARE A BREED APART," he continues, "they need a delicate touch, and calm nerves, but they have a special kind of confidence born of long hours of practice; lifting the bird a few inches off the ground and settling again, to get the feel of a whole new way to fly, then patiently learning each new maneuver until it becomes automatic."

If your fingers itch to move into this new world of R/C skill, be sure that you have equipment you can trust – especially the invisible link that translates a twitch of your thumb into a command for a precise maneuver.

ASK YOUR ORBIT DEALER why Orbit flyers have an extra margin of confidence; and ask about custom engineered control configurations for R/C helicopters.

ANNOUNCING: Orbit Invitational Helicopter Competition June 29, 30, 1973 (In cooperation with the MACS Show in Anaheim, California). Ask your Orbit dealer for details, or write the C.D. at Orbit Electronics.

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SPECIAL INTEREST

HOWARD RUSH ON COMBAT

Plastic and Poxy: Finishing the center section of a Combat plane covered with plastic film has been a problem. Try this procedure: Cover the engine pod, tail surfaces, and fuselage (if any) with silk and dope. Let the dope dry several days. Cover the wings with Super MonoKote, FasCal, or Solarfilm. Mask off the center section with cellophane tape. Sand the area to be painted (including plastic covering) with No. 400 silicon carbide paper. Now brush or spray on K&B Super Poxy; two coats are usually enough. Peel off the tape before the last coat is dry.

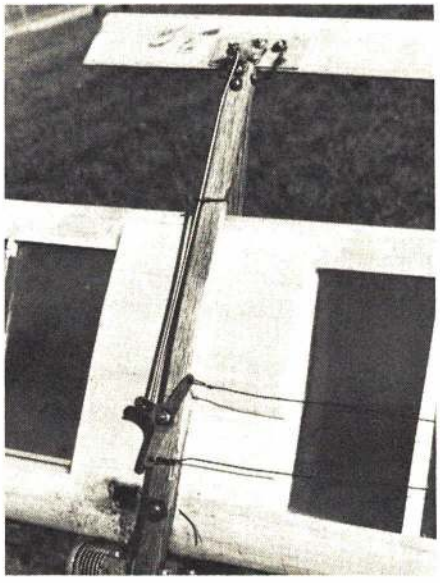
Behold, a good finish that actually is fuelproof (it's no secret that "fuelproof" dope is soluble in nitromethane). Super Poxy sticks to both dope and plastic film if the surfaces are sanded and free from oil or fingerprints.

More on Lubricants: An article in the February 1973 issue of *Dirt Bike* magazine gives laboratory test results on 35 two-stoke engine lubricants. Some oils they tested are petroleum based and won't work with alcohol fuels, but many were the castor oil and synthetic types that interest us. Fanatics can find even more data on synthetic oils by looking up high-temperature hydraulic fluids in the local technical library.

Scoreboard: Wouldn't it add to spectator appeal to have a large, illuminated board which automatically displays scores during a Combat match? The electronics necessary to modify a conventional football or basketball scoreboard are fairly simple, but the board itself is expensive. If anyone has access to such a scoreboard—from an old gymnasium, for example—and would like to donate it to add some flavor to the NATS and other meets, please write to me c/o AAM.

Diane and Max Mearns with the ST 15-powered FAI event winner at the October Dayton meet. In case you have not tried FAI, the smaller planes are not that much slower and they are lots quicker in the turns. This one is just a 15 on a 35 size ship.

Some insist that a combat job must be aerodynamically clean to win—not so. Jerry Haupt's Wedge is draggy, but it won the Open event at the '71 NATS. Jerry attributes his success to building a lot of uncomplicated models such as seen here.



BOB STALICK ON FF GLIDERS, POWER, RUBBER, INDOOR

The Questions We Get: The glamorous world of the magazine correspondent? Fame and fortune? AMA Records? Trips to the Internats?

This column has brought this writer few of the above, but it soon becomes obvious after reading the mail, that there are many newcomers looking for answers to some questions that we "experts" have taken for granted for years. How about these?

How do I hook up an eyedropper fuel tank on my PeeWee .020?, Gary Clark would like to know. First off, get an eyedropper with a nipple which fuel tubing can slip over. Then, disassemble the fuel tank from your PeeWee. Take the fuel pick-up tube off the nipple in the engine back plate and replace it with a longer one. Drill a hole in the tank and run the new fuel tube out it and connect to the eyedropper. There you have an eyedropper tank, Gary. The same procedure works for any integral tank engine, ie., the Baby Bee. Fasten the eyedropper to the fuselage side with a rubber band or two, check the fuel level while the engine is running so you can see how much fuel the engine uses in ten sec. and launch when this much fuel remains.

What do I cover it with?, David Hurst asks (as have several others recently). Depends, Dave, on the model. Small models and most lightweight free flights—rubber power models, gas models (except for FAI Power), towline gliders—should generally be covered with Japanese tissue. This comes with some better kits, but most kits come with Silkspan. Jap tissue is put on dry and dampened with water after the dope adhering the tissue to the framework has dried. Silk and Silkspan covering materials are best left to large or heavy free flights, ie., FAI Power. Both are dampened before being doped to the framework. All of these materials will shrink when the water dries. No forced drying is necessary or desirable.

Larry Well times as Wes Malby prepares to put his K&B powered Maxi-Boy into the thermals at Brewster Field, Oregon.

Current Category II ½A record holder, Al Grell, launches his high-thrust Ram Rod which he calls Hi-Ram.

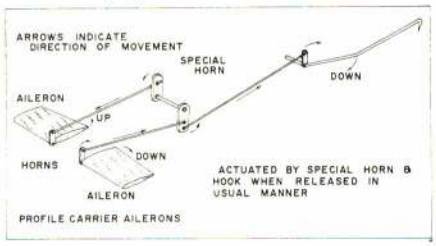
Free flighters, new and old, shouldn't overlook the advantages of the mylar coverings: MonoKote, Solarfilm, or the new clear mylar marketed by the National Free Flight Society. These are excellent materials and need no preparation of the framework as do tissue and silk. Besides, the time saved is considerable and there is no unpleasant dope odor. There are two drawbacks: These

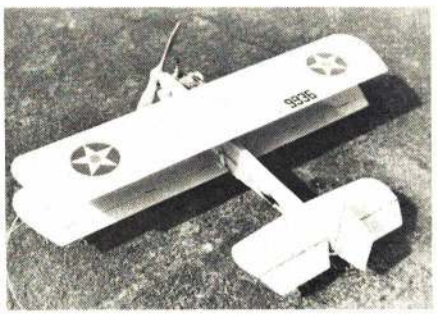
(Continued on page 120)

JOHN BLUM ON CL CARRIER

Safety Checks: Safety is anytime! It may seem that this lecture should have taken place at the very beginning of the 1973 season, but it's still pertinent. It's of particular importance if you are using any of last year's equipment.

All models get a vigorous workout regardless of type. Even during handling, storage and hauling, some damage may occur. However, of all types, the Carrier model perhaps suffers the most physical abuse when actually used as intended—the larger engines in proportionately smaller air frames, the higher speeds each year, and particularly the landing. Few of us can conceive the structural abuse of a 25 mph arrested landing. So, safety is a constant alert—watch glue joints, mounts, tailhook assemblies, etc. Don't cut short the inspection of related equipment either.





Harry Higley's Mo-Bipe at St. Louis contest sports full-length ailerons operated as in the above sketch.

Ailerons and Lift: Various methods of giving the Carrier model more lift, plus the ability to stay "out" on the lines during slow speed, have been published recently. Making proper choice of whether to use landing flaps is sometimes a "sticky" one, particularly in profile. With a 300 sq. in. minimum wing area ruling, the use of landing flaps on the profile is questionable. Most kits are such that the addition of flaps causes the model to assume too slight nose down attitude during slow speed and makes the flight more difficult with little accomplishment. This is mainly caused by the tapered wing with wide root cord of most kits, thus positioning the flaps too far rearward.

However, the addition of ailerons, best created as part of the existing wing area, will aid in keeping the model "out" on the lines during slow speed. The sketch depicts a method which is also used on the Mo-Bipe by Don Gerber. The system is actuated when the tailhook is released. The opposed horns, working in opposite directions, cause the inside flap to move downward and the outside flap to move upward, thus giving the aileron effect causing the model to "roll" slightly to the right. A full-length, narrow flap is best suited.

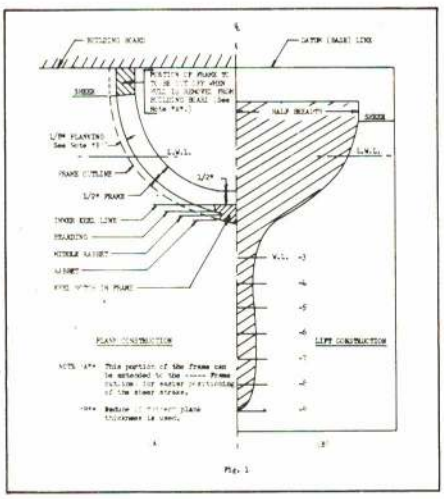
Class I Judy: Photos show Terry Herron's *Japanese Judy* for Class I Carrier. Terry, of Wichita, Kansas, has set several records with

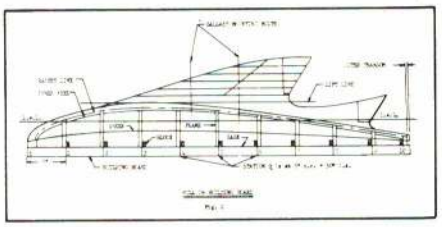
(Continued on page 120)

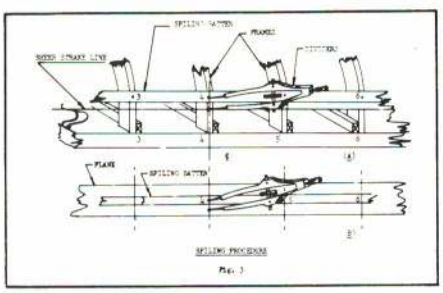
Proper ducting makes small openings adequately effective on the Judy. It is well streamlined.

'63 EPPERLY INDY ROADSTER, entirely scratch built. First Place RC Car, by Roy A. Moody

CRITTER







Building and sailing a model racing yacht is a healthy pastime and a challenge to one's imagination, skills and patience. The results will be rewarding —the satisfaction of the many hours of patient craftsmanship it represents, plus the thrill of sailing the model that can be handled like a real yacht, thanks to RC, except for the fact you're not on board.

The boat is 50 in. long with a beam of nine in. and is planked from the sheer line down to W.L.-3. Below this, the lift or "bread and butter" method is used. The model is built upside down on a large flat jig board (3/4 x 12 x 52"). Mark off the centerline and frame spacing per plans and attach the cross pieces, equal in length to the breadth of the frames, to the jig board in the proper positions.

Trace the frame outlines on 1/2" marine plywood allowing 1/2" thickness for the innerface of the frame and decreasing the outerface by 1/8" to allow for the planking. (See Fig. 1A). The small lips extending past the upper ends of each frame are for proper alignment and are later cut off. (Always reset the sheer and W.L. references on the faces and edges of the frames that are cut away during construction.) Note that the keel, due to its curvature, rests on the forward edge of the notches in the midships and forebody frames and the after edge of the notches in the afterbody frames. All the notches, including the flush fitting frames 3 and 4, must be filed off to permit the backbone to fit across them. Set the frames in place and fasten to the cross pieces with screws.

Trace the backbone outline on 1¼" thick mahogany or clear white pine, marking all station positions, rabbet line, keel bolt and stuffing box holes and skeg slot location. The "noseblock" at the stem serves to fasten the stem to the jig board and will be cut off later. Cut out and finish the backbone to the correct profile. Locate and drill the keel bolt and stuffing box holes. Shape the backbone to the dimensions shown on the half breadth plan and cut the skeg slot 3/16" deep, "dead" on the centerline from station 7 aft.

The next phase of construction is that of the keel from W.L.-3 through W.L.-8 using the lift method. In some lifts the upper face of the layer is larger than the lower face then the converse occurs. It is important to remember this point in sawing the layer to shape, as the outline is governed by the larger face. (Though requiring more labor, all lifts may be cut to a uniform width of 1-3/8" with the length determined from the profile.) Trace the outline of each lift to one-in. thick pine keeping the grain running in the same direction. (The forward rudder is part of the keel and will be cut out later.) Cut out the lifts, mark all references and drill required holes. Using the keel bolt holes

Simplified construction all wood racing yacht in the Marblehead 50-800 Class. It is an easy sailing model even for us RC airplane nuts. / by Victor F. Miglierina

for aligning, glue and clamp up the lifts. When the glue has hardened, cut the keel to proper profile. The diagonal lead line is cut straight across the beam. Assemble the keel sections to the backbone installing beveled blocks on the innerface of the keel.

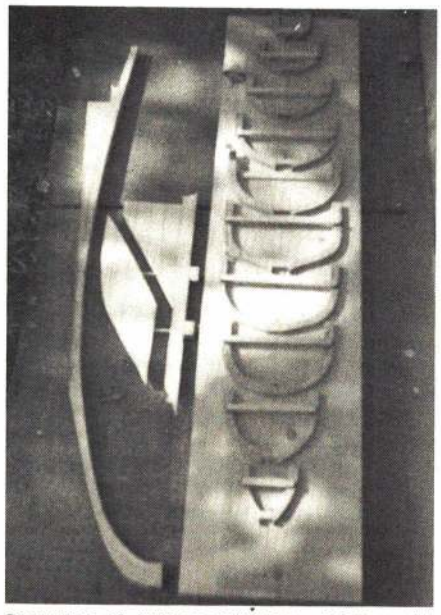
Next, the keel is fitted to the frames and right across them. When fitted, glue up and secure the frames to the backbone, fastening the stem in position through the nose block (from the underside of the jig board) and with a brass countersink screw through the keel to the fashion piece. At this stage your boat should look like Fig. 2.

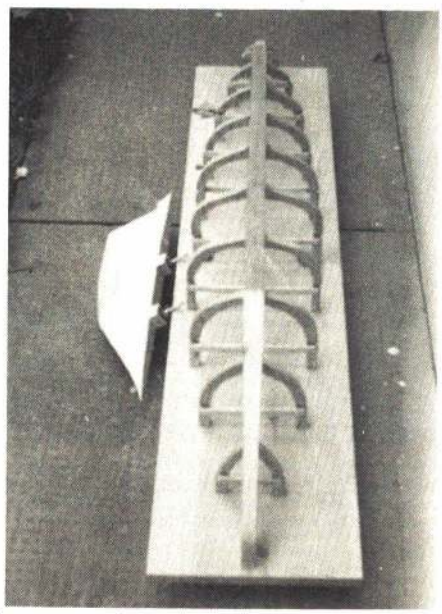
Before planking can be applied, the frames must be faired up to allow the planks to lie snugly on them. This is best accomplished by laying a strip of planking across several frames, keeping it parallel to the W.L., and filing the frames until the plank lies "true" across them. Sight the batten frequently when fairing out to detect any unusual kinks. Before planking, there are several things to bear in mind:

(1) The planking material must be uniform in thickness and width, straight, free from knots and well seasoned. (Spruce was used.)
(2) Each plank should be in one piece from stem to stern.
(3) Each plank must fit its neighbor without forcing or strain, butting up to it with an absolutely tight joint.
(4) The work must be kept "level" on both sides of the hull. Therefore, the planks must be put on in pairs.
(5) Pre-drill all plank holes staggering (fore and aft) the holes so that they do not go through the same frame ply and split it. Use two holes per frame, per plank.
(6) Use round toothpicks, dipped in waterproof glue, for fastening the planks to the frames; wire brads may be used provided they are "set" and filled.
(7) Keep planks parallel to the W.L. as much as possible.

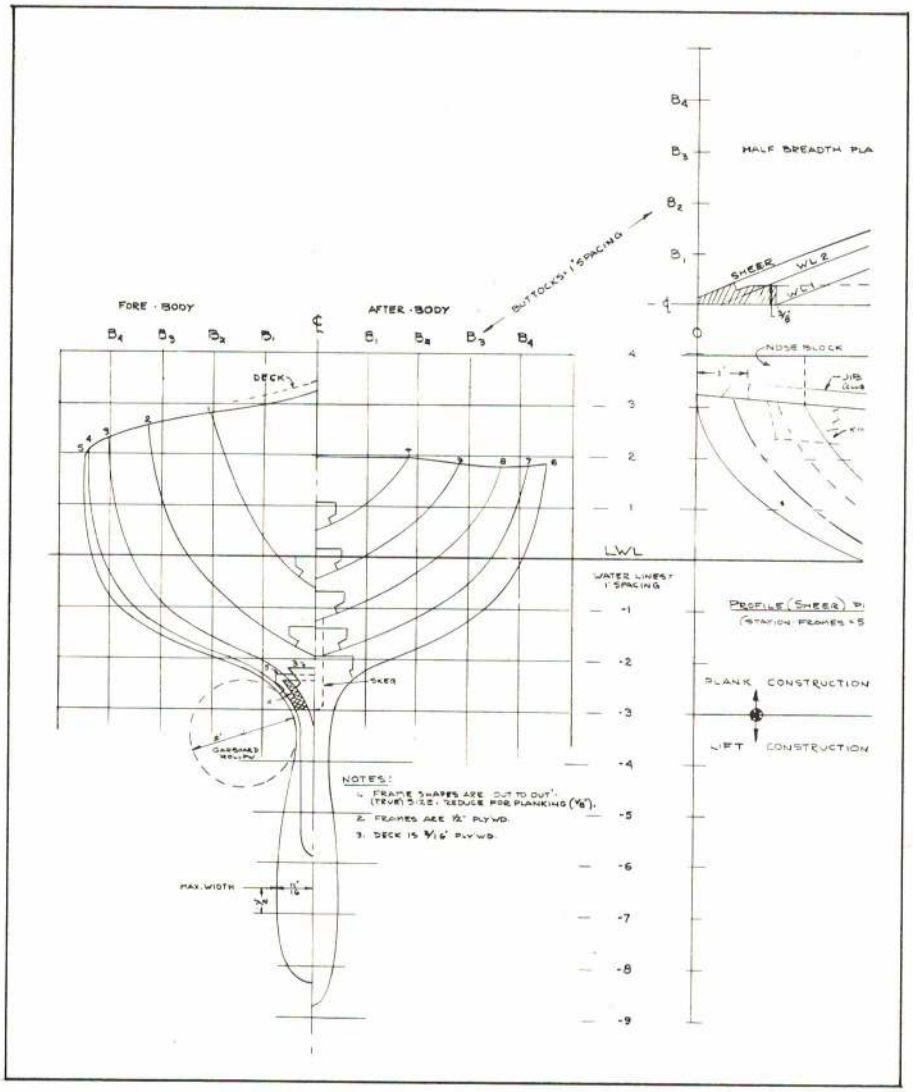
Since each plank has a different shape and curvature, the best method of finding the shape of each plank is by "spiling." Prior to spiling, plank widths are selected and tentatively laid off on the frames. (Generally the sheer strake is made wide enough to take care of the deck line and the balance vary from 1/2" to 3/4".) Fit a piece of planking to the boat across the frames and as nearly parallel to the W.L. as possible. When properly sighted, clamp the batten in place.

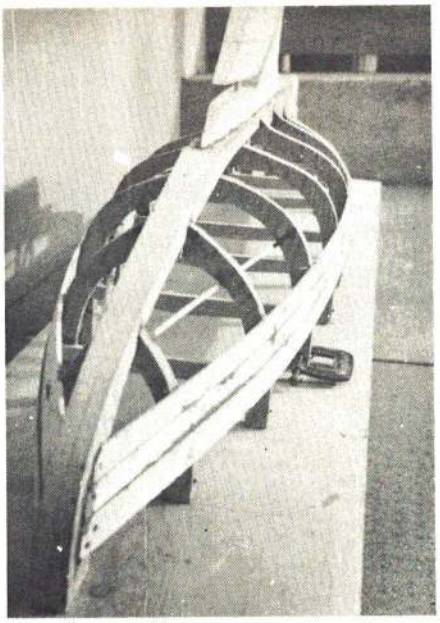
Number and mark the centerline position of each frame on the plank. Set a pair of dividers with their points apart and parallel to the frame centerline at a distance greater than the space between the edge of the spiling batten and the shape to be obtained (sheer strake) and





Sequence of hull construction. Built upside down on a flat board assembly is quick and accurate. When you remove it from the board, and have sanded the hull, the inside must be carefully painted for waterproofing protection. Decking and controls are next.





As each side planking is prepared it must be an even fit all along the lift line where each plank meets the next one. Do both sides at one time to prevent warping the hull.

prick off spots from the sheer line on each station. (See Fig. 3A).

Remove the plank from the boat and set the references and measurements just taken on the plank from which the sheer strake is to be made. (See Fig. 3B). Draw a line through the spots to get the shape of the upper edge of the sheer strake. The stem end shape of the plank can be obtained by offering it to the rabbet while the stern end can be cut flush to the after edge of the inner transom. The rabbet can be cut using a piece of planking to measure its depth. Bevel the keel at each station, first, and then remove the waste wood in the areas between, afterward dressing the surface between the rabbet line and the keel centerline. (See the stemhead on the half breadth plan.)

To obtain the bottom edge, take the dividers and measure on each station to spots set out for the top of the next plank. The line is again run in using a batten. The plank is finished to the lines. A duplicate strake is made for the other side of the boat and fitted. When final fitting has been satisfied, the strakes can be glued in place, fastening to the stem and inner transom with two No. 0 x 3/8" F.H. countersink brass screws and with toothpicks or brads at the frames. For the second set of planks, the spiling plank is again brought into use; proceed exactly as before except that the measuring point is the lower edge of the sheer strake instead of a row of spots. The lower edge of the plank is obtained in the same manner as for the sheer plank. Cut the planks just outside the marked lines, fit them to the boat, to the lower edge of the sheer strake and extend the rabbet. When satisfactorily fitted, glue, pin and screw in position in the same manner as the sheer plank except that the edges are also glued to the sheer strake. When planking is complete the keel is beveled to the centerline.

The lift sections of the keel are shaped using templates of stations 3-5 (See Fig. 1B). Start by removing the corners of the lifts at the stations and fairing in between until all the waste is removed. When contours are satisfied, sand to a smooth finish fairing into the planked section of the hull.

The fin is made, fitted and glued to the backbone. Next, the rudders may be cut out, the leading edges shaped and fitted with rudder posts. (There must be no movement between the posts and rudder.) Make, fit and glue the outer transom to the fashion piece.

Set the hull aside and make a cradle as shown in Fig. 4.

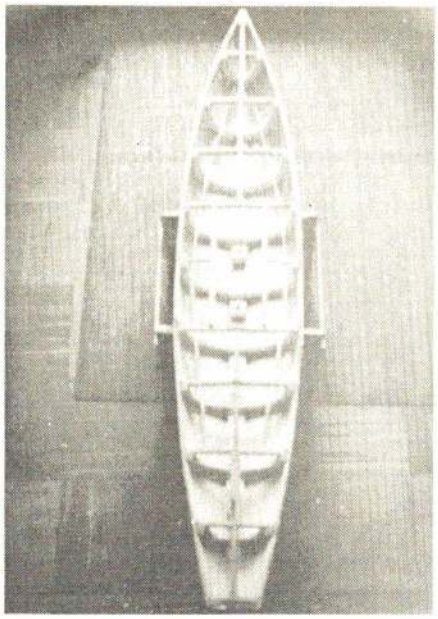
Remove the hull from the building board; set in the cradle and cut off the stem nose block and frame lips to conform to the sheer line and deck curvature.

The keel is formed from 15 lb. of lead poured into a greased (Vaseline) plaster mold fitted with the keel bolts. The split mold (be sure to allow for a right and left mold) is made as shown in Fig. 5; filled with molding plaster and "formed" using the prefinished and waxed ballast pattern removed from the hull. Note that the mold is split at the centerline of the ballast and this line is used as the plaster leveling line. Bake the plaster molds at 375° for three hours. Assemble with tape, set the keel bolts and pour in molten lead-leveled off at W.L.-4. Cut off excess bolts at bottom of keel, smooth out any irregularities, fill voids with auto body filler and "true" up the top edge (W.L.-4) to insure proper fit with the hull via the brass plate.

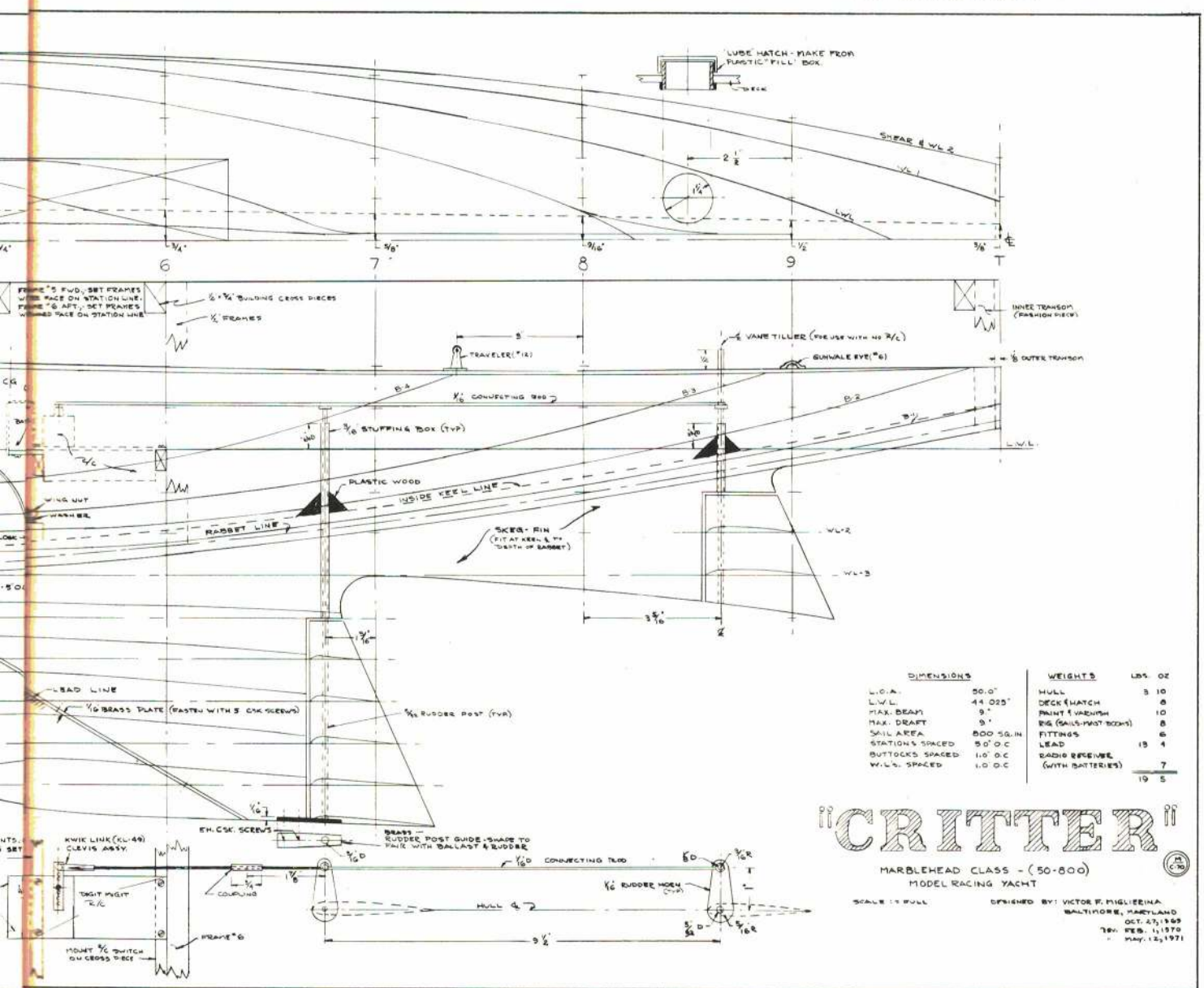
Shape, fit and fasten the brass plate to the hull. Assemble the ballast to the hull installing the handle, washers and wing nuts accordingly. Make, fit and install the forward rudder post guide.

Figs. 6 & 7 and the hull drawings indicate the sizes, shapes and positions of the various components making up the control system. A Digit-Migit system is used as the action is positive and reliable. Further, it can be readily expanded to encompass sail control units if desired. Make, fit and install the control system in whatever sequence you desire, but naturally, the system must have freedom of movement. When adjustment and operation is satisfactory, remove the RC gear. (A change in the RC gear is the use of NiCads, wired and taped together and the installation of a charging plug.)

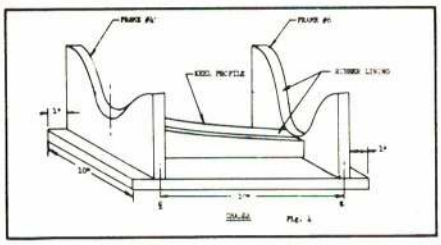
The hull should now be given a final check for smoothness, open seams, tool marks, dents, low spots, etc. Fill and

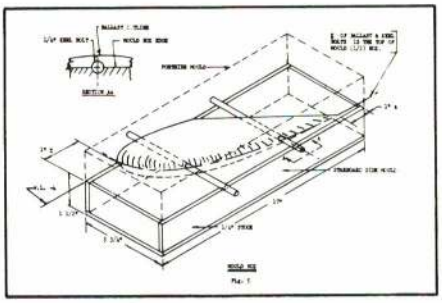


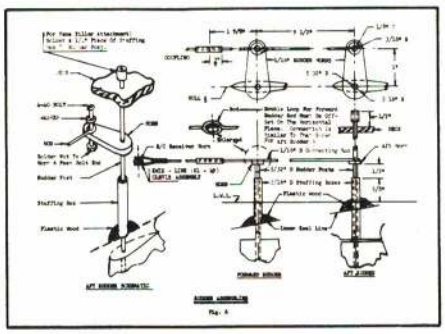
With the interior varnished for waterproofing the hull is ready for internal fittings and then the deck. Note mounting holes for the lead keel and carrying handle.

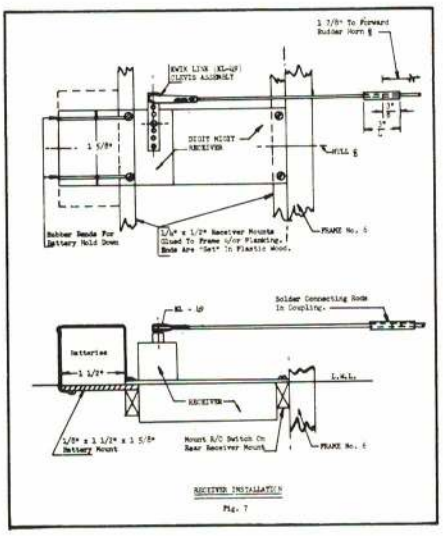


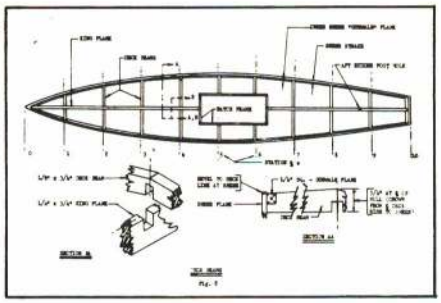
FULL-SIZE PLANS AVAILABLE—SEE PAGE 84

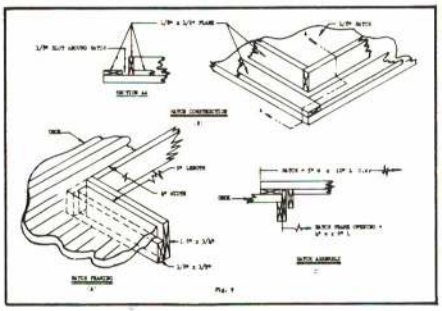


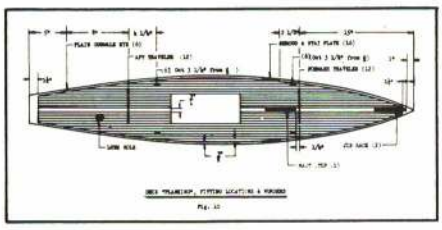


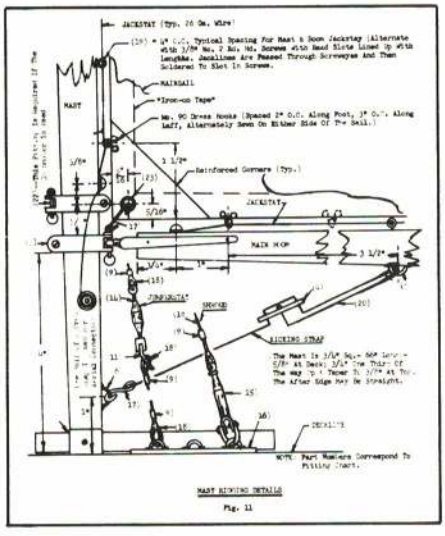












Single-control sailing generally means a pre-set main and jib sheet with steering control by RC only. Your sheet setting is a compromise for all "points" of sailing. *Critter* is a lively and swift moving yacht, so the sheets are kept fairly close in except in very windy conditions.

smooth where necessary and sand to a glassy surface. Apply successive coats of sealer, pure shellac and two of undercoater, sanding between coats with 180 W-D paper.

To support and properly crown the deck, a King plank and deck beams must be installed and the hatch framed as shown in Figs. 8 & 9 and the hull plans. Gunwales must be installed between the deckbeams in positions occupied by the cross pieces and all beveled to proper crown.

The inside of the hull should now be varnished with three coats of spar varnish rubbed well into the seams and the first coat cut 50% with turpentine permitting good penetration. *Do not varnish the top of members to receive the deck or permit spillage on the controls.*

A birch deck is fit, cut and "planked" as shown in Fig. 10. The underside is given one coat of sealer and undercoater *between* the areas to receive glue and the top side finished with two coats of varnish, the first being thinned 50%. Glue and fasten the deck to the hull with 1/2" No. 18 "set" brads or 3/8" No. 1 F.H. countersink brass screws. Sand the edges even with the hull.

The hull and deck are ready for their final finishes which is left to the builder. If a multi-colored hull is desired, the W.L. may be established by placing the hull in a tub of water, the surface of which has been sprinkled with talcum powder, and allowed to float free. When finished apply auto wax to the hull and deck and polish to a shine.

The main hatch is made as shown in Fig. 9 and finished similar to the deck. The lube hatch is made from a "pill" box as noted on plan. A maple mast with straight after edge is made as described in Fig. 11 and fitted with the Ferrule and pin. The backstay brace (Fig. 12) is made and fastened to the top of the mast and the mast finally finished with two coats of shellac and one coat of spar varnish. The main and jib booms, Fig. 13 are made as described and finished in similar manner as the mast. Attach the goose neck and jib club swivel, respectively to the forward edges.

Refer to Fig. 14 for the sail nomenclature. For the mainsail, draw the chords between the head, tack and clew. Divide the leech chord in half and measure out two in. for the roach. Sweep a fair curve from the clew to the head, allowing a slight more curve at the top half of the leech. Lay out the four four-in. batten pockets perpendicular to the leech chord by dividing it into five equal parts. Tablings are made from 1" iron-on tape and headboards from 1/32" plastic. Tablings are sewed with two rows of stitches, corners reinforced with triangular patches of tape and battens of 1/16" plastic are slipped into the pockets. Sew No. 90 dress hooks on the luff and foot of the mainsail spacing them 3" and 2" o.c. respectively (Fig. 11, 12, 13), alternating the hooks on either side of the sail. Eyelets will be installed and crimped during rigging. The jib is made in similar fashion using a 1" roach and three two-in. battens with the hooks

(Continued on page 78)

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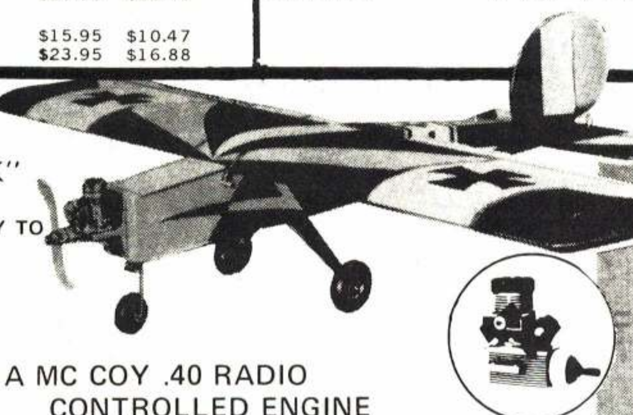

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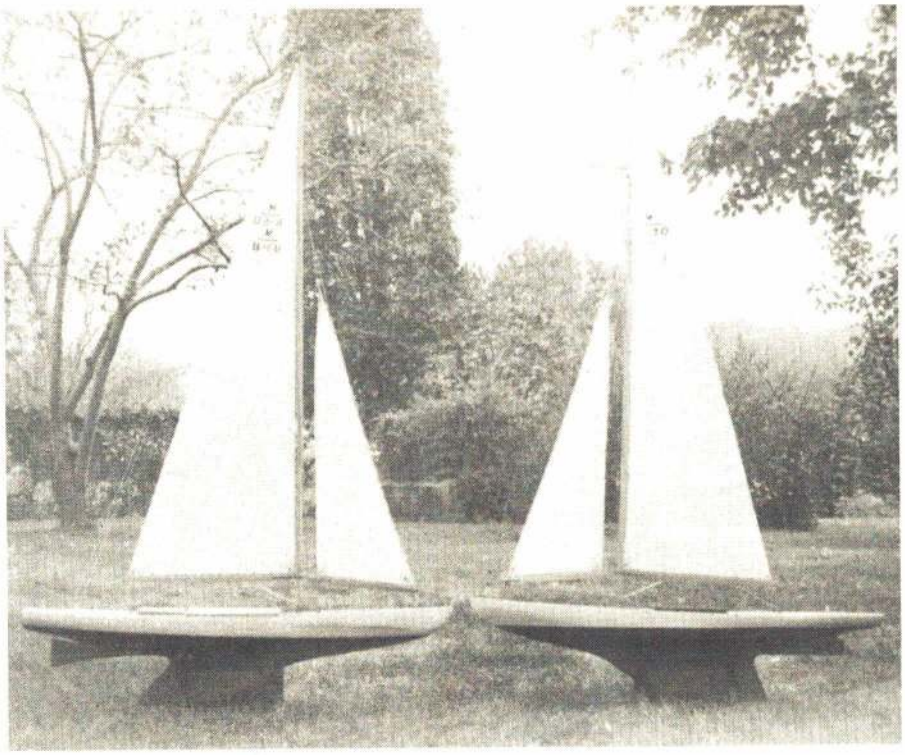

Part of her character is the twin rudder arrangement. Note that the keel has a rudder which is linked with the aft rudder. Numbers stitched on the sail indicate racing class and the owner's number. The model is registered in AMYA (American Model Yachting Assoc., 4761 Niagara Ave., San Diego, Calif. 92107).

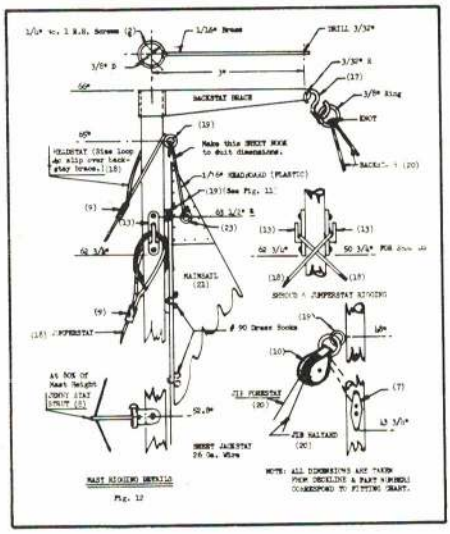

Fig. 12

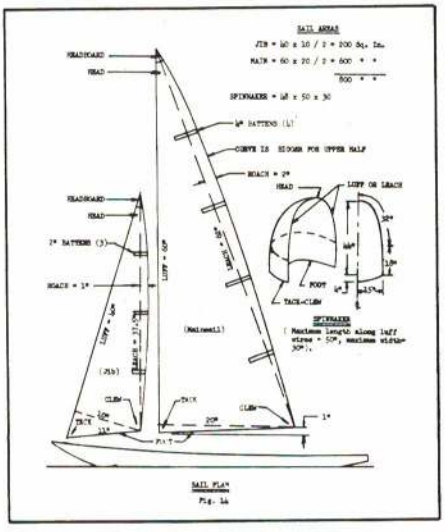

Fig. 14

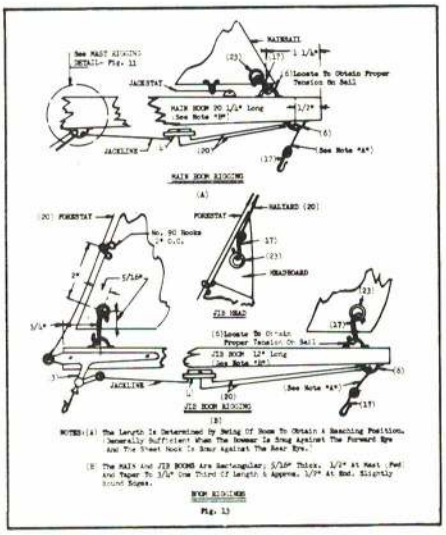

Fig. 13

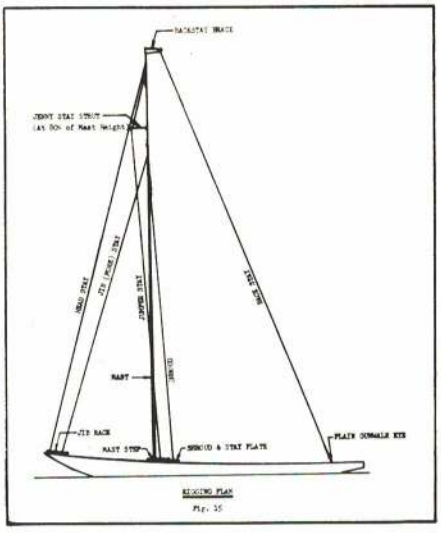

Fig. 15

CRITTER

(Continued from page 76)

spaced two-in. o.c. on the luff (Fig. 13B).

Install deck fittings (Fig. 10) in their proper positions. Install sheet jackstays Figs. 11, 12, 13. Installation of the rigging (Fig. 15) can best be described by reversing the method of unshipping the rig; (See Figs. 11-13 & 15-17 to become familiar with the interelationship of the fittings.) Therefore, with mast in design position:

Mainsail:

(1) Unhook the backstay sheet hook from the backstay brace by slacking the bowsers.
(2) Unhook the kicking strap from the gunwale eye on mast by slacking the bowser.
(3) Unlock antenna snap swivel from antenna loop.
(4) Unhook the jackline sheet hook from the aft traveler by slacking bowser.
(5) Uncouple the jumperstay turnbuckles from the tangs. Note: Run up the turnbuckles when uncoupled to prevent their loss.
(6) Uncouple the swivel turnbuckle from the shrouds at the stayplate.
(7) Slacken the headstay swivel turnbuckle in at the jib rack. Slip head loop out of screw eye, located immediately below the backstay brace, and pass head loop over and out of the backstay brace.
(8) Unship the mast from the mast step.

Jibsail:

(1) Untie the jib forestay and halyard from the spring cleats and slip through the sheave.
(2) Unhook the jackline sheethook from the forward traveler by slacking the bowser.
(3) Disengage the jib club swivel from the jib rack.

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Subsequent actions and reactions of the sails and hull would entail a lengthy discussion. However, the problem at hand is finding the correct position of the mast covering the maximum sailing range and trimming the sails accordingly or raking the mast. If the sail plan is too far forward, the yacht will not point up to the wind. If too far aft, the boat will go into irons. These conditions can be

(Continued on page 80)

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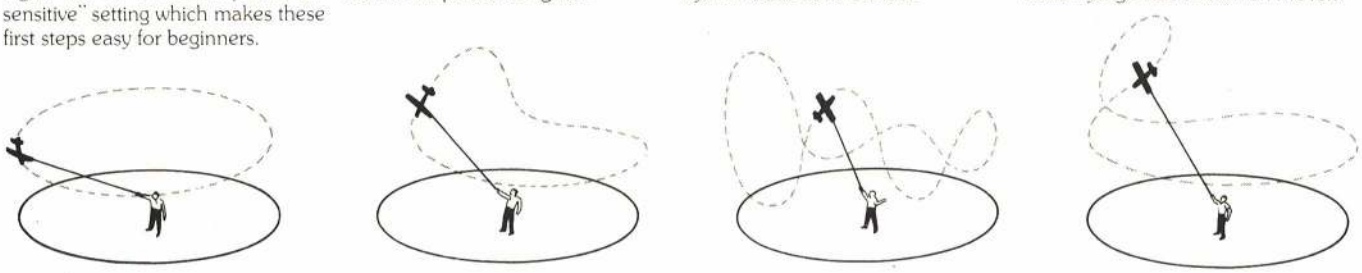

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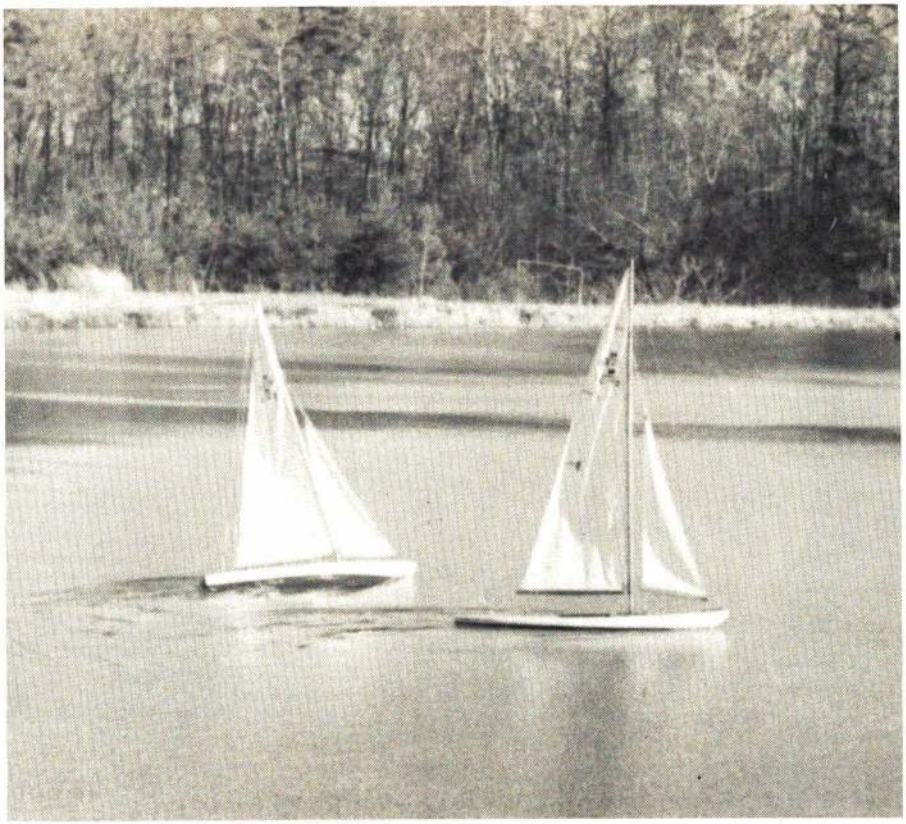


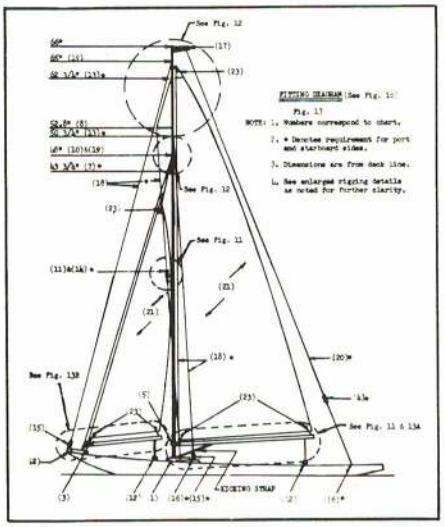
The two models above are tacking to starboard, however, the boat to the right is pointed so directly into the wind, it is not moving as swiftly as its companion.

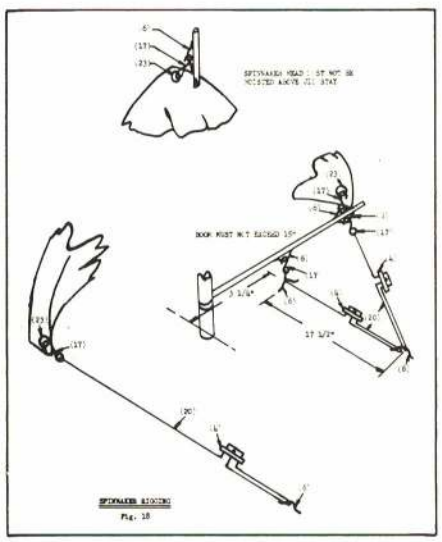
controlled by moving the entire sail plan forward or aft by the slots in the mast step. The principal function of the jib, besides furnishing additional drive, is to guide the flow of air around the leeward side of the mainsail. It should not under any circumstances, backwind the mainsail. If it does, either trim the main closer or slack off the jib, if the point of sailing will permit it. If the boat comes into the wind, the jib shaking first, trimming the head sail may correct this condition and keep the boats head off, permitting her to sail a steady course. If the mainsail shakes first, then the jib, shift the rig forward. The following figure illustrates some positions of sailing a boat in relation to the wind.

Visualize the angle that each sail makes with the wind when the craft is close hauled on the port or starboard tack, reaching and running. When running or broad reaching, the jib, blanketed by the mainsail, has little drawing force. Hence, the use of the spinnaker. Tacking is simply sailing a zigzag course, due to the fact that you cannot sail directly into the wind, by making headway, first on the starboard tack, coming about, then making headway on the port tack. Spinnaker is hooked up as shown in Fig. 18.

Get to know your boat, the adjustments required and how much control is to be applied to make her go where you want her to. Above all, keep the gear moving freely and batteries charged. Happy sailing!

For your convenience, an abbreviated Glossary of Nautical Construction Terminology begins on page 82.





FITTING CHART (Fig. 16)

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8	1	515	1/2" Style "A"	Jenny Stay Strut
9	14	587		Shroud Sleeves
10	1	105	5/16" Double	Sheave Block
11	2	567		Tang
12	2	260	3" Style "E"	Sheet Travelers
13	4	216		Shoulder Cleat
14	2	511	3/4" TU. Style "B"	Turnbuckle
15	3	580	1" Take Up	Swivel Turnbuckle
16	2	226	2½"- 3 eye	Shroud & Stay Plate
17	9	423		Sheet Hooks
18	24 ft.	455	1/32"	Stay Wire
19	1 doz.	441	3/32"	Screw Eyes
20	20 ft.	415		Linen Line
21	2 yds.	450	39"	Sail Cloth
22	1	532	(See Note 1.)	Spinnaker Fitting Set
23	9	427	3/32" (See Note 2)	Eyelets
24	1	541	(See Note 3)	Self Tacking Vane Gear

1—Item 22 is required only if spinnaker is used.
2—Item 23 includes 3 for spinnaker.
3—Item 24 is not required for Radio Control.

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GLOSSARY OF NAUTICAL CONSTRUCTION TERMINOLOGY

This is not a complete nautical glossary, but rather a list of terms, words and expressions needed to understand and follow instructions for the construction of "CRITTER."

Abeam—At right angles to the line of the keel.

Aft (Abaft) (After)—At or toward the stern.

Amidship—The center of a ship either midway from bow to stern or inboard (thwartships) from her sides.

Apparent Wind—The difference between the true wind and the forward speed of the boat.

Astern—A relative term meaning behind.

Backbone—The lowest permanent part of a vessel (see Keel).

Backstays—Ropes or wires from the masthead slanting aft and out to the hull to help support the mast. (Stays requiring adjustment with each change of tack are known as running backstays; while ones leading directly to the stern are known as permanent backstays).

Ballast—Dead weight carried low inside a boat to increase its stability by lowering the center of gravity. Lead and iron keels are termed outside ballast.

Battens—Thin wooden or plastic strips, fitted into a batten pocket, used to keep the trailing edge of the sail stiff.

Beam—The greatest breadth, or width, of a vessel; also a structural member on which the deck is laid.

Beat—A course by which the boat sails to windward. Beating is sailing to windward by a zig-zag course. The term beating to leeward is used when a boat sails down the wind in a series of zig-zags known as jibes (see Jibe).

Bearding Line—The after side of the rabbet formed by the meeting of the inner faces of the planks and the side face of the backbone (see Rabbet).

Bend—To fasten in place. To "bend a sail" is to make it fast to a spar.

Bermuda Rig—A fore and aft rig with a triangular sail and a mast with an extreme rake.

Bilge—The turn of the hull below the water line; also that part inside the hull where water collects above or near the keel.

Block—A pulley with one or more rollers (sheaves).

Boom—A spar at the foot of a sail; also a pole used to hold spinnakers outboard.

Bow—The forward part of a vessel.

Bowline Knot—A knot forming a non-slip noose.

Bowser—A device used for adjusting the ropes on a model yacht.

Bowsprit—A boom or spar which projects over the stem of a vessel to carry sail forward.

Bread and Butter—A system of lift construction (see Lift).

Buoyancy—The ability of a vessel to float.

Buttock Lines—Outlines of a number of equally spaced longitudinal sections taken through the hull vertically and parallel to the centerline of the hull.

Camber—The upward curve of a deck.

Center of Effort (C.E.)—The point on the sail plan through which the force of the wind acts. (Normally considered to be the C.G. of the sail plan.)

Center of Gravity (C.G.)—The point about which all parts of a vessel balance each other.

Center of Lateral Resistance (C.L.R.)—The point at which the boat, when afloat and pushed sideways, will move evenly sideways. It is the C.G. of the underwater profile of the boat.

Chainplates—(Shroud and or stay plates)—Plates used to fasten the lower ends of the shrouds.

Cleat—A "horned" fitting around which ropes are made secure.

Clew—The lower aft corner of any sail.

Club—A short spar at the foot of a sail, especially a jib.

Close Hauled—Sailing as close to the wind as possible with sails trimmed for beating to windward.

Deck—The floor of a vessel.

Deck Beams—Beams across the width of the boat supporting the deck.

Diagonal—Sloping straight lines across the sections in the body plan, meeting and crossing in the centerline of the plan. They indicate the shape in an inclined plane and are valuable in shaping the boat.

Downhaul—A rope or tackle by which a sail is pulled downward.

Draft—The depth of water needed to float a boat.

Ease—To relieve pressure on a sail or helm (steering system).

Eyelets—Ringlets in sails to receive lacings.

Fairing—To develop curves around which a plank or batten can be bent without breaking or having humps and waves.

Fairlead—An eye or fitting which changes the direction of a rope led through it.

Fin—A thin projection from the underbody for the purpose of steadying and stability.

Fly—A masthead pennant to assist in determining the apparent wind direction as related to the mast. (Also known as the telltale.)

Foot—Lower edge of a sail.

Frames—Ribs to which planks are attached.

Freeboard—Vertical distance from the water line to deck.

Garboard (strake)—Plank nearest to keel.

Gooseneck—A hinge or fitting, normally a universal joint, attaching the boom to the mast.

Gunwale—A timber around the upper, top side, of a boat.

Guy—A rope or wire used to steady or support.

Half-Body Plan—A view showing the transverse or cross sections of one half (forebody and afterbody from the midships section) the hull taken at selected points or stations.

Half-Breadth Plan—A view or elevation showing one half the hull as seen from above.

Halyard—A rope or wire used to hoist sails.

Head—Upper corner of a sail.

Headboard—A wooden, metal or plastic fitting at the head of the sail.

Head To Wind—With bow headed into wind and sails shaking.

Headway—Forward motion of a boat.

Heel—The tilt, tip or laying over of a boat, usually due to wind.

Helm—Tiller or wheel used to steer a boat.

Hull—The main body of a boat exclusive of masts, spars, sails and rigging.

In Stays or In Irons—When head to wind while tacking. When a vessel remains "in stays" unduly long with no forward motion she is "in irons."

Jackline—The line fitted under the boom to receive the bowsers that adjust the sheets.

Jackstay—A wire running along the spar to which the sail is hooked in lieu of lacing it around the spar.

Jib—A triangular sail set forward of the foremast.

Jib Club (swivel)—A fitting used on the fore end of a jib boom.

Jibe (Gybe)—To change tacks by turning away from the wind with the boom shifting from one side to the other.

Jib-Head & Jib-Headed—A tall rig with triangular mainsail. Often called a Marconi or Bermuda rig.

Jib Rack—A fitting mounted on the bow of the vessel to receive the jib club & swivel.

Jib Stay—The forward stay on which the jib is hoisted.

Jenny (Jumper) Stay—A single or forked strut placed aloft on the forward side of a mast for added support.

Keel—The lowest permanent and main member (backbone) of the hull running fore and aft to which are fastened the stem, stern post and frames. In keel boats it extends below the rest of the hull. In centerboard boats, it is the central timber through which the board is lowered.

Kicking Strap—Fittings, cable or line attached to the mast and boom which keeps the leach taut during a jibe in addition to holding the boom down when it swings.

King Plank—Center plank of the deck.

Knot—Tying or sewing of a rope. Also a measure of speed. One knot = one nautical mph.

Leach (Leech)—The aft edge of any sail.

Lee or Leeward—The side away from the wind, hence lee side and to leeward. Leeward helm, an unbalanced condition which turns the bow of the boat away from the wind.

(Continued on page 99)

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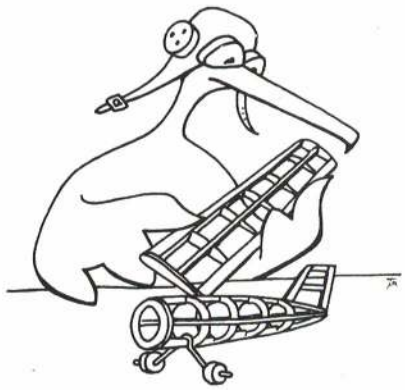

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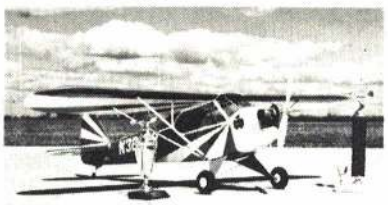

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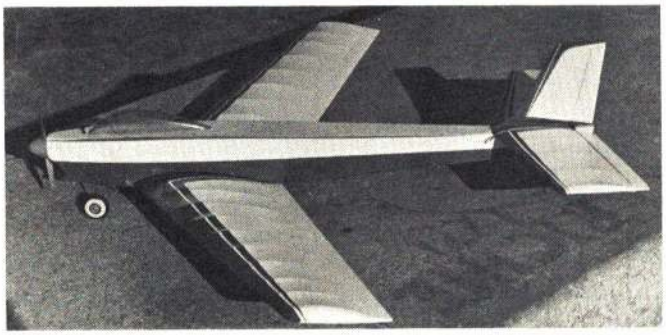

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No. 1113, Bippi-Bipe—Delightful scale-like rudder-only or GG model for single channel and 09 engine. A fun plane. **$2.75**

PROJECT TELEPLANE

(Continued from page 14)

benefit from such a nominal investment as this aircraft since its experimental program led directly to a more sophisticated prototype contracted effort by Philco Ford. This latter program is called "Praeire" and uses aircraft designed and constructed by two modelers, Jan Sakert and Dick Riggs, under contract to Philco Ford.

Modified Drones: The "Bikini" drone was developed for the Marine Corps as a forward battlefield reconnaissance system. It weighed about 60 lb., was powered by a McCollough 4.5 hp ignition engine, was of all-metal construction, was catapult launched and landed by parachute. The control system was a Babcock ten-channel tone system providing "Bang-Bang" rudder plus trim elevator control. It carried a framing camera for recording data. This program was scrapped by the Marine Corps and the surplus equipment was subsequently obtained for use in Project "Teleplane."

To date, one "Bikini" has been modified and flown. Modifications consisted of adding a variable throttle to the engine, adding a landing gear, stripping out the parachute and Babcock control equipment and substituting a model proportional radio control system. In modified form this ship has been flown at 44 lb. weight and at 5 lb./ft.^{2} wing loading. This wing loading

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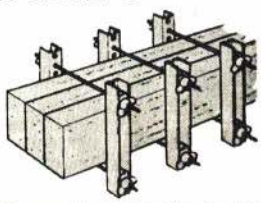

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is over *three times* that of standard model airplanes. The craft flies very well at this loading and handles well in the air. Care must be exercised in takeoffs and landings since speeds are higher, moments of inertia are high and it handles like a light airplane!

This craft will be used for general purpose testing as well as testing of the electrostatic autopilot. We have flown this bird using the ignition engine. This normally creates problems with digital proportional equipment. We found that the Kraft "Dual Conversion" receiver worked best in this ignition environment.

Helicopters: A Schlueter Bell Huey Cobra is now being flown in the Project as an introduction to remotely piloted helicopters. The thinking here is the possible utility of this kind of craft for a number of RPV missions. Autopilot testing with this bird is also planned. The relatively simple mechanization of present model helicopters makes this an attractive possibility for some of the missions previously described. In addition, the helicopter adds the dimension of vertical flight, hovering, and eliminates the need for launch and recovery gear. The addition of a simple stabilization system could ease helicopter flying considerably. We have found that forward flight is relatively easy to learn, so if the hovering problem can be solved, then this really becomes a practical RPV. We plan to perform experiments with video equipment installed to fly the bird as an RPV.

Strange Birds: The Project includes rather strange vehicle concepts such as the powered "Parafoil." The Parafoil wing is a steerable parachute concept pioneered by Prof. Nicolaits of Notre Dame University. Interest in this wing concept for RPVs stems from its compactness when folded. This could increase its attractiveness for forward battle field reconnaissance use. The Teleplane Project contribution in this area will involve building and flying a powered vehicle of about 20 lb. gross weight and flying it via video equipment and remote control systems.

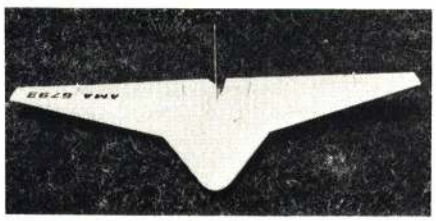
Robin: Robin is a very large model aircraft obtained from Jim Martin of Nashville's Hobby Lobby. It was a semi-scale model of the old Curtiss Robin. This bird is of built-up construction and has a 12-ft. span, 19-sq. ft. length. Extensive modification to this aircraft was undertaken to perform rather sophisticated Gimbled camera RPV experiments. In final form the bird will fly at about 50 lb. gross weight and be powered by a 2 hp engine mounted over the wing in tractor fashion. It will carry a repackaged Sony TV camera mounted on a Gimbled system allowing almost hemispherical forward viewing. Other instrumentation to read out altitude, air speed, altitude and heading will be added. The Gimbled camera will be controlled by the operator from the ground via a two-axis stick control and by means of a so-called helmet mounted site. This latter consists of mounting the viewing system directly in front of the pilot's eye by attaching to a helmet or

other suitable device. In this way pilots head motion will control the direction that the camera in the aircraft will look! This experiment is an attempt to create a pilot-in-the-cockpit situation to evaluate this level of sophistication for piloting RPVs and performing simulated missions. Various forms of video are being considered including three dimension and color displays.

NEXT MONTH:
Project Teleplane's use of the Hill Auto-Pilot.—Ed.

DELTA DIAMOND

(Continued from page 31)



The double delta shape is particulary stable during a stall. Airfoil is slightly reflexed for good lift and control.

wanted to head down. Opposite rudder just made the tail come down with little roll action from the ailerons.

On nearing the ground this time I let the Delta land by itself. A wing tip hit a small bush and over it went just like Delta No. 2. The rudder broke off. No more flying that day for the Delta. The following flying session I got in three flights before I lost the rudder. I was still having trouble with rudder control, so I cut the rudder area in half and installed an extra-long control horn on the rudder giving me less throw, now down to 1/4 in. either way. I never touched the aileron controls—they had 1/8 in. up and down.

We later found a more suitable slope from which to fly—it is a 80-ft. high and half-mile-long bluff. The only landing area is the road along the top.

The first flight there with the Delta was very exciting. It was very stable and easy to fly. I could see what the model was doing because I was at the same height. I stayed way out from the bluff, over 75 ft., on this flight. On coming in closer to the bluff, I tried flying back and forth. The turns were mushy. I landed in one piece. I disconnected the rudder and pinned the rudder in neutral.

The next flight was just as good as the first except the turns were now sharp and quick.

After about ten min. total flying time on the Delta off the bluff, I flew at a Hang Glider meet at Torrance Beach, Los Angeles. I flew the Delta for three short flights as there just wasn't enough wind. On the last flight I had radio interference, lost control, and almost hit some people on the beach who were watching the contest. Yes, we did con-

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NORM PAGE WITH HIS MACH II

There were three G.60 Supertigre Blue Heads used in the 32 man "Masters Tournament" at Huntsville, September 72. Their users finished 1st, 5th and 8th. The 5th place contestant was young Steve Ellison of Salem, Oregon. 8th place was captured by Dave Brown who supervises the tool room here at World Engines in Cincinnati. Norm's engine was an out of the box stock engine that had only been in use less than two weeks before the Masters. We also think it a tribute to our radio control industry that there were no crashes or radio problems reported.

John Maloney

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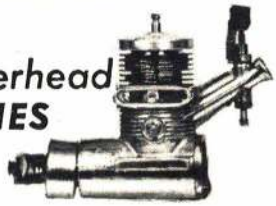

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firm that it was interference by turning on the receiver and transmitter and waiting for it to happen again—it did within one minute. The transmitter was about 25 ft. away—my transmitter that is. We never did find out who was causing the interference.

It was over one month before I could fly again. When I did get to fly, I tried it off the high start—50 ft. of 1/4-in. shock cord and 300 ft. of 30-lb. fishing line. The Delta would go up fast but would do a pop-up on release. I had to hold about half down elevator to prevent this. One time I held a touch of up elevator and it did a loop on release. Back to the power winch for more altitude to see if I could do it again. Yes it would. I tried a roll on the next flight. With full aileron control it dropped about 25 ft. doing the roll. This was the last stunt I ever tried.

The last flight for Delta No. 3 was in 15 mph wind. Damage was not too bad, left wing broke off, nose block was pushed up and back into the center section and the servo mount was broken loose.

Delta No. 4, christened the Delta Diamond by my wife and called the Delta Demon by me, is the same as Delta No. 3. The changes made were heavier bulkheads in the center section and a larger fin. No extra weight had to be added to balance the model this time. This is the model pictured in the photos.

Test flying the Delta showed up a little nose heaviness, but one turn on the elevator clevis corrected this. The flight characteristics were the same as on Delta No. 3. It had good aileron and elevator response.

The Delta has been shown to many modelers. They all liked the small size and one-piece construction. All asked the same question: Why all the dihedral with aileron control? Well, I wanted stability, and with a flat wing the CG would have been high, making the Delta hard to control. So I added five degrees of dihedral in each wing. I also wanted to experiment with different control setups, elevator and rudder, coupled aileron-elevator, coupled aileron-rudder and elevator. I have flown the Delta in all of these modes but have settled on aileron and elevator.

The one-piece construction has many advantages in itself. Most of these show up at the soaring site. No wings to assemble, no rubber bands to break and you can move around with it without hitting anyone with the wings or tail. Also, if the slope is far from the parking lot, just tuck the Delta under one arm and grab your transmitter in your other hand and take off. Nothing else is needed. The Delta's wing is strong so you don't have to worry about the wind breaking it. All you have to do is hang onto it.

Construction

The basic framework is of the egg crate type of construction. Everything interlocks into each other for a very strong structure that can take a lot of punishment.

Cut out all formers and ribs and prefit them together before gluing. Glue the 1/16 x 1/2" strip to the 1/8 x 1/4" TE spar on top only. Glue F5, F8, R1 and R3 together making sure they are aligned correctly and are not twisted. Add R10 and the TE checking that R10 is level. The TE should be straight and not bowed. Glue F1 in place and the 1/4 x 3/4" LE from F1 to R3 on both sides. Glue R3A to R3 checking the top side is the same level as R3. The 1/4 x 1/2" LE is now added to the outer wing panels.

The rest of the formers and ribs are now added to the center section. Add the wing ribs and spars. Finish the hatch frame and install the 1/2" sq. hardwood hold-down blocks and 1/4" triangular pieces to the hatch frame. The 1/8" plywood for the blind nut is glued to R2 and braced with 3/8" triangular pieces. Glue in the 1/16" plywood doublers F4A in front of F4 and the 3/8" triangular braces. The 1/8" plywood skid is glued in with the balsa doublers R1A and R1B. Glue the 1/4" sheet doublers on either side of R1 between F7 and the TE spar. Glue in the tow hook mount 1/4 x 3/8 x 5" hardwood. This completes the framework.

Carve the elevator and aileron from one piece of 1/4 x 2" balsa sheet—to give you the built-in twist. Make one left-hand and one right-hand. Attach them temporarily to the TE. I used small pieces of MonoKote which can be removed later for finishing the construction. Cut out the hatch framework and set aside. Install the 1/8" plywood servo

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mounting plate and brace with 1/4" sq. balsa along both sides of R1.

Install your servos so you will know how to mount the bellcranks. The bellcranks are mounted on 1/8" plywood pieces and braced with balsa blocks in the center section only. 1/16" music wire is used for the pushrod between the aileron bellcranks. I used Du-Bro Solder Kwik-Links at the end of the 1/16" wire. The pushrods from the bellcranks to the control surfaces are bent 90 degrees and are held in by the spars only. The control surfaces are set up as follows: 1/8" up and down on aileron; 1/4" up and down on elevator. More can be added later for faster response.

Remove the servos and control surfaces and replace the hatch frame. Place small strips of wax paper between the hatch and the center section so that no glue will get in between. Start planking the nose from F1 to F6 first. The top with 1/16 x 1/2" balsa strips and the bottom with 3/32 x 1/2" balsa strips. Note the pattern—this will help bending around the curves. Mark each strip where it crosses over the hatch so you will be able to cut it out later. Finish sheeting the top center tail section.

Before doing the bottom tail section, shape the bottom of the TE spar. The bottom 3/32" sheeting extends over the TE spar in the center section only. Add the 1/16 x 1/2" strip to the bottom TE spar. Glue on the 1/16" sheeting to the top and bottom of the wing LE and the 1/16 x 1/4" cap strips to the wing ribs. Glue on the 1/4" sq. wing tip blocks and the nose block. Sand everything to shape being careful not to sand through the top of the nose section. Cut out the hatch section. For added protection, cover the bottom from the nose to the skid with a six-in. wide strip of Celastic or fiberglass. Cut out the rudder from 3/16" sheet balsa and sand to shape. Glue in position and add the 3/8" triangular braces to either side.

Covering is up to the individual. I covered mine with MonoKote so I could attach the control surfaces to the plane without leaving a gap.

Install the servos, receiver and battery pack. Make sure you have wrapped the receiver and battery pack in foam for protection. Check to see if the balance is correct. Shift the battery pack if needed. Weights can be added to the nose block if you covered it with MonoKote. If not, you will have to add it in front of the battery or receiver. Don't add all the weight to one side. I had to add two oz. to the original model and still my total flying weight came to only 30 oz.

Flying the Delta Diamond on a slope takes an eight to ten mph breeze to stay up. Over this and you will have to start adding weight as the wing loading is very light—about 7-1/2 oz. per sq. ft. Also, when slope soaring, try to keep the nose into the wind. If it should turn around and come into the slope, all you will be able to do is hold full up elevator and hope for the best. Landings just about have to be hands off because you do not have rudder control—if anything, hold down elevator.

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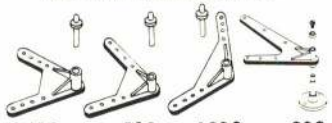
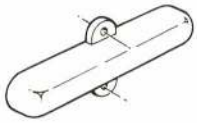


AIR FLOW MANIFOLD



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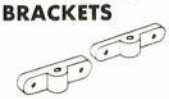

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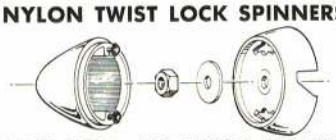

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OSPREY

(Continued from page 38)

First regulate the engine for maximum power by screwing the cylinder head down as far as you can while the engine is running. Adjust it while running so as not to screw the cylinder down too far and possibly damaging the engine. You must have absolutely maximum power if you expect your plane to take off from the water. Until you have tried flying off water you will not believe the amount of power it requires. With the increased power you will have to add more "up" elevator and left rudder to counteract the tendency of the engine to try to force the plane down.

When launching ROW, there is one trick that makes the difference between success and failure. When a CO_2 engine is first started, the first ten seconds or so, the engine is delivering its maximum power and this is when you want to launch your plane off the water. So hold it just off the water and as soon as it starts, launch it. When launching, always get the plane out of the water as soon as possible to keep it from absorbing any more water than necessary.

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You may obtain an information packet on the Osprey "1" by sending $3.00 to Osprey Aircraft, 3741 El Ricon, Sacramento, California 95825. The packet contains photos, three views, and statistics about the plane. You might end up wanting to construct a full-sized Osprey.

SKYPHONIC

(Conitnued from page 56)

ribs 3 and 10 to their respective notches on the leading edge and glue. This raises the leading edge but allows ti to rest flat, assuring a true wing.

Begin gluing the remaining ribs with the exception of 1, 4a and 5a. Now cut taper in wing spar and carefully slide the spar through the ribs and glue in place. When dry, turn wing plan upside down and build the right wing panel in a similar manner. Make sure the leading edge, spar and trailing edge lengths are correct where the two panels join, and taper their edges so the required dihedral can be made.

Dihedral is made by laying one panel over four 1/4 sq. in. strips of balsa placed next to ribs 2 and 11 under the leading and trailing edges. Pin down panel so it stays in place 1/4 in. above the building board. Now raise the bottom of the other wing panel tip 4¼" above the board using a book and 6-in. length of 1/4 sq. balsa strip on top of the book to ensure the leading and trailing edges are raised equally. Glue the leading and trailing edges together and pin to hold in place. I recommend a five-minute epoxy here as it will greatly speed building time.

Next, glue straight leading edge piece in place, let dry, cut off pointed tip and sand leading edge round. Now glue ribs

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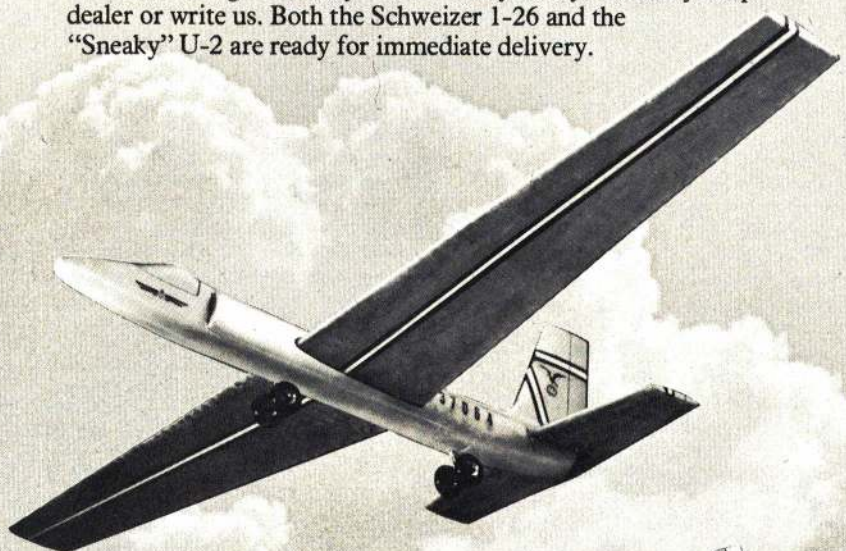

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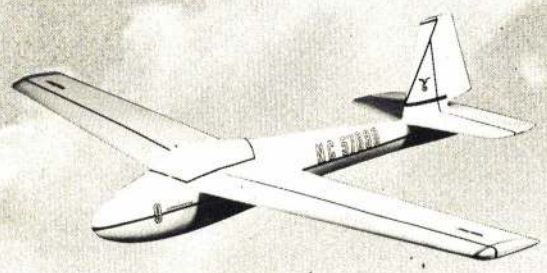

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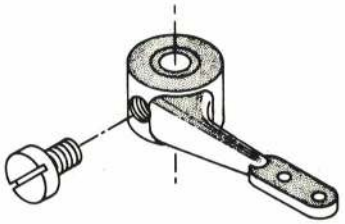

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1, 4a and 5a in place. Sheet top and bottom center section with 1/16 med. balsa with the grain running perpendicular to the ribs. Sand sheeting smooth and apply 3/4 in. reinforcing tape along leading and trailing edges that come in contact with the fuselage, and along the top and bottom center section of wing.

Landing Gear Brace: Cut brace from 1/8 in. plywood. Bend landing gear strut from 3/32 dia. music wire. Cut wire with metal cutting blade for the coping saw. Drill holes in brace as shown on plan and with picture wire mount strut to brace. Install j-bolt and apply epoxy liberally around strut in contact with brace to insure the strut is held rigidly in place. After both braces are made, epoxy them to wing.

Fuselage: Cut out formers as shown on plan and fuselage sides and doublers. Glue doublers to fuselage sides—be sure to make one right and one left fuselage side. Mount nose gear to firewall in same manner that wing landing gear strut was mounted. Glue the firewall and F-2 in place to one of the fuselage sides. To do this, turn the fuselage side upside down over top view of plan and line up firewall and F-2 with side.

A word of caution: The formers are not perpendicular to the fuselage but are at an angle with the sides as shown in top view. I would recommend five-minute epoxy here. Be sure to be as accurate as possible.

Next, glue former F3 in place. Now take the other fuselage side and glue it to the firewall and F-2, and let dry. After firewall and F-2 are in place, glue F-3 to other fuselage side. Glue fuselage tail ends together and let dry. Now install formers F-4 to F-7. Add top and bottom sheeting, being sure that grain runs perpendicular to fuselage sides from F-3 to firewall and parallel to the sides from F-3 to F-7. Between F-2 and F-3, the fuselage sides will tend to bulge out slightly, but this is normal. When adding top sheeting, press the sides together to eliminate the bulge; hold until the glue is dry. Again five-minute epoxy would be most helpful here. Finally drill dowel holes and place 1/8 in. dowels in position.

Stabilizer: Lay plan on building board and lay a sheet of waxed paper over it. Pin the trailing edges in place and join them with 1/8 x 1/4 joiner (as shown on plan). Now sand 1/4 sq. leading edge to shape.

Glue ribs S-2 and S-5 to trailing edge and to keep the ribs in position stick a pin through the rib tabs to the board. Pin the left leading edge in place, glue and let dry. Add the right leading edge glue and let dry; then add 1/8 in. leading edge joiner. Glue the remaining ribs in place. Be sure ribs S-1 are in place exactly 1/16 in. apart as this is where the tail is mounted. Slide the 1/4 x 1/8 spar carefully in place and glue.

Now remove the stabilizer from the building board and cut off tabs from ribs S-2 and S-5, then add top and bottom 1/16 balsa center sheeting. When dry, cut center slot for tail on top of stabilizer only. If you are going to fly two or three channel with elevator control, cut trailing edge on dotted line and hinge as shown on the plan. A word of caution: Do not join the elevators together at the center as they must work independently of each other, being driven by a separate pushrod as shown on the plan. Also be sure the control horns are mounted in the same position on the right and left elevators to ensure that their up and down throw is equal.

Cut out the tail and rudder from 1/16 med. balsa and hinge the rudder to tail as shown on the plans.

Painting: Doping of the framework is done by using full-strength clear dope. Give fuselage, wing, stabilizer and tail

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two coats, sanding between coats with extra-fine sandpaper or No. 400 wet or dry sandpaper. This will seal the pores completely; more coats will only add unnecessary weight.

Now paper the wing and stabilizer. The best method is to cut the Silkspan to size and when papering bottom of wing be sure to cut a small hole where the wing landing gear strut is located. Wet the paper and cover the bottom of the wing panel first, then lay out over the wing eliminating all the wrinkles. Now thin some of the dope down adding 50% thinner to 50% dope. Brush dope on liberally over the Silkspan along the leading and trailing edges, wing tip and center sheeting. Using your finger, rub the dope in to ensure that the Silkspan will adhere to the framework. Trim off paper around the edges with a sharp razor blade. Now paper the top of the wing in a similar manner.

Cover the stabilizer in the same way, but use one piece of Silkspan to cover the top and bottom panels. When the Silkspan is dry, dope it using full-strength dope; give two coats, sanding lightly between coats with No. 400-500 wet or dry sandpaper. Using the thinned-down dope, apply three coats and sand lightly between coats. The fuselage and tail may be covered with Silkspan to cover the wood grain. The paper is applied wet and doped on in the same manner as it is applied to the wing.

Color Doping: I spray my planes with colored dope using the convenient spray cans available in many colors. The Skyphonic is white; one coat is sufficient when spraying. If you wish to brush on the dope, thin down and apply four coats. You shouldn't need more than one 4 oz. bottle or a 16 oz. can of spray colored dope and a can of 8 oz. clear to cover the plane. I use Aero Gloss dope and it is excellent, but I found that if you use their spray dope you must let it dry for at least one week before applying trim or the dope will wrinkle or curdle.

Trim: Color of the leading edges and pin striping on fuselage is Bonanza Blue. The second trim color is Stearman Red. Lay masking tape down and seal the edge of the tape with clear dope to avoid the color dope from seeping underneath the edge, then paint on desired trim color.

One note concerning the canopy. It is to be glued to the hatch cover only. The back of the canopy is to slip underneath a piece of scrap acetate which is glued to the fuselage.

Flying

If flying single-channel, the stabilizer must be raised 1/16 in. under the trailing edge (this gives up elevator). This must be done as the glide will be too fast. The stabilizer as shown on the plans is for the two-channel flyer using elevator control. Depending on the weight of the model slightly more shim under the elevator might be needed. Don't raise up more than 1/8 in. as stalling flight will result. The rudder must be offset to the right by 1/16 in. (looking down on the tail) to overcome left engine torque.

Check the center of gravity by placing the finger just past rib 6 as shown on the plans. The rearward center of gravity position isn't critical, but the plane will not fly satisfactorily forward of the CG position shown. I recommend the Cox Golden Bee or Babe Bee or, if flying three channels, a Cox 09. Do not use the Cox blue can fuel as it is *not* strong enough for the engine to develop the power it needs. Use either Cox racing fuel (silver trophy on can) or Fox Missle Mist. I have seen many beginners lack success due to their engine's not running at its peak. Take my advice and use these fuels. Also do not use an old engine that runs in and out of peak, as this will mean disaster. A model going too slow is much more difficult to control than one going slightly fast.

Make sure you fly on a calm day. With engine running and radio checked out, hold model shoulder height just behind the wing trailing edge, run into the wind and, when you feel the model lifting, release, and the model will immediately start a moderate climb. It will probably turn slightly to the left, so give a small amount of right trim. The model will fly straight as an arrow once you find the correct trim position. Once in flight, you can do simple stunts. When doing loops and spiral diving, elevator control might be needed if the model is on the heavy side. Other stunts are pos-

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sible depending on pilot skill. Recovery from a stunt is always quick and positive with no tendency to fall off. The model with an 09 is a sparkling performer for the more advanced modeler.

When the engine stops, if flying with elevator control, give a little bit of up and the plane will slow down to a nice gentle glide. A 40-second glide is usually the case from 400 ft. up, even in still air. If flying single-channel, the extra up you made by shimming the stabilizer should give you a similar glide. If the glide is fast, even though the powered flight is alright, shim up the stabilizer more (up to 1/8 in maximum).

I would like to hear any comments on the design you might have. Would you like to see the plane kitted and in what category? Also, if your letter has questions on the Skyphonic I guarantee you an answer. Write your questions or comments to: Michael Saponara, 31-21 29th St., Long Island City, New York 11106.

And remember that good building, and a good RC installation with a good engine, means good flying.

MODES IN APPEARANCE

(Continued from page 60)

car, but is handled with kid gloves. So, tissue-covered wings are protected with a parental instinct.

Preston Wilson had a few methods which may seem unique: As the filling and sanding operation progresses, he sprays on a silver coat for a visual color effect. Anyone who ever worked with silver knows that when applied, all the blemishes show up, so it is logical to follow this procedure. Preston also combines methods, using a free flight application. He adds 480 drops of tcp plasticizer per quart to everything. The results are fantastic: When he pushes on the wing covering, it is like rubber, giving almost a half-inch under his touch. He uses medium silk span on the wing and nose and lightweight elsewhere, spraying everything from start to finish.

Phil Granderson uses no tissue at all. He is not concerned with weight, for his planes are highly powered. His metallic purple-and-black giant cuts a pretty good corner, but according to him, it is not his best plane. Somehow he ran out of room in the house and a few of his planes were being stored under the car. . .and guess what? Well, at least that's the way he tells it!

Phil's method consists of Hobbypoxy on the bare wood of the well-sanded fuselage, then acrylic lacquer, all sprayed. This leaves very little sanding with the smoothing flow of materials and does a beautiful job.

Robert Whitely feels as I do about the commercial dopes—they present problems. Many modelers are plagued with yellowing, blushing and lifting bubbles. Bob uses butyrate, available in all colors. He cuts it about five times, plasticizes it, and sprays all the way. Another sour note on the commercial

MEUSER ON FF SPORT

(Continued from page 28)

Spotters' Manual Cont.: Also newly introduced is the Orbiteer for 049-051 engines, by Competition Models (P.O. Box 8012, Long Beach, Calif. 90808). Designed by former National Champion and U.S. Nordic Team member Dennis Bronco, and Sal Taibi, the Orbiteer can be built with a 370 sq. in. wing for Category I competition, or a 300 sq. in. wing for Cat. II. Tool-and-diemaker Taibi grades the wood himself, and lumbers it to micrometer tolerances.

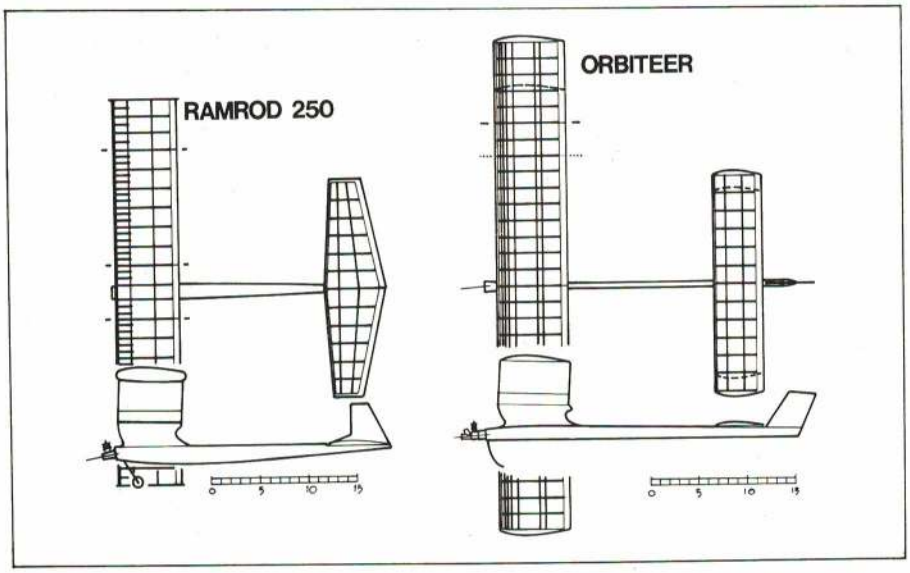
Originally intended for the pre-Cox TD engines, Ron St. Jean's Ramrod 250 continues to be produced by Sig and sold in large numbers. When the Cox TD was introduced, wing areas went up to around 350 sq. in., but now the smaller models are finding a new life in Category II competition.

Asymmetric Model Airplane Contest: First we must explain that it is a contest for asymmetric model airplanes; the contest itself is as symmetric as any other. You have undoubtedly seen the airplane with the wing installed slaunchwise, proposed by Robert T. Jones of NASA, in the newspapers. Some of our models already look like that, but he proposes doing it on purpose. The American Institute of Aeronautics and Astronautics is sponsoring a contest for asymmetric hand-launch gliders. Scoring is 40% for design, 30% for distance, 30% for flight duration, and a factor for degree of asymmetry. Judges are Hank Cole, Ralph Carmichael, George Xenakis, and Robert T. Jones himself. Jones, whose talents include the manufacture of catadioptric astronomical telescopes, proposed the angled wing way back in the forties, at the same time he called attention to the virtues of extreme sweepback for high speed aircraft, but at that time the asymmetric wing was not considered practical. I have a little news for Robert T. . . .

Fifth Annual BMA Contest: The Boeing Management Assoc. will hold its Scholarship Contest for youngsters 18 and under near Seattle on July 7 and 8. Emphasis is on Outdoor Free Flight and Control Line, but events for Indoor, RC and Rocket are also provided. BMA, P.O. Box 3707, Seattle, Wash. 98124, Attention Ted Johnson, Org. 4-1830, Mail Stop 79-44.

National Free Flight Society: It is time for the annual "NFFS lives!" announcement. FAI Powerhouse Doug Galbreath is the Membership and Subscriptions Manager in addition to being the printer, and he is the person to contact for information about the NFFS (707 Second St., Davis, Calif. 95616). There has been a little problem with membership applications and renewals, but ol' Doug has it pretty well together again. Nevertheless, there are bound to be a few slip-ups, so if you have a problem, write to Doug.

Bob Meuser is the Editor of *Free Flight*, the NFFS Digest, and with the help of a staff of Contributing Editors is now publishing it monthly. Some of the Director positions have changed hands recently. Hardy Brodersen continues as Executive Director and Number One Galley Slave Whipper. Various NFFS committees are working with the Academy of Model Aeronautics on domestic and international free-flight competition activities. Any outfit whose goal is to "preserve, enhance, and promote the sport and hobby of Free-Flight Model Aviation in all its forms" can't be all bad.



dopes: Mix batches are not always consistent.

Bob uses epoxolite fillets, as did almost everyone I spoke with. Only practice improves application, but Bob's method simplifies it somewhat. Tape off the wing and fuse where the fillet fairs in and spread it on, shaping with the fingers. Here you can wet the work using acetone, alcohol or plain water. After shaping to your satisfaction, remove the tape and feather into the wing and fuse. All of this should be done before the material hardens. Very little, if any, sanding is required.

Bob has a method of sanding which works over regular ribs or rib caps, shaping them evenly after the plane is built. He makes a long sanding block which extends from the fuselage to the wing tip. The bottom edge of the block has a slight curve fore and aft, with the sandpaper formed around and stapled to the sides of the block. The sanding is done with a fore-and-aft motion, hitting the tops of all the ribs at once.

Bob uses tissue on the wing only. I asked if he ever had trouble with longitudinal cracking over the wood parts, due to the motion of expanding and contracting wood. He stated that he never did, but then added, "My planes don't last long enough to find out."

Les McDonald showed up this year with a work of art: a beautiful beige ship. The color was so different, it screamed for attention. A new ship, it was white a few weeks before the Nats, but yellowing. Les had to finish it, for he pranged the ship he had been flying. Les uses Gierkes method all the way, cutting his filler coats to 30%. Blushing rubs out when compounding.

A helpful hint from Les: When applying tissue over wood, do not use dope. Paint on the tissue with thinner. This loosens the undercoats and the tissue goes on with ease. I have tried this and it is very satisfactory.

Les was the only one to admit the use of a felt block for sanding. They are a little expensive, but work wonders in getting that smooth appearance, and will form to gradual curves.

Neal Thompson is a young modeler, but his excellence shows through. His plane was metallic salmon in color, and beautiful. He builds as I do, applying filler coat and sanding as he builds. He covers his planes with silk, adding color and lines after a buildup of four or five coats. Thinning towards the end, he sprays everything. The final touch is 12 coats of clear, then compound.

James Lynch is a real contender in the Stunt circle. After months of practice and traveling 2000 miles, he forgot to do a square loop! He was still in the running—a fine flier.

Jim brought a semi-scale FW-190 (Jack Sheeks design), which was superbly done. It performed as well as it looked. He dislikes the matte-type finish for a semi-scale ship. It doesn't rack up the points as other finishes do. He feels something should be done about this: It works in Scale, so it should in Stunt.

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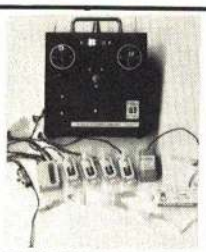

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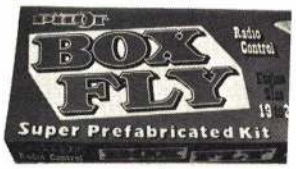

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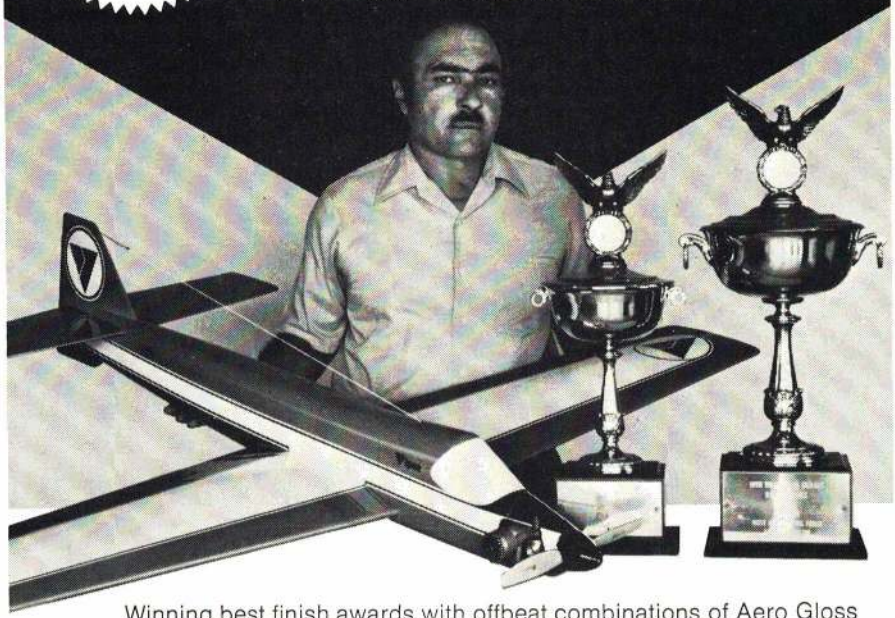

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For this reason, the rules for judging appearance points are being revamped.

There are a few important points I would like to make, and they apply to all forms of modeling. Everything you do must be done to the best of your ability if you are ever to be an excellent builder.

In working with new ideas, methods or applications, do not experiment with ships being built for contests. In many cases three or four attempts must be made before the finished product is done to your satisfaction. The first time you work with polyester resin and glass cloth (for reinforcement), you will undoubtedly have a horrendous mess. It ends up thick and lumpy, and takes hours of work to smooth off, fill and sand. The high spots can be scraped off with a razor blade.

This part of modeling takes time and experimentation. Eventually you will know the products and their peculiarities before applying them to that ship you are building for the coming season. The same applies to whatever material you use for fillets and everyone has their own favorite—wood, putty, plastic, epoxy. You must be familiar with them to do a good job. At times it seems that the good finishes are to be had only with spray equipment. However, I have had winning planes in "appearance and workmanship" contests with all-brush work. Either way, it takes hours of experimentation before trying on a contest ship.

These factors are as important to a good finish as correct building procedures. Everything done in the beginning shows through in the final touch. Also, the painting, sanding, compounding and polish put to a plane is not the only finish a plane shows. Accessories such as controls, leadouts, landing gear assemblies and engine installation contribute to appearance. I have seen beautiful RC planes with poor antenna installations detracting from the overall appearance of the ship. Everything, seen and unseen, must be taken into consideration.

Whatever you are starting to build *now*, make a point to do your best. Show your ability to everyone with this project and each one from now on. The planes we build for sport and fun are the ones we practice on to learn how to build contest winners. Experience is the keynote.

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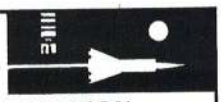

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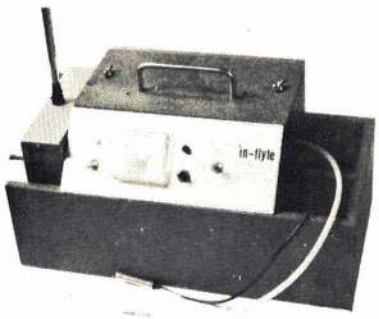

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BAVARIAN WOODS

(Continued from page 43)

A production D.VIII abandoned by the Germans. Reportedly "pleasant to fly," double-bay construction gave greater rigidity.

lages, the Roland design (showing Albatros lineage) featured a smoothly rounded contour. This contract would initiate the classic shape and construction technique that, in the future, would identify the Pfalz. The first Roland D.I (Pfalz) passed its proving flights in January 1917, and a small production run gave Pfalz engineers lead time to develop an original design.

By June 1917, after extensive testing at Germany's Adlershof flight test center, the Pfalz D.III became the company's first real production aircraft. With an oval, tapering monocoque fuselage giving it a sleek torpedo-like exterior, the Pfalz D.III was constructed in two halves over molds (like the early Deperdussins). Plywood bands, 9 cm wide, were laid in opposite directions over a minimum frame. After the two halves were mated, the whole structure was covered in a thin fabric and doped.[5] It was a technique they'd improve on as time went by.

Universally, these early day monocoque constructions, although stronger, were heavier than conventional aircraft. But, never having been a strong ore-producing country in the first place, Bavaria hadn't developed a large cadre of metal workers. Since both the men and materials required for conventional aircraft construction had to be "imported," when inevitable war time shortages combined with an unimpressive priority in the distribution of German goods, the Pfalz company made use of locally available lumber and developed home-grown talent.

Since Pfalz was responsible only to the Bavarian government, rather than the German Directorate of Aircraft Production, this gave them greater freedom to operate—which, in turn, was followed by an inherent parochialism. Nevertheless, in the four years of the company's existence, it became a full-fledged partner in the Empire's aviation industry.

As the war grew hotter, pilots on either side battled to counter increasingly sophisticated aerobatics above the war zones, while engineers at home strained to produce new possibilities in engine and aircraft design. Over the next year, with the exception of a quick pass

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at a triplane and a momentary flirtation with a Rumpler C.IV, Pfalz concentrated on improving its D.III and D.IIIa biplane and getting into full-scale production.

By November 1917 the company had a design staff of 15 engineers under Chief Engineer Rudolph Geringer and 11 new fighters were in various stages between drawing board and maiden flight.[6] In the factory, the workers were busily expanding their expertise in monocoque construction.

When the January 1918 Fighter Biplane Competitions were announced, Pfalz selected three biplane variants to send to the Adlershof trials: the popular Mercedes-powered D.IIIa, a graceful D.VI (110-hp Oberursel) and an even-structurally stronger Siemens-Halske powered D.VII. However, losing out to Fokker in these competitions, Pfalz then prepared to meet the May/June trials head-on.

Entering their D.VIII (in three different engine versions) and a D.XII (two different engines), the company received a small production order. By August 1918, both the D.VIII (160-hp Siemens-Halske) and the D.XII (160-hp Mercedes) were in front-line service. And by now, the Pfalz company had 2,600 employees and was producing close to 200 aircraft a month.

Working up to the last minute, the final Pfalz single-seat biplane variant (a D.XV) was tested on 4 November 1918. But, with the Allied armies closing in, the handwriting was on the wall. Orders soon went out from the German High Command to destroy all military and industrial records to keep them from falling into Allied hands. (In 1945 this same order went out again. Fortunately for historians, in both instances, a little luck and a little fudging kept this from being carried out to the extreme.)

Since the city of Speyer fell under French occupation (where it remained until 1930), the 5½-year-old Phalz Fleugzeug-Werke produced its last airplane at the peak of its career. With the signing of the Armistice and demobilization, Phalz airplanes were among the 15,000 aircraft and 27,000 engines to hit the post-war bonfire. Only a few known Pfalz D.XIIs are in museum care today.

Paul Harvey News

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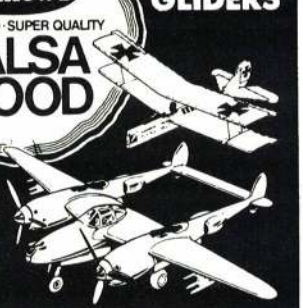

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NOTES

1. Pronounced: Pfalts, Fahlz, fall-ts (or, as a last resort) faults.
2. Pfalz Flugzeug-Werke Gesellschaft mit beschrankter Haftung roughly translates to Pfalz Aircraft, Limited.
3. Peter Gray & Owen Thetford, *German Aircraft of the First World War* (New York: Doubleday & Company, Inc., 1970), page ix.
4. Peter M. Grosz and Egon Kruger, *PFALZ—The First Detailed Story of the Company and its Famous Planes* (West Roxbury, Mass.: World War I Aero Publishers, Inc., 1964) page 3.
5. Henry Woodhouse, *Textbook of Applied Aeronautic Engineering* (London: T. Werner Laurie, Ltd., ca 1919), page 211.
6. Peter M. Grosz, *The Pfalz D.XII* (England: Profile Publications, Ltd., Number 199), page 3.

Note to the Potential Builder: All the above contain a good supply of black and white photos for construction data, notes on the flying qualities of the aircraft, etc. See also *Jane's 1919* for construction drawings and the Kenneth Munson books for color information.

GLOSSARY

(Continued from page 82)

Lift—Horizontal sections through the hull which give the shape of the water lines.
Lines—A general term for light ropes and for any running rigging.
Load Water Line—The plane of floatation of the hull at its designed displacement.
Luff—The forward edge of a fore and aft sail. Also the shaking of a sail when a boat points too high for her trim (much like stalling as in an airplane wing).
Mainmast—The principal mast of a vessel.
Mainboom—Boom at the foot of the mainsail.
Mainsail—The triangular, fore and aft sail set on the aft side of a mainmast.
Mast—A vertical spar supporting sails and rigging.
Mast Step—A slotted "T" fitting permitting fore and aft positioning of the mast.
Off The Wind—Sailing on any course except to windward.
On The Wind—Close hauled.
Outboard—Beyond the boat's side or hull.
Outhaul—A line used to secure the clew of a sail.
Pay Off, Pay Out—A boat pays off when her bow turns away from the wind. Pay out is to slacken.
Pennant—A small narrow flag.
Pinch—To sail a boat so close to the wind that her sails shake or her progress slows.
Point, Pointing—To head high, close to the wind.
Port—The left side of a boat when facing forward.
Port Tack—When the wind blows over the port side.
Profile or Sheer Plan—A view of the hull broadside on.
Quarter—The part of the boats side aft of abeam and forward of the stem.
Rabbet—A notch in the backbone into which the plank is fitted.
Rake—The inclination of a mast from the vertical.
Reach, Reaching—All sailing courses between close hauled and running. Close reach, sailing nearly close hauled sheets just eased. Beam reaching, sailing with the wind abeam. Broad reach, sailing with

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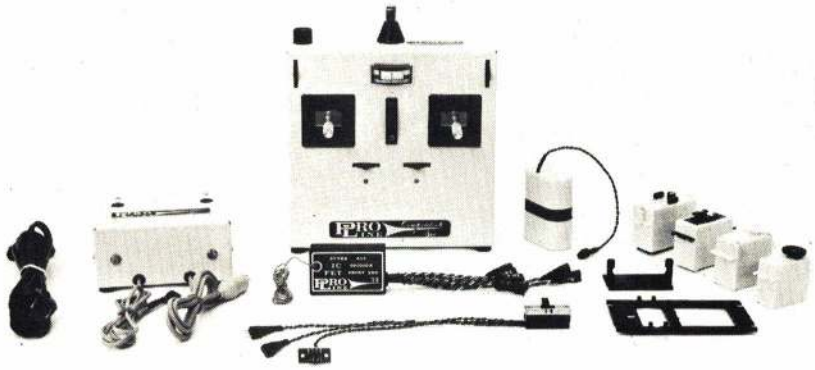

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Rib—See Frame.

Rig—The distinctive shape, number and arrangement of sails and masts.

Rigging—The wires and ropes of a boat. Running rigging sets or trims sails. Standard rigging is permanently secured rigging.

Roach—The outward curve of the leach of a sail.

Running—To sail almost directly before the wind.

Secure—To make fast.

Sheave—The wheel in a block.

Sheer—The curve of the deck between bow and stem (sheer line).

Sheet—Rope controlling the trim of a sail.

Shrouds—Wires or ropes supporting mast. (Usually on each side of mast.)

Skeg—An extension or protrusion of the keel aft, usually to aid steering.

Spar—General term for masts and booms to support sails and rigging.

Spinnaker—A light, balloon or parachute shaped sail used when running and reaching. It is held out from the mast by a spinnaker pole or boom.

Starboard—The right side of a boat when facing forward.

Starboard Tack—When the wind blows over the starboard side.

Stays—Ropes or wires supporting masts.

Stayplate—Deck fitting to which stays are secured.

Stem—The foremost timber at the bow of a boat.

Stealer plank—A short plank used to fill in a gap due to errors in spacing strakes.

Spiling—A method used to determine the shape of planks.

Stern—The aft end of a boat.

Strake—Any plank on the side or bottom of a hull.

Stuffing Box—A tube (watertight) through which the rudder post is passed (also for propellers).

Tack—The forward lower corner of a fore and aft or triangular sail.

Tacking—Sailing to windward in zigzags.

Tang—A wire or rope used to steady a spar or boom.

Telltale—See Fly.

Tiller—A bar or rod fitted to the top of the rudder or rudder post used to steer boats.

Transom—The stern of a vessel. (Inner transom is the stern frame and the outer transom is the solid stern end of a vessel.)

Traveller—Metal rod on which sheet blocks slide athwartships for trimming purpose.

Trim—To set sails correctly in relation to the wind. The fore and aft balance of a boat.

Tumblehome—The inward curve of the upper sides of a hull.

Tuning—The adjustment of a boat's rigging, sails and hull to the proper balance to obtain optimum sailing performance.

Turnbuckle—A threaded link which pulls two eyes together for setting up standard rigging.

Wake—Foamy disturbed water astern of a moving boat.

Water Line—A longitudinal line, parallel, in profile, to the load water line which shows the shape of the hull in the half-breadth plan.

Windward—Toward the wind, hence the weather side of a boat and to windward. Windward (weather) helm is one which tends to turn the boat's bow toward the wind.

Yacht—Any pleasure craft.

Yaw—The side to side swinging of a boat.

CORDLESS MOTORS

(Continued from page 26)

The 7¼-in. dia., 5-in. pitch prop is driven through plastic gears having a ratio of 5.33. The motor, gears, battery, and flight-program-cam drive are integrated into an ingeniously contrived plastic housing that would make a Chinese block-puzzle designer writhe in envy. The complete power unit is available from Mattel for $7.50 as a replacement part. The charging cord and prop are not included, however, so at $10 to $15 for the complete aircraft, the Super Star is the biggest bargain in town.

Now there is a new Super Star in the sky, with 15% more power, a general beefing up of the weaker spots, a very slight increase in cost, and identified by its yellowish carton. About ½% of the earlier propshafts failed prematurely, so Mattel adopted an alloy steel shaft heat treated for maximum toughness. Perhaps that is the sort of attention to detail that helped make Mattel the country's leading toy manufacturer.

The most distinguishable features of the new Super Star are a man that parachutes to earth and streamers that unfurl in towed-sign fashion, actuated by the already somewhat ludicrous flight programmer. Personally, I'll take plain vanilla—a model that takes off the ground, circles realistically, and glides in for a fair landing is enough to expect of a toy airplane. Clearly, unfurling streamers and parachuting dolls befit only mere toys and are scarcely worthy of notice by "serious" model hobbyists. Still, if the same system were used to retract the landing gear, then lower it, along with the flaps. . . .

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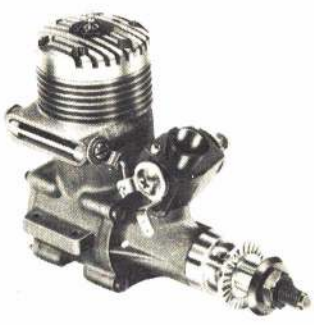

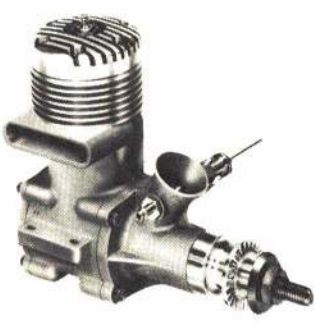

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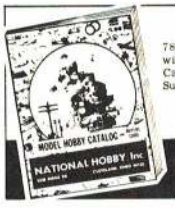

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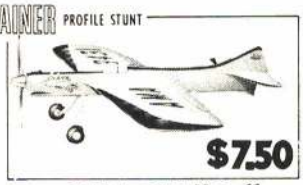

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There is no need to chuck your old Super Star power plants or to delay buying one if the new model is not available. The increased power is obtained by loading the motor more heavily by virtue of a lower numerical gear ratio. The battery is the same, so the flight duration is decreased slightly. The same result could be obtained by loading the motor with a prop of higher pitch, greater diameter, or greater blade area. To a rubber-power nut this must seem backwards—more power and less motor run with a *larger* prop—but that is the way it works.

The next step is a big one, as there are no power plants between the $7.50 Super Star unit and ones costing six times that amount.

The Alpha Power Unit: The heart of the Alpha is a specially rewound and reworked 26D-size can-type slot-car motor, fitted with two ball bearings. The output countershaft turns in sintered bronze bearings and is coupled to the motor by a steel pinion driving a nylon gear, with a ratio of 5.78. The stock 10x6 wooden prop is cemented directly to the output gear. The assembly consisting of the prop, shaft, and gear sells for $3.50 and is easily replaced. The battery consists of five 500mAh AA-size cells made by General Electric. The motor is provided with a shock-absorbing Lexan tab for mounting it to the fuselage. The complete motor-battery system, selling for $45.50, includes a cord for overnight charging from a car battery. A fast-charging cord, which includes a high-wattage current-limiting resistor, is available at extra cost.

Two accessories are of interest to the purchasers of either the Alpha or other electric propulsion system of comparable power. The Solid State Timer ($14.95), weighing an ounce, turns off the motor after a period that is adjustable from 30 sec. to four min. The one-oz. Mocontrol ($12.95) which may be used with any RC system, provides in-flight on-off control of the motor without requiring an additional RC channel. A small permanent magnet is mounted to any moving part of the rudder control system. The Mocontrol sensor is mounted in the aircraft close to the magnet. A quick blip of full left rudder turns the motor off; a right blip restores full power.

The Signal Command: On the next rung of the cost-power ladder, the Signal Command power unit looks like a Super Star that has been popping Big Pills. The housing and gearing configurations bear a family resemblance. The battery, a cylindrical cluster of six G.E. 250mAh ½AA-size cells, slips over the propshaft housing. Two 1/3-AA cells to drive the radio, and the galloping ghost actuator, are built into the power unit housing. The 9 x 7 prop, driven through a 5-to-1 gear reduction from the 1/50-hp motor, adequately powers the four-ft. 25-oz. Signal Command aircraft.

The motor has a three-slot armature, carbon brushes, and is similar in design to that in the Super Star. A three-position switch lever projects from the bottom. The back position is off. The

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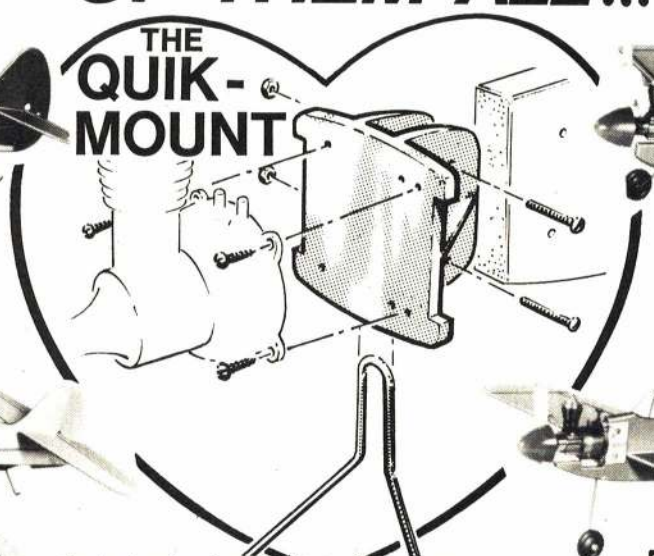

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middle position fires up the radio gear and allows the motor to run once it is started. The forward position starts the motor, and after the lever is released it flips back to the run position. The prop thrust pulls the propshaft forward actuating a switch and keeping the motor running. Should the prop tangle with the weeds or the model nose over, the propshaft slides back and turns the motor off, preventing a burnout. Should that fail, an easily replaced automotive type fuse blows. The thrust-actuated switch serves another function: When the battery starts running out of beans, the circuit is broken, preventing the battery from discharging completely, which could cause reverse charging of the weakest cell.

The Signal Command is no longer in production. Mattel's policy is to carry spare parts in stock for a number of years beyond production, so the power unit will continue to be available as a spare part.

The EMF-040: The most recent propulsion system on the scene, and an exceptionally complete one, is the Electro-Motive Flight system by United Recording Electronic Industries. The Power Module is a streamlined pod containing the motor, reduction gearing, charging cord receptacle, switch, a low-voltage cut-off device to prevent charge reversal, a free-wheeling device, and a radio interference supression system. An optional sold-state timer, weighing 0.65 oz., and adjustable for motor run times of from one to five min. may also be installed within the pod. The rear portion of the pod may be removed to facilitate fuselage mounting.

The Field Charging Unit is provided for charging the ni-cad batteries from a 12V car or cycle battery. This is not simply a line cord and current-limiting resistor. It includes a battery-temperature sensor and a control circuit that decreases the charging current as the fully-charged condition is approached, a solid-state timer to permit unattended operation, and a meter to indicate any anomalies in the system.

Two alternative battery packs are offered. The smaller one weighs 3.6 oz., contains six 250mAh ½AA-size ni-cads, and drives the motor to 1/40 hp for a motor run of three to five min. The larger pack weighs 5.3 oz., contains seven 450mAh AA-size ni-cads, and drives the motor to 1/25 hp for a motor run of 3½ to 5½ min. Motor run is roughly 1/2 to 2/3 of the charging time.

Props of 7, 8, and 9-in. dia. are offered. They are high-pitch, wide-blade, square-tip props about midway between typical gas engine and rubber-driven designs. As if this were not enough, an optional pulse-width-modulated throttle control is available. A kit for an RC trainer, the Electric I, is offered. Designed by Freddie Reese and Don Dombrowski, it spans 52 in. and weighs 17 to 22 oz., depending on the battery pack and radio system used. The motor is similar to a slot-car motor in configuration, but it is designed to produce high power at relatively low rpm. The motor efficiency (56%) and power-to-weight ratio (1/4.4 hp/lb.) are excep-

Slope Soaring Giant

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tionally high for such a small unit, especially when one considers that the weight is that of the entire power pod, not merely the bare motor.

The specifications quoted above are based on tests of pre-production prototypes performed by the manufacturer. At this writing the system is not yet in production and prices have not been established.

The Graupner Hi-Fly: Johannes Graupner of Germany, one of the oldest names in commercial electric propulsion, has recently introduced a new electric propulsion system as an alternate power plant for its Hi-Fly aircraft. The Hi-Fly is basically a high-performance RC glider, spanning 90 in. and weighing two lb.

Two propulsion systems are offered: An over-the-wing pod housing a Cox Golden Bee or a Cox TD 051, and the Electroprop system. The Electroprop system consists of two motors, one on the trailing edge of each wing, driving 14-in. folding pusher props. The 12-volt motors are driven in parallel by two 6-volt Varta ni-cad batteries in series. The total weight of the propulsion system is two lb., doubling the flying weight of the aircraft. The power output of each motor, inferred from the published data on the aircraft performance, is about 1/45 hp, giving the aircraft an average rate of climb of 180 ft./min. for the first three min. of the ten-min. power run.

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Militky to the earlier Silencer and Silentius aircraft: A high gear ratio to permit the use of a large, high-pitch, rubber-power type prop capable of very high efficiency at low aircraft speeds. The motors are not the Micro-Mo motors employed in the earlier aircraft, but are much more powerful ones of conventional design, employing five-slot armatures and internal brushes. Motors, motor mounts, props, batteries and various accessories are available separately or as a complete package. An ungeared version of the motor is also offered, primarily for model boats. The geared motors would be unsuitable for any aircraft that is not quite similar to the Hi-Fly. As they require 12 volts, two battery packs would be required even for one motor. The power-to-weight ratio would then be too low for anything but a super-efficient, super-light aircraft, but the motor run would be extneded to 20 min. The high gear ratio requires that a large prop be used—too large for conveniently mounting the motor to the nose of the fuselage, and also too large for a pylon mount. For the intended application, however, the system seems well suited.

The Electroprop system is expected to be available in the U.S. in September or October, and will be sold through normal hobby supply channels. U.S. prices have not been announced.

The Astro 10 and Astro 25: The Astro 10 and 25 motors are specially modified high-quality industrial motors. End bells are ventilated to provide air cooling. The prop is bolted directly to an extension of the armature shaft. The brushes are cantilever-arm mounted. The five- and seven-slot armatures turn on precision ball bearings at the front and sintered bearings at the rear. The Astro 10 battery contains 12 550mAh ½-sub-C cells. Two 10-volt batteries connected in series drive the Astro 25, and two sizes are available: 550mAh, eight ½-sub-C cells; 1200mAh, eight sub-C cells. Batteries are enclosed in a light plastic container. The Astro 10 battery is charged from three 6-volt motorcycle batteries in series. Astro 25 batteries are charged in parallel from a 12-volt battery.

A prototype of the Astro 25—25% larger than the production model, and driven by a one-shot Eagle-Pincher silver-zinc battery—was used by Roland Boucher in the Fournier RF-4 that he flew for 30 min. at an average speed of 40 mph. With stock ni-cad batteries flights up to eight min. are obtained. Recently the Boucher brothers and their associates have been flying their Electro-Sport-10 aircraft with the Astro 10 motor. This is a simple sheet-covered model with an all-up weight of 38 oz. and controlled by a Kraft two-channel "brick." Span is 42 in., but spans from 36 to 44 in. have been tried. They now have a "throttle" control that gives a realistic 600 rpm idle. Aircraft companies have used the Astro motors to power RC models of various sorts, including a model of an STOL aircraft, some being multi-engine applications.

The Kroker Systems: The Kroker motors—Sea Ram, Sea Wasp, etc.—are

generally regarded as the world's best model boat motors. Most world records have been set with Kroker-powered boats, and at the last European Championships, the winning English team used Sea Wasp 12 motors. The requirements for aircraft propulsion are essentially the same as those for boat propulsion: high power/weight ratio, high efficiency, high reliability, and long life. While the 3/8 hp Sea Ram is a bit large for aircraft, the 1/10 hp Sea Pup was specifically designed with aircraft propulsion in mind.

The 12-slot armature, which is more expensive to manufacture than one with fewer slots (or poles, if you prefer), turns on two sealed precision ball bearings supported in rigid aluminum end castings. The shunted, cartridge-mounted silver-impregnated brushes turn against a 12-bar silver-copper alloy commutator (24-bar on the Sea Wasp 12.) The result is a military quality commutator that can pass a 30,000 rpm spin test at 500°F and still satisfy a run-out specification of 0.0005 in. Aircraft prop adapters are available, as are batteries containing imported SAFT ni-cad cells. Brush timing can easily be set by the user for either clockwise or counter-clockwise rotation. The Kroker motors are obviously designed for long trouble-free operation, in addition to their high power-to-weight ratio and high efficiency.

Batteries: For most model aircraft propulsion applications, the only batteries worth considering contain nickel-cadmium cells of the sealed cylindrical type (not the button type) having sintered plate construction. Most of these are equipped with a safety valve to prevent the cell from exploding due to the generation of excess gas. While such cells have a safety valve or "vent," they are not termed "vented" batteries; that term is reserved for the ni-cad batteries that are built like car batteries with liquid electrolyte sloshing around.

Cylindrical ni-cads are made by a number of manufacturers: Gulton, Gould, Marathon, Union Carbide (Eveready), and General Electric in the U.S., SAFT in France (distributed in the U.S. exclusively by Kroker Engineering), Varta in Germany, and probably many others.

Some cells, by virtue of their inherent size and shape, and because of the way the connections are made inside, can be discharged very rapidly without a severe voltage drop, and without a great loss in capacity. Usually the smaller cells are better at this, as there is simply a shorter distance for the current and heat to travel. When it comes to cranking out a moderate amount of power for a long time, the larger cells have the edge—a higher energy for their weight. However, there are exceptions. In the smaller sizes of cells, all cells cost about the same, regardless of size; in the larger cells, cost is roughly proportional to capacity.

The normal charge rate for most ni-cads is that which charges the battery to full capacity in about 14 hours. The charging current, in amperes, is one-

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tenth of the nominal capacity in ampere-hours. A 500mAh (milliampere-hour) battery would be charged at a constant current of 50 mA (milliamperes). At that charge rate, batteries can be overcharged for a hundred hours or so without damage. Some quick-charge cells can be charged in four hours and similarly left on overcharge without damage. For our purpose much faster charging is required. Once a cell becomes fully charged, all of the additional energy pumped into the cell goes into the generation of heat and gas. Up to a certain point, the gas is absorbed chemically within the cell. Beyond that point, the gas is vented, and some of the capacity of the cell is permanently lost. The difference between a high-charge-rate cell and a normal-charge-rate cell is not so much that the high-charge-rate cell can be charged faster, but that it can be *overcharged* at a high rate without damage.

Several manufacturers have developed systems for fully charging their batteries in 15 to 30 min. A new line of Eveready "Hustler" cells, for example, has been designed to exhibit a sharp temperature rise before the pressure rises to the point where venting occurs, and the charging is terminated when the temperature reaches a certain value. SAFT, on the other hand, utilizes the sudden and reproducible voltage rise that occurs with their cells to signal the end of the rapid-charge period. These are just two examples, and you can be sure that the other manufacturers who do not yet have such rapid-charge systems are working hard at developing them.

That still is not fast enough for a kid with the fidgets, but anything faster inevitably results in either a ruined battery, or an incomplete charge. One manufacturer of cells specifically intended for fast charging, for example, states that 25% of the capacity can be obtained with a one-min. charge, 45% with a three-min. charge, and 70% with a five-min. charge. The method used is the "dump-timed-charged" method. The cells are first "dumped," that is, completely discharged, or nearly so. Then one applies a "timed charge"—a certain current for a certain length of time—to a fraction of their capacity that is sufficiently far removed from a full charge to ensure that the cells will not be accidentally overcharged at a high rate.

A high-rate ni-cad cell can be completely discharged hundreds of times. But, a battery consisting of more than about two cells connected in series cannot be completely discharged without suffering irreversible damage. No two cells are identical, so in a series string of cells, one cell is certain to be weaker than the others.

When the battery is discharged, the weakest cell will become completely discharged, while the others continue to produce current. That current flows through all of the cells, including the weak one. The current is in the direction opposite to that in which a cell should be charged, so the weak cell becomes charged in reverse. At best, the cell will lose a little of its capacity. At worst, the cell will become completely incapable of being charged in the proper direction.

In a multi-cell battery, then, it is best to terminate the discharge before the battery voltage drops too low. Prior to charging by the dump-timed-charge method, it is best to discharge the battery cell by cell, or to occasionally give the battery a long slow charge to be certain all cells are fully and equally charged.

Conclusion: The power outputs of electric propulsion systems seem low compared to those for glow engines. But it is not the power output of the motor that counts, but rather the power output of the prop. Tests have shown that a small geared electric motor puts out the same propulsive power at 27 mph as a reed-valve 049 engine having twice the horsepower. If the glow engine were geared down about 3-to-1 the story would be different, of course. Small motors turning at high rpm used in models that fly slowly must be geared down to achieve a reasonably high propeller efficiency. For motors as large as the Astro and Kroker motors, which turn at lower rpm than their smaller counterparts, and in models that fly fast, little can be gained by gearing down the prop.

Since we started gathering material for this article, several propulsion sys-

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tems we were initially not aware of have popped up, and there is a possibility that there are still some that we missed. AAM apologizes for any that have been omitted, and will update this review as new systems appear. AAM is undertaking tests of a typical RC airplane to determine the relative performance with both electric propulsion and gas-engine propulsion in terms of both laboratory and field tests, and will report on the results.

In a future article we will consider the application of electric propulsion to various types of models. We'll consider types of batteries other than NiCads. We'll show you how to match the propeller, batteries, gears, prop, motor, and aircraft to each other—not too formidable a job when it is laid out step by step. And, we'll discuss some motors that are not specifically intended for model aircraft propulsion, but which are nevertheless worth considering.

Gas motors specifically designed for model aircraft propulsion were commercially available near the turn of the century, but it was thirty years before the gas engine had any noticeable effect on sport or competition model aviation. Then the gas engine suddenly took over, practically to the exclusion of other forms of propulsion. Commercially available electric propulsion systems were on the market 14 years ago, but it has only been within the last year that electric propulsion has been more than an interesting curiosity. Rather suddenly, interest has bloomed, and new systems seem to pop up every few months. Where will it all lead? Who can say. Ten years from now will we look back on electric propulsion as the Hoola Hoop of Model Aviation? Or as we are topping-up our NiCads, will we reminisce about the good old days when we used to fly those noisy, balky, dirty old glow engines?

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Executive Council Winter Meeting

February 17,1973
Holiday Inn—Washington, D.C.

The following were in attendance: President John Clemens, Dallas, Tex.; Secretary-Treasurer Earl Witt, St. Thomas, Pa.; Executive Director John Worth, Fairfax, Va.; and the following District Vice-Presidents: I, Cliff Piper, Atkinson, N.H.; II, Josh Titus, Paramus, N.J.; III, Ralph Pennetti (proxy for Ron Morgan), Sewickley, Pa.; IV, John Spalding, Lanham, Md.; V, James Perdue, Athens, Ala.; VI, Glenn Lee, Batavia, Ill.; VII, Jack Josaitis, Dearborn, Mich.; VIII, Murry Frank, Wichita Falls, Tex.; IX, Stan Chilton, Wichita, Kans.; X, Alex Chisolm, Fresno, Calif.; XI, Bob Stalick, Albany, Ore.

Also attending at the invitation of the president: former Dist. II VP Bill Boss, New Hyde Park, N.Y.; former Dist. IV VP John Patton, Frederick, Md.; Dist. IV Assoc. VP Cliff Telford, Bethesda, Md.; Dist. V Assoc. VP Bob Stevenson, Marietta, Ga.; Dist. XI Assoc. VP Dick Carson, Spokane, Wash.; AMA HQ Staffers Frank Ehling, Laurel, Md., and Carl Wheeley, Bethesda, Md.

9 am: Clemens began the meeting with an informal period for free and general discussion prior to formal opening of the meeting to agenda items of council business.

10:35 am: Clemens announced that he and Worth would abstain from voting, to assure that council decisions would reflect the majority wishes of district vice-presidents. Witt (Sec.-Treas.) said he would be voting along with the VP's. Council official business was then initiated with agenda items as follows:

Magazine/Dues

Worth noted that AAM had asked for a price increase effective in August '73, from 30 cents to 37½ cents per copy purchased for AMA members; failure to accept would terminate the current AAM contract at the end of 1973. Witt stated he wanted to go on record that AMA should provide the membership with a first-class magazine, equivalent to those of the Experimental Aircraft Association, Aircraft Owners and Pilots Association and other such organizations, and not a newsletter type publication. Titus disagreed, saying that our situation is different, that there are many adequate model aircraft magazines available, so this is no need for AMA to provide such a full fledged publication. He stated that we should have our own house organ, without advertising, and therefore the ar-

Executive Council meeting in progress. At table (L-R): Josh Titus, Dist. II VP; Jack Josaitis, VII VP; Stan Chilton, IX VP; Bob Stalick, XI VP; Ralph Pennetti, III AVP representing Morgan; John Spalding, IV VP; Earl Witt, Sec.-Treas.; John Clemens, Pres.; John Worth, Exec.

rangement with AAM should be terminated. General discussion followed.

Witt then moved (seconded by Stalick) that AMA continue, as a policy, providing all Open members with a substantial general interest magazine or publication as a dues benefit. Chilton moved (seconded by Stalick) to table the motion until other options were discussed; eight voted for tabling, 1 against. Worth was then asked to list options available to AMA concerning future publication arrangements. He did so:

a. Continue current arrangement, at 37½¢ per copy price, or optional @ 50¢ (for each AMA member who chose to obtain AAM).

b. AMA to produce its own publication, with several choices as to size and nature of contents.

c. RCM–MAN original offers: free publication of AMA news but member to obtain either magazine on his own rather than by AMA purchase.

d. AMA section be published in all magazines–AMA to pay costs, average of approximately $1,000 per month per magazine.

The various options were discussed in depth for over an hour. Stalick asked what the current obligation of the council was regarding a decision concerning publications. Worth replied that the only contractual obligation was to accept or reject AAM's increase from 30¢ to 37½¢ for membership copies of the magazine.

Titus moved that AMA not accept AAM's price increase (seconded by Stalick). The vote was unanimous to reject the increase: the 11 VP's plus the secretary-treasurer all voted in favor of the motion.

The council then adjourned for lunch.

Upon reassembling, Piper spoke in favor of AMA publishing its own house organ type of publication without advertising. Stalick then noted that a number of council members had arrived at a consensus during lunch and presented this as a motion: AMA to provide AAM on an optional basis to members who pay dues of $15 and that we provide the "AMA News" section of that magazine as a mail-out to all other Open members who would pay dues of $12. Further, that the council empower and direct the executive director to negotiate with AAM a sliding cost scale, varying from 50¢ to 37½¢ per copy, based on a percentage of current membership. Pennetti seconded the motion. The vote was 8 in favor; I, V, VIII, and X against. The subsequent discussion indicated a consensus that this action was intended as an interim measure until AMA can publish its own magazine.

Pennetti then moved (seconded by Stalick) that if the negotiations do not produce a result acceptable to AMA and AAM, we proceed to produce our own publication as of January 1, 1974. Voting was unanimous in favor of the motion (all VP's and the S-T).

The consensus of further discussion was that we should not as yet define the nature of an AMA publication for the future, and that we should use the time between now (February) and the next meeting to determine such nature.

Witt then moved, and Pennetti seconded, that this consensus be adopted officially. The vote was unanimous in favor (11 VP's and S-T).

Frank next moved, and Pennetti seconded, that all further discussion on the magazine subject be tabled. The voting was again unamimous in favor by all VP's and the S-T.

Budget Review

Worth called attention to the two budget documents which had been distributed to council members together with the 1972 financial statement. He then reviewed the basic budget estimate for 1973 operations which included a 5% increase in overall costs, assumed a 2,000 increase in memberships (to 49,000) and also assumed a break-even operation for the National Model Airplane Championships. The budget estimate showed an income total of $660,500 of which all except $44,000 would be from individual memberships; the expense estimate showed a total of $560,000. A balance of $100,500 was therefore indicated as anticipated surplus if normal operations (essentially the same as in '72) are maintained in 1973.

Following general discussion, Frank moved to accept the basic budget estimate as submitted; seconded by Chilton, followed by a unanimous vote in favor.

Worth then reviewed a list of proposed additional '73 budget items. Included was a 4% cost-of-living increase for the executive director, and it was noted that the last previous increase was in September, 1971. Witt said it was unnecessary to vote specifically on this item since the amount was already included in the basic budget estimate,

(Continued on page 114)

FF TEAM PROGRAM CORRECTION

The announcement of 1975 FF World Champ Team Program details in the June "AMA News" section contains an error. **The "second-chance" aspect of the Team Finals was not approved,** and this paragraph (p. 107, 1st col.) should have been omitted before printing. We regret the error.

Dir.; Glenn Lee, VI VP; Cliff Piper, I VP; Alex Chisolm, X VP; Murry Frank, VIII VP; Jim Perdue, V VP. Previous VP's Patton (IV) and Boss (II), respectively, are behind Chisolm and in R foreground. Assoc. VP Telford (IV) is behind Stalick.

$ $3,500 in 1972 AMA Scholarships to Five

The AMA is constantly striving to achieve a greater acknowledgment for its members by the general public of the worthiness of model building and flying as a sport and a hobby. One such means of doing this has been by awarding scholarships to outstanding young modelers to assist them in furthering their education. The scholarship awards described here (for 1972) are the third such awards presented by AMA; the total amount is $3,500, topping the 1971 scholarships by $1,500.

The amount and number of scholarships to be presented for 1973 will depend to a large extent upon the number of applicants and their qualifications–as well as the amount of money that accumulates in the Scholarship Fund. All applications will be considered and evaluated by the AMA Scholarship Committee which will then make a recommendation to the Executive Council (AMA's board of directors). Currently, the Scholarship Committee is composed of Bob Stalick, Albany, Ore., chairman; Art Schroeder, Glen Ridge, N.J.; Cliff Telford, Bethesda, Md.; and John Worth, AMA HQ.

In choosing the recipients for the AMA Scholarship Program many aspects are taken into consideration. The most desirable applicant is one who is academically superior and also is a participant in many aspects of school, modeling, and the community. The 1972 applicants were rated in several major categories: class rank, grade average, test results, school and community activities, and model flying. An average of points in all these areas resulted in a ranking to determine the most worthy applicants to be named as winners. High achievement in all of the categories is important; however, this should not discourage a person who is not right at the top of his class if he is active in the community and in modeling. All facets are taken into consideration, and a well-rounded person may well be more qualified than one who excels only in school grades or only in modeling.

1973 Scholarship Program

It's easy to involve yourself in AMA's Scholarship Program. The first step is to write to AMA HQ, 806 Fifteenth St., N.W., Washington, D.C. 20005, for a scholarship application. Any current AMA member is eligible who (1) has flown a model in an AMA sanctioned competition in 1972 or 1973, prior to submitting the scholarship application, and (2) graduates from high school in 1972 or 1973. But write immediately, because applications for the 1973 AMA scholarships must be completed and returned to AMA HQ by August 1.

1972 Winners

Our congratulations go to the five recipients of AMA scholarships for 1972. The highest award was to William Booth of Fresno, Calif., in the amount of $1,000; Randy Wright of Media, Pa., and Whit Stockwell of Encino, Calif., both received $750; and Ron Ganser of Pittsburgh, Pa., and Michael Hainen of Vicksburg, Mich., both received $500 (although the latter declined his award–see further on; Michael Kuehne of Bryan, Ohio, was given the award in his place).

William Booth the top winner, is a superior achiever in academics as well as modeling. He has held several national records in Free Flight Gas classes within the past few years, the most notable of which was a record of better than 60 minutes established in 1971. Since 1962 he has flown in a FF contest almost every month, winning many trophies and ribbons. In most of these years, Bill has placed within the top three Jr.-Sr. flyers for highest points in the Fresno Gas Model Club, where he was vice-president for the 1971-72 term.

Achievements and honors have been frequent in Bill's academic career. His grade average was 3.74 out of a possible 4.0, placing him 22nd in a class of 662. Equally as commendable were the results of his National Merit Scholarship Qualifying Test scores. He participated in many extracurricular activities: president of his senior class, member of the California Scholarship Federation for three years, and secretary of athletics and awards in the spring of 1972. He took part in track and cross-country events where he lettered in both, and he was a member of the Key Club and Lettersmen's Club. Bill was a member of the Student Affiliate Board of the Fresno Community Council, and he was named carrier of the year of the Fresno Guide, a local newspaper. He is now a student at the University of California, Berkeley, in the College of Environmental Design, studying architecture, where he was accepted with honors.

Whit Stockwell, $750 award winner, shown with Stafford Minnow and 2nd place trophy he won at the 1972 Whittier Narrows Race.

High academic and modeling standings landed a $750 scholarship for Whit Stockwell. He received a 3.3 grade average out of a possible 4.0 in high school, and he participated in many school activities, sports and community projects.

Whit's participation in modeling has brought him many honors, the most well known of which was his being named NMPRA Grand Champion in 1969. His major interest is RC where, in addition to Pylon Racing, he has been an aggressive competitor in Pattern and Scale. He has many contest wins to his credit, particularly in Pylon Racing. Whit has been a member of several clubs including the FAST Club, the Valley Flyers, and BIRDS. In 1969 he was awarded the Valley Flyers' Distinguished Service Award, and from the

$750 scholarship winner, Randy Wright, shown here with a Nordic A-2 Towline Glider.

Winner of the highest scholarship award, $1,000, was William Booth (left), shown with Free Flight Gas Model. During high school he was an outstanding student and participated in many activities. In modeling he has set several records and won numerous awards. He is currently at the Univ. of California, Berkeley, studying architecture.

Good Leadership—And Good Followship!

PRESIDENT'S MEMO

GOOD LEADERSHIP is always considered to be the first necessity in all fields of human endeavor. This need for good leadership is obvious, because the finest wagon, be it without a tongue, is worthless for lack of a way to steer it.

We of the Academy of Model Aeronautics are extremely fortunate to have the highest quality of leadership, and at all levels. This becomes even more outstanding when it is realized that, except for a small headquarters staff, all of AMA's leadership is volunteer and has risen from the ranks of our regular dues-paying membership. We are doubly blessed to have a headquarters staff peopled by a "crackerjack" bunch of dedicated people.

AFTER YOU HAVE GOOD LEADERSHIP—WHAT? Just as a coach needs a team or a general needs an army, good group leadership is only a start! In every organization the need for skilled leadership is obvious, but JUST AS IMPORTANT are those who are to be led. And this is always a much larger group. I would like to coin a phrase and call this "GOOD FOLLOWSHIP."

Contrary to most thinking, it takes some effort to be a good follower! To be a really GOOD follower it takes some thought, some dedication, some desire, and a willingness to "pitch in," even if only for selfish reasons. And the follower has many good reasons for making a real investment in being this "good follower." If he plays his cards right he is able to take advantage of the effort and time spent by his leaders, with little or no risk to himself, at only the cost of dues and a little cooperative effort with these leaders.

It is an obvious fact that if EVERYONE decided to just pay dues and "go along for the ride" that we would still be back at the stone age in getting what we want and enjoying life. THERE IS AN OBLIGATION that goes well beyond just paying dues if you want to be a part of ANYTHING. This extra obligation is in fair exchange for the privileges of "belonging," and of taking advantage of the services and facilities that the efforts of your leaders have supplied.

Considering all of the above profound statements, I would like to point them out in terms of your being a member of the Academy of Model Aeronautics and the satellite clubs and groups of clubs, large and small, local and regional, that spring from the parent national organization.

To be a "GOOD FOLLOWER" I suggest—

1. Pay your dues, in full, and on time. And please don't gripe about the fees, because not one cent goes into any other member's pocket. It all goes for your fun and the protection and expansion of YOUR hobby.

2. Realize that EVERY member of a hobby club or organization has an obligation to help sustain or improve the organization, since there is no one paid or hired to do the work.

3. Hunt up your organization leaders. Don't force them to always hunt you up.

4. Enter into your group's activities. You MIGHT learn something, or you might have a chance to show how smart you are by helping someone else. Either way you win. Don't show up, and it is a cinch you won't enjoy anything. When your group has an activity, DO YOUR PART. If you don't know what to do, ask your leaders, for there is bound to be SOMETHING you can do. If you do nothing this leaves you with an unpaid debt for the fun and privileges you enjoy.

5. Remember that your group leaders have NO obligation personally to you, and are serving you and the hobby just because they are "good guys"! You can be one of the "good guys" by carrying your part of the load, and it sure makes for a good feeling inside! It also stops that guilty feeling when you use facilities that the other members have worked hard to obtain and protect for your fun.

6. Be sure to show appreciation to your leaders and to your communities. Remember, nobody owes you a thing until you've done something to deserve it!

7. RULES! AMA has rules, local clubs have rules, your community has rules, your government agencies have rules, and then there are rules of just plain old common sense. Be sure YOU know these rules and FOLLOW THEM! Beyond that, make sure that those around you are aware of the rules and that THEY are protecting your RIGHT TO FLY by how THEY follow the rules.

President John Clemens (L) presenting Distinguished Service Award to Bob Vojslavek of Woodridge, Ill.; he organized volunteer AMA member help for the '72 Nats. Award made during the Toledo RC Conference.

8. IMAGE! How your hobby looks to your community is exactly how it will be treated by your community. How it looks is the impression YOU make while you are indulging in your hobby. You have a responsibility to YOURSELF and to each of us to always do everything you can to maintain and improve a dignified, safe, and respected image of model aviation in the eyes of your community, local, regional, national, and even worldwide. WORK ON IT. THE REST OF US DO!

9. FUN! The name-of-the-game in air modeling is FUN! You have an obligation to yourself to get all the fun out of it you can, but not at the expense of someone else and at no cost to you. Make sure you have evened your account as a "GOOD FOLLOWER," and modeling WILL BE MORE FUN!

If you are meeting the above suggestions you have "Good Followship"! Then I ask only one more thing. Go preach the gospel of "Good Followship" to those who are not as thoughtful as you are. It will help make a little better world, and hobbies will be more fun.

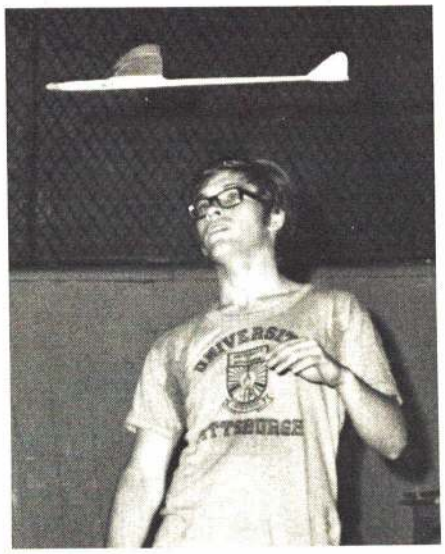
John E. Clemens
AMA President

BIRDS he won the Paul Mantz Memorial Trophy for outstanding performance by a Junior. He, like Booth, is currently attending the University of California at Berkeley, studying architecture, where he is maintaining an average better than 3.25.

The other $750 scholarship winner, Randy Wright, will use his award for tuition at Rochester Institute of Technology in New York where he is presently a student. He is studying photography which he hopes, among other things, will enable him to help improve modeling's public image by bettering the quality of modeling pictures. During high school Randy maintained a 3.869 average out of a possible 4.0 and was a National Merit Scholarship Foundation finalist. He was also a member of the National Mathematics Honor Society. His hobby of photography earned him honorable mention in the Kodak International Newspaper Snapshot Awards in 1971.

Randy has been active in modeling both in and out of high school, being a member of his school's model airplane club and also a member of the Golden Ealges MAC. He has been successful in flying Nordic Towline Gliders, placing 2nd at the D.C. Maxecuters 1971 Fall Meet and also representing his club, by being a member of the Golden Eagles Nordic Team, at the Skyscrapers International Challenge.

Ronald J. Ganser, $500 scholarship winner, placed 15th out of 205 members in his class at Canevin High School in Pittsburgh, with an average of 90.6 out of a possible 99. He was also a member of the National Honor Society and active in school sports, including basketball and track. His list of awards for modeling are numerous, especially in Indoor Rubber, Indoor HL Glider and 1/2A Proto Speed. Besides having flown at every Nats held at Willow Grove and Glenview, and



A commendable career in modeling and high scholastic achievement won a $500 award for Ron Ganser, shown with his Indoor Glider.

receiving awards at all of them, Ron has held the Indoor Category II records for Indoor Stick, R.O.G. Cabin, Helicopter, and Baby R.O.G. He is a member of the Pittsburgh Aeromodelers Club. Ron is attending the University of Pittsburgh School of Engineering.

From among the five chosen scholarship winners, Michael Hainen, winner of a $500 award, is the only one who declined the offer. He is a cadet at the U.S. Merchant Marine Academy in New York, where all his expenses are paid by the Department of Commerce. Still, the Scholarship Committee found Michael a deserving recipient on the basis of his scholastic and modeling achievements. Like all the others, he was outstanding in his high school grades with a 4.194 average out of a possible 5.0, and a member of the National Honor Society for two years. Sports were of interest to Michael, particularly football and tennis, both of which awarded him letters. Outside of school oriented sports, Michael is an avid skier. From 1969 to 1971 he has flown in the Control Line portion of the Nats and placed in several Control Line events, including Scale Racing, Rat Racing and Speed. AMA is pleased to give recognition to Michael's accomplishments even though the award has been declined.

The Scholarship Committee subsequently has decided to grant the $500 scholarship to Michael Kuehne, the applicant of next highest rank. Besides placing 39th out of 169 in his high school class, Michael has been a participant in a variety of activities. Science is a major interest: he was a member of an advanced biology course, received honors in chemistry, and was granted a rating of superior on a science project in his freshman year and an excellent rating in his senior year. He is studying medical technology at the Toledo University.

Michael was also active in high school sports, where he lettered in football and track and served as the sports editor for his school newspaper. He also played in the dance and symphony bands. Outside of school, Michael is a charter member of the Key Club, a Kiwanis affiliate. Swimming, another of his interests, has earned him the Most Valuable Swimmer Award for five years, and he holds league records in several categories.

Modeling has been a major part of Michaels' life for approximately 14 years. He has entered several of the National Contests and has done well in each, particularly in the Indoor Rubber, Scale, H.L. Glider, Outdoor Rubber and Towline Glider events. Michael is a member of the Bryan Aero Modelers.

Background

Matty Sullivan (AMA Life Member, former Nats CD, manufacturer of Pylon Brand Products) was the initiator of the AMA Scholarship Program. Mr. Sullivan made a substantial contribution to AMA for this specific purpose. The Executive Council followed suit and authorized the apportionment of AMA dues and the solicitation for additional contributions to create a basis for the program which was and is expected to be continued for many years.

The first scholarship awards were made in 1970. That year, although it was originally thought that only one award would be made, two young people were given $1,000 each. Those winners were Bill Reed of Raytown, Mo., and Susan Weisenbach of Cleveland, Ohio. This unexpected dual award was made due to the outstanding scholastic and modeling achievements of both. This began a new era for AMA, giving the members an active part in furthering the interests of their hobby, and showing the organization to be one interested in its young members in areas beyond the building and flying of model airplanes.

In 1971 the Scholarship Program had three winners: George Pharr of Montgomery, Ohio, received $1,000, while Richard Leidner of Miami, Fla., and Robert Hanford of Tulsa, Okla., each received $500. Even though the total amount awarded was the same as in the previous year, a greater number of people benefited. Again, like the earlier winners, all three 1971 recipients were outstanding in school and modeling; however, George Pharr rated highest.

AMA expects to continue this program as long as funds are available and there are suitable applicants. As AMA continues to grow it seems logical that this program and others will thrive. Participation is the key to making this and all AMA programs a success. Any interested AMA member should send for an application immediately.

Mike Kuehne, a student at Toledo University, received a $500 scholarship. In photo from '72 Nats he's holding an Indoor Stick Model.

Nats Entry Deadline

June 29 is the 1973 National Contest advance entry deadline! Entry forms not postmarked by this date will be accepted only at the Nats: for Indoor late entries (those not postmarked by June 29) at the Brig. Gen. Richard L. Jones Armory in Chicago, on Sunday and Monday, August 5 and 6, from 9 am to noon and from 1 pm to 5 pm; for Outdoor late entrants, at Wittman Field, Oshkosh, Wisc., only on Monday, August 6, from 1 pm to 5 pm and from 7 pm to 9 pm. Late entry fees are higher than advance entry fees. The absolute deadline for late entries is 9 pm Monday August 6—no exceptions!

Entry forms are available upon request from AMA HQ, 806 Fifteenth St., N.W., Washington, D.C. 20005. Send a preaddressed and stamped (8 cent) envelope.

EXECUTIVE COUNCIL

(Continued from page 111)

under the general 5% increase.

Frank then moved (seconded by Stalick) to accept two of the additional budget items: executive director assistant and additional staff help. Frank's motion included the requirement that the choice of E.D. assistant be subject to council approval of the person. The motion passed unanimously.

Frank then moved to accept several items listed under the title of Expanded PR; seconded by Chilton. These items included an increase for the services of AMA's current PR officer, Bob Lopshire; a basic PR budget for expense reimbursement, beyond that currently allocated; and a budget for PR supplies and equipment. The total budget for this group totaled $12,500. The motion passed unanimously.

Frank also moved (seconded by Chilton) to accept a $5,000 budget for legal representation concerning FAA activities. The motion passed unanimously.

Film projects were discussed as a new budget subject. Worth noted that the outstanding success of AMA's first professional film venture (1971 RC World Championships) resulted in this proposal. He advised that the film's producer, Jay Gerber, had offered to do similar work for AMA on a continuing basis, in much the same manner as our PR man—spare time, averaging 10-20 hours per week.

Worth also noted that AMA had consider-

able film footage left over from the world championships project and also that additional footage had been shot of other AMA subjects (Transpo 72, RC team selection, various trade shows). He further indicated the need for other films concerning HQ operations, council meetings, and other areas of general membership interest; all these film projects to be considered a further expansion of PR activities, both internal for membership benefit and external for education of the general public.

Gerber's status was pointed out: a top professional film expert (winner of the National Football League's award for Outstanding Achievement in Cinematography), and a dedicated AMA member (former secretary of the SPARCS Club of Philadelphia). His services would include filming, editing, directing and producing; also the establishment of a more professional AMA film library at AMA HQ.

The budget item for '73 Film Projects totaled $28,000 and included a basic weekly fee for services rendered, an allocation for purchase of production supplies and supplementary services, also the purchase of a professional film editing machine which would be AMA property. Piper moved, and Stalick seconded, to accept the Film Project budget, subject to regular review by the council. The motion passed unanimously.

Witt reviewed the need for additional Nationals support, noting that many items previously available through Navy sources would have to be rented or purchased in the future; also that AMA would benefit by purchasing rather than renting whenever feasible. Even with Air Force hosting of the Nats, it was pointed out, there would be many new expense items. Lack of airlift for officials and movement of HQ supplies and equipment, for example, would add considerably to Nats costs. A new budget item of $10,000 as a Nats reserve for added support, if needed, was noted. Witt moved, seconded by Pennetti, to accept this item; approved unanimously.

Worth then outlined the need for one other new budget item, in the amount of $2,000, for an expanded publication effort involving equipment and supplies. He explained that regardless of whether AMA produced its own publication or went to some new arrangement with other publishers, there would be a need to produce ready-for-camera material, and this would entail additional expense. Pennetti moved, seconded by Chilton, to accept this additional budget item; approved unanimously.

All additions to the basic budget estimate totaled $82,700. This amount, when deducted from the anticipated surplus of $100,500 remaining from the basic budget, would leave a general reserve of $17,800. The council then closed the subject of budget matters by noting that a further review of AMA finances would be made at the Summer Executive Council Meeting in August.

1973 Nationals

Witt, as chairman of the Nats Executive Committee, reported on the Feburary 3rd meeting of the NEC in Chicago, concerning recommendations of the committee pertaining to the competition event schedule and entry fees. Basically, the recommendations were to retain the '72 entry fees (no increase for '73) and keep the competition schedule essentially the same; only minor changes in the event schedule were involved. Witt then moved, seconded by Chisolm, for the council to approve the NEC recommendations; approved unanimously.

Worth and Witt next explained the current situation concerning Nats location and dates. The Navy was definitely unable to host, the Air Force was considering hosting (at Chanute Air Force Base in Illinois) but had not given a definite answer. It was noted that even if the answer was affirmative, the amount of support was expected to be minimal—even less than the Navy had provided at Glenview in 1972. No airlift of officials was likely, BOQ space for officials would probably be only 10% of normal, use of a hangar, barracks, and mess hall was doubtful. The airfield itself had been inspected by the committee and determined to be adequate. There was also an as yet unresolved problem concerning interference with an Air Force flying club operation on the field.

Considering these problems, council discussion indicated support for accepting a previous offer from the Experimental Aircraft Association to use its facilities at Oshkosh, Wisconsin, for a fee of $15,000. Although the cost was a strong negative factor, it was noted that there were many opportunities available at Oshkosh for recovering this additional cost: admission charge for spectators, share of concession and camp store profits, trade show booth rentals, sales of various materials—the operation would be free of the usual military restrictions concerning what could be sold or charged for.

Other factors favoring Oshkosh were the availability of excellent camping facilities on the airfield, economical dormitories ready for family accommodations, excellent food facilities, a ready-to-use public address system, existing crowd control fencing, simple arrangements for sanitation, security, and trash removal by using extensions of EAA contracts. Because the EAA was having its annual fly-in the week before AMA's event, many of the same arrangements could be used. Also, the atmosphere at Oshkosh was excellent—a clean and green country airport with modern buildings and facilities.

A change in traditional Nats dates would be required, and Worth noted that this could cause problems with scheduling of other contests. Council discussions indicated agreement that the usual banning of major AMA meets during Nats week need not be observed this year, as an emergency measure to permit the change of dates—other meets could, therefore, be held if the sponsors were willing; also such meets would be given priority for different dates if scheduling during Nats week was impractical.

Further discussion showed a consensus that a decision concerning Nats dates and location had to be made immediately, without waiting further for an Air Force response. Also, the general council sentiment appeared to be that it was time for AMA to see if it could hold a Nats without military support and that AMA's financial position was never better to test the possibility. Stalick then moved, seconded by Titus, to move the Nats to Oshkosh in 1973. The vote was 10 in favor, with 2 abstentions (Perdue, Frank).

The council then discussed Nats future problems in general. Of particular concern was the fact that no specific list of Nats requirements was as yet available to distribute to potential hosts so that offers could be sought and evaluated. Stalick then moved a proposal, which was amended and seconded by Frank, to the effect that the Nats Executive Committee draw up by the next council meeting (August) the requirements for holding a Nationals, with this information to be made available to anyone desiring same; approved unanimously.

Perdue then initiated discussion relating to the need for a long-range thinking concerning the Nationals, with a view toward reviewing the size and nature of the event, rotation of location vs. remaining in the same place each year, number of events, and other major factors. Noting an apparent council consensus of agreement on the subject, Perdue moved (seconded by Lee) that the AMA president, by April 15, 1973, appoint a Nats Study Committee for the purpose of presenting to the Executive Council a long-range plan for future Nats; this committee to be composed of at least one member of the Nats Executive Committee along with representatives from all modeling interests and geographical areas—the committee will formulate definite plans for the type of meet and location. The motion passed by vote of 11 in favor, 1 abstaining (Spalding).

Frank inquired concerning whether the Nats Committee had considered what could be done to avoid the complaints of '72 concerning the Nats 3-minute starting rule in Free Flight. Worth replied that the NEC had abolished the rule for '73, in favor of a 10-minute no-penalty procedure which had been recommended by the National Free Flight Society.

6:45 pm: Piper then advised that he had to leave for home and asked permission to appoint John Patton to act as his proxy for the balance of the meeting. The president agreed, and Piper departed.

FAI Representation

Clemens asked Worth to explain AMA concern over a new FAI ruling, expected to be applied at the next FAI annual meeting, which would limit each country to only one delegate in the meeting room. Worth gave a background briefing and said that the only way to have more than one U.S. representative in the meeting would be to separate the positions of voting delegate and subcommittee chairman—chairmen are authorized to be present in addition to delegates.

Clemens noted that the U.S. voting delegate was also a subcommittee chairman and that he preferred for these positions to be divided between two people, to enable the U.S. to have more than one seat at the meeting and also to avoid any possible conflict of interest position—the latter was possible because subcommittee chairmen are elected as technical experts in their field rather than as national representatives. In a subcommittee position, therefore, it is possible for a person to pursue a position contrary to what his obligation might be as the national delegate.

Clemens explained further that while he had the authority to decide our representation for the next meeting, he felt the matter should be treated by the council as one of long-range policy. Also, because there has been considerable controversy concerning AMA's past FAI representation, he felt his own actions in the matter could be misinterpreted as a personality disagreement rather than an objective decision. Clemens therefore asked the council to decide this issue and also a broader one of whether the U.S. delegate should represent the views of AMA members directly involved in FAI activities or the AMA membership as a whole—he noted some situations in which there could be direct conflict, and he felt that his obligation was to represent those actively engaged in the activity since they would be the most affected by FAI decisions.

Josaitis asked for further clarification concerning dual representation problems. Worth explained that although a subcommittee chairman was elected by vote of FAI delegates, he must also be approved by the national aero club of his nationality (AMA for the U.S.). In such a situation, and with the aero club paying the travel expenses of the representative, it was not realistic to expect that a subcommittee member should represent his own thinking without regard to the views of his home organization.

Following more discussion in which there appeared to be general agreement that the job of U.S. voting delegate should be separated from FAI subcommittee representation, Pennetti moved (seconded by Perdue) that the separation be made a matter of policy, effective immediately. Prior to voting, however, Patton was asked for his views since he had attended several FAI meetings. Patton noted that while there had been confusion concerning the nature of representation in the past, the U.S. had actually been very successful in achieving most of what our FAI flyers wanted. He acknowledged, however, that the new FAI thinking of only one representative per country at the meeting (other than subcommittee chairmen) presented new problems which could aggravate the situation.

A call for a vote followed, and Pennetti's motion passed with 10 in favor and 2 abstaining (Titus, Spalding). Pennetti then moved, and Perdue seconded, that U.S. representation should reflect the wishes, insofar as is practical, of those participating in FAI activities. Voting approved the motion, with 11 in favor, 1 abstaining (Witt).

Awards

DISTINGUISHED SERVICE. Two nominations were seconded and approved unanimously. Winners will be publicly announced following formal presentation of awards to the individuals at appropriate local events.

HALL OF FAME. Chisolm spoke on the need to reactivate this series of awards which is supposed to be made annually by action of AMA's Council of Past Presidents. Worth noted that lack of time by both the E.D. and the president had prevented activation so far in 1973. Frank moved, seconded by Chisolm, that the first AMA president—Willis Brown—be asked to lead the effort. (Historical note: Brown has since had to decline, so another past president is being sought to chair this group action.)

FELLOWSHIPS. Worth noted that, as a matter of precedent, all past presidents are automatically treated as Fellows, with life membership privileges, but a search of past council records had revealed no official action to provide for this. Frank then moved, seconded by Chisolm, that the council approve the precedent so that it would be a matter of official policy; unanimously voted in favor.

SCHOLARSHIPS. Stalick reported on recent Scholarship Committee action to recommend five awards for 1972 winners and moved for council approval of the following amounts (seconded by Pennetti): 1st—$1,000, 2nd and 3rd—$750 each, 4th and 5th—$500 each, for a total of $3,500. Frank then moved (seconded by Lee) that the names recommended by the Scholarship Committee be approved: 1st—W. Booth, 2nd—R. Wright, 3rd—W. Stockwell, 4th—R. Ganser, 5th—M. Hainen; approved unanimously.

8 pm: The council adjourned for supper and reconvened at 9:40. The president absented himself from the reconvened session, due to illness, and designated Witt to preside in his place.

Contest Board Procedures

Boss described his current effort, based on previous discussions with the E.D. and the president, to draft a new set of CB Procedures for the new two-year cycle of rules change actions to be initiated in 1974. He noted that current and past procedures had been the subject of much discussion concerning revision during recent years but without effective result, so that the existing and very complicated procedures were in great need of updating and simplification. He requested council approval for himself and Jean Pailet, CL Contest Board Chairman, to draft a new set of procedures for presentation to the council during the '73 Summer Meeting; approved unanimously.

Lee then moved, seconded by Perdue, to instruct Contest Board members to shorten the rules proposal voting period in '73 to within five days of receipt of the ballot (rather than the usual 30 days); approved unanimously. Further council discussion indicated a consensus to maintain the September 1, 1973, deadline for completion of '73 rules action, in order to expedite new rules book publication by year end. The consensus also indicated that, in this interim year, CB chairmen should use the telephone whenever possible (with reimbursement by HQ) to expedite decision making, so as to avoid delays and confusion in cases of non-response from CB members.

10 pm: Clemens returned, noting some improvement in his health, but elected to have Witt continue to chair the meeting.

Appointment Reviews

Worth explained that this item, which had come up and been tabled in the closing minutes of the '72 Summer Council Meeting, needed some clarification since its original intent had apparently been misunderstood by some council members. The correct intent is to avail VP's, without obligation, of the experience and advice of the president and AMA HQ concerning potential appointees, so as to encourage continuity and/or proved performance on the part of new officers—in other words, it is recommended that VP's seek any information from these sources which may be helpful in improving the likelihood of selecting better qualified appointees. It was noted that some appointments were made without awareness of performance problems known to other officers. Stalick moved, seconded by Chilton, to have the council approve the principle; 11 voted in favor, 1 abstaining (Witt).

FAI Programs

Frank spoke on the need for a committee to provide guidelines for program details, noting that there was confusion concerning team selection programs in terms of lines of authority and responsibilities of program administrators. Chilton supported Frank's comments and stated a need for simplification of programs, noting that there were too many differences between Control Line, Outdoor and Indoor Free Flight, Radio Control and Scale team programs.

Worth agreed, and said that there were so many differences of opinion concerning single vs. multiple team finals meets and preliminary qualification requirements that practically all programs were in a constant state of confusion and criticism. He noted further that polls taken after each program, which were supposed to help decide which way to go in order to give contestants more of what they wanted, seemed instead to emphasize the different views and reinforce disagreement. The end result was that no matter which way a given program went, there were many criticisms.

Clemens concurred and said that the subject had gotten too complicated. He then

appointed a committee to draft simplified guidelines for future FAI team selection programs. Chilton was named chairman, with Lee and Spalding also on the committee. Worth was directed to provide the committee members with copies of existing FAI team selection policies and procedures along with his recommendations.

Special Awards

Lee spoke on the need for special awards, such as certificates, which vice-presidents could authorize HQ to issue for special local situations. Frank agreed and moved to ask (seconded by Stalick) that certificates of merit or achievement be made available by HQ to VP's, to be worded as requested by VP's; approved unanimously.

Nomination Procedures

Worth reviewed the problem: the council several years ago had approved a specific set of procedures governing nominations for AMA elections, but these had not been reviewed since. He noted that AMA had been criticized for not reviewing annually so that new councils could have a voice in authorizing procedures each year. Copies of the procedures which had been used for the past several years were distributed and discussed. Frank then moved, seconded by Lee, that the procedures used in '72 be used again in '73; approved unanimously.

Officer Guidelines Book

General discussion indicated the need for updating this reference manual which is currently provided to all council members and associate vice-presidents. Worth noted that various new items would be added: Nomination Procedures, lists of Life Members, Fellows, and winners of past Distinguished Service Awards. The books currently contain details of duties and responsibilities of AMA officers, Contest Board Procedures, Contest Coordinator guidelines, Contest Director requirements, samples of all forms and printed materials available from HQ.

Noise

Witt reviewed details of a study he had made concerning the current status of anti-noise law activities. He noted that AMA action did not seem necessary at present because uniform and specific standards concerning noise had not yet been established nationally. He estimated that this might take two years and that there would be a compliance period of time afterward for those affected to adjust. His recommendation was, therefore, that AMA take no action until such time as national standards are known.

Contest Directors

Stalick and Boss talked of inactive CD's and the fact that there were no more three-digit AMA numbers for issuance to new CD's. Boss noted that he was writing a magazine article on the subject and what he thought should be done about it. Worth noted that other than the lack of three-digit numbers the problem was not serious. General discussion indicated a lack of agreement concerning whether inactive CD's should be allowed to retain their ratings. No specific action resulted from the discussion.

Leader Members

Chisolm spoke concerning a need for Area Leaders (above a CD or Leader member classification, but just below associate VP level)—such leaders to act as area AMA representatives where no AVP or other AMA officer was available. There was general agreement that the idea had merit, but no action was taken other than to note that VP's could make such appointments, if they desired, to help improve representation and communications in outlying areas of their AMA districts.

CD Handbook Status

Worth reported that recent discussion with the project chairman, Bud Tenny, had indicated that HQ should proceed to put the handbook together with contributions to date. Worth said that HQ was in the process of typing clean copy of all reworked raw material so that the chairman could format the book in preparation for the printer. The outlook at present appears to be that the handbook could be ready for release in early 1974.

Contest Coordinators

Chilton asked that HQ provide each CC at the start of each year with ten signed sanction certificates so that meets scheduled immediately after the first of the year could be sanctioned without delay. Worth advised that there were requirements to submit sanction requests with specific lead times, and it was impractical and undesirable to shortcut these intentional advance notice periods. No specific action was taken on this suggestion other than the fact that Worth promised HQ would try to be alert to not delay sanction processing at the start of the year.

National Records

Stalick noted discrepancies between the rule book and record application forms concerning submission times for new records. Worth noted that the current rule book rewrite had incorporated changes to make the requirements agree with actual practice.

Control Line Tests

Worth reported that the project had not had any action since the last council meeting—it had been the victim of lack of time due to HQ efforts being concentrated on Nats and magazine controversy problems. It was hoped, he said, that the project could be reactivated and reported on by the summer council meeting.

Next Council Meeting

Lee asked for the Nats meetings to begin a day earlier than usual, on Tuesday instead of Wednesday. Clemens said he would try to do this if possible. But he noted that many council members were involved in Nats administration and that it was typical for these members to be completely absorbed during the first Nats' days getting the event operating properly. It was usually Wednesday, he noted, before the Nats operation was going sufficiently well to permit council members to be available for other meetings, and this year there would be new problems due to the switch in Nats location to Oshkosh.

Midnight: Clemens noted that the council had been in session for almost 15 hours, other than for meals, and that many subjects other than those on the original agenda had been acted upon. He thanked all present and apologized for the health problems which had plagued his own participation. Upon unanimous agreement of all present, the meeting then adjourned at midnight.

Official Sanctioned Contests of the Academy of Model Aeronautics

JUNE 1-3—GREENVILLE, MAINE. 2nd International Moosehead Fun Fly. Site: Mun. Airport. A. Kurth CD, Greenville Airport, Greenville, Maine 04441. Sponsor: Moosehead Bushpilots RC Club.

JUNE 2-3—BILLINGS, MONT. (AA) Flying Mustangs Annual Spring RC Fun Fly. Site: Billings F/M Field. R. Wilson CD, 3225 Phillip, Billings, Mont. 59102. Sponsor: Billings Flying Mustangs.

JUNE 2-3—BATON ROUGE, LA. (AA) "Cajun Classic" Baton Rouge 12th Annual RC Meet. Site: Kleinpeter Field. H. Roberts CD, 9243 Hampton Way, Baton Rouge, La. 70814.

JUNE 2-3—HAMPTON, VA. (AA) 9th Annual Southeastern Va. RC Meet. Site: Hampton. D. Holmes CD, P.O. Box 814, Grafton, Va. 23490. Sponsor: Southeastern Va. RC Group.

JUNE 2-3—NASHVILLE, TENN. (AA) 10th Annual Mid-South RC Championships. Site: Percy Warner Park. B. Reuther CD, 216 Vaughns Gap Rd., Nashville, Tenn. 37205. Sponsor: Middle Tennessee RC Society.

JUNE 2-3—MESQUITE, TEX. (AA) Dallas RC Club 19th Annual RC Meet. Site: Samuels East Park. D. Brown CD, 930 Vinecrest Ln., Richardson, Tex. 75080.

JUNE 2-3—VALLEY PARK, MO. (AAA) Gateway FF, Ind., CL and RC Championships. Site: Buder Park. R. Underwood CD, 4109 Concord Oaks Dr., St. Louis, Mo. 63128.

JUNE 2-3—LUBBOCK, TEX. SPARKS Annual Fun Fly. Site: SPARKS Field. J. Parkam CD, 102 McGuire St., Reese Village, Tex. 79416. Sponsor: SPARKS.

JUNE 2-3—LINCOLN, NEBR. (AA) Lincoln Sky Knights 14th Annual RC Meet. Site: 33rd & Superior. G. Chisholm CD, 1027 Stuart Blvd., Lincoln, Nebr. 68508. Sponsor: Lincoln Sky Knights.

JUNE 2-3—SHREVEPORT, LA. (AAA) 10th Annual Louisiana State CL Championships. Site: Skydemon Hobby Park. H. Hunton CD, 9529 Pitch Pine, Shreveport, La. 71108.

JUNE 2-3—BROCKPORT, N.Y. (AA) 14th Annual N.Y. State RC Championships. Site: Brockport. T. Salvemini, Sr. CD, 6 Valley Ln., Avon, N.Y. 14414. Sponsor: Radio Control Club of Rochester.

JUNE 3—GLASTONBURY, CONN. (A) Flying Aces Club Spring Meet. Site: Glastonbury. R. Thompson CD, Hat Shop Hill, Bridgewater, Conn. 06752. Sponsor: Flying Aces Club.

JUNE 3—SHOREVIEW, MINN. (A) 1st Annual North Central RC Pylon Meet. Site: Shoreview. D. Granlund CD, 7213 Oliver Ave., N., Brooklyn Center, Minn. 55430.

JUNE 3—LANCASTER, OHIO (A) F.O.R.K.S. RC Pylon Day. Site: FORKS Field. J. Slater CD, 809 Forest Rose Ave., Lancaster, Ohio 43130. Sponsor: Fairfield Ohio Radio Kontrol Society.

JUNE 3—DETROIT, MICH. (AA) Great Lakes CL Internationals. Site: Rouge Park. A. Adamisin CD, 22454 Fairfax, Taylor, Mich. 48180. Sponsor: Strathmoor Model Club of Detroit.

JUNE 3—DAYTON, OHIO (AA) Dayton Early Season Super Spectacular CL Meet. Site: Dayton Municipal Flying Circles. K. Trostle CD, 6301 Leawood Dr., Dayton, Ohio 45424. Sponsor: Dayton Buzzin Buzzards.

JUNE 3—JAMESBURG, N.J. (A) Tri-County RC Internationals. Site: Tomson Park. A. Eck CD, 361 Main St., Spotswood, N.J. 08884. Sponsor: Tri-County Radio Control Club.

JUNE 3—ELLINWOOD, KANS. (A) Continental Pattern RC and CL Meet. Site: Ellinwood. W. Mowrey CD, Rt. 2, Box 56, Kinsley, Kans. 67547. Sponsor: The Kansas Sunflyers Model Club.

JUNE 3—BRISTOL, CONN. (AA) Model Classic CL Meet. Site: Edgewood School. J. Scott Jr. CD, 265 Witches Rock Rd., Bristol, Conn. 06010. Sponsor: Hornets M.A.C.

JUNE 3—PASADENA, TEX. Red Barrons Fun Fly. Site: Red Barrons Flying Field. W. Beckham CD, 806 Grove Ave., Deer Park, Tex. 77536. Sponsor: Gulf Coast RC Club.

JUNE 3—NASSAU COUNTY, N.Y. (A) Long Island Drone Society Annual RC Pylon Meet. Site: Mitchell Field. T. Felco CD, 3989 Florence Rd., Seaford, N.Y. 11783. Sponsor: Long Island Drone Society.

JUNE 3—COLORADO SPRINGS, COLO. (A) 9th Annual Pikes Peak Fun Fly. Site: Colorado Springs. G. Hayhurst CD, 1219 Oswego, Colorado Springs, Colo. 80904. Sponsor: Pikes Peak RC Club.

JUNE 3—DENVER, COLO. (A) MMM Monthly FF (Cat. II) Meet. Site: E. Colfax Airpark. D. McGhee CD, 1260 Elm, Denver, Colo. 80220. Sponsor: Magnificent Mountain Men.

JUNE 3—HOWELL, MICH. (A) 5th Annual MWRCS RC Pylon Jamboree. Site: Howell. J. Josaitis CD, 7845 Wyoming, Dearborn, Mich. 48126. Sponsor: Midwest Radio Control Soc., Inc.

JUNE 3—WARMINSTER, PENNA. (AA) Golden Eagles "Early Bird" FF (Cat. II) Annual Meet. Site: Johnsville N.A.F. J. Kutkuhn CD, 517 Georgetown Rd., Wallingford, Penna. 19086.

JUNE 3—MUSCATINE, IOWA (AA) Third Annual CL Meet. Site: Muscatine Plaza. F. Brewer CD, 706 Walnut, Muscatine, Iowa 52761. Sponsor: Muscatine Miniature Aircraft Assn.

JUNE 9—HILLSBORO, ORE. FF FAI Qualifying Trials. Site: Nor'Westers Field. J. Shafer CD, P.O. Box 322, Dallas, Ore. 97338. Sponsor: Willamette Modelers Club, Inc.

JUNE 9—FT. SILL, OKLA. (A) LAFF'S 1st RC Sailplane Meet. Site: Gate No. 4, Laff's Field. J. Spoka CD, 4509 Cherokee Ave., Lawton, Okla. 73501. Sponsor: Lawton Area Fun Flyers.

JUNE 9-10—HOUSTON, TEX. (AA) Houston RC Club Annual RC AA Contest. Site: Houston RC Field. B. Striegler CD, 5831 McKnight, Houston, Tex. 77035. Sponsor: Houston RC Club.

JUNE 9-10—KANSAS CITY, MO. (AA) KC/RC Annual RC Meet. Site: Lake Jacomo. K. Borgman CD, 9700 E. 82nd, Raytown, Mo. 64138. Sponsor: Kansas City RC Assn.

JUNE 9-10—WARREN, OHIO RC Fun Fly Nationals. Site: Kent State University. R. Plant CD, 550 Freeman St., Warren, Ohio 44483. Sponsor: T.C.R.C.M.

JUNE 9-10—ELK GROVE VILLAGE, ILL. (A) Chicagoland 25th Anniversary RC Contest. Site: C.R.C.M. Field. D. Wehrheim CD, 1438 Linden Rd., Spring Grove, Ill. 60081. Sponsor: Chicagoland RC Modelers.

JUNE 9-10—CHESAPEAKE, VA. (AA) TRC 7th Annual AA RC Meet. Site: Fentress Air Field. L. Woolard CD, 301 Haledon Rd., Chesapeake, Va. 23320. Sponsor: Tidewater RC Club.

JUNE 9-10—PENSACOLA, FLA. (AAA) Fiesta of Five Flags S.E. Model Airplane FF Championships. Site: 8A Navy Field. T. McLaughlan CD, 4140 Fern Ct., Pensacola, Fla. 32503.

JUNE 9-10—LAKEHURST, N.J. Rockaway Valley RC Standoff & Pattern Meet. Site: Lakehurst N.A.S. A. Schroeder CD, 18 Spencer Rd., Glen Ridge, N.J. 07028.

JUNE 9-10—WINSTON-SALEM, N.C. (AA) North Carolina Triad CL Challenge. Site: Memorial Coliseum Parking Lot. W. Pardue, Jr. CD, 1201 Surry Dr., Greensboro, N.C. 27408. Sponsor: Prop Twisters M.A.C.

JULY 9-10—MILE SQUARE, CALIF. (A) 4th Annual Western Spring RC Champs. Site: Mile Square. B. Hahn CD, 1336 Ashington Ln., Anaheim, Calif. 92804. Sponsor: Harbor Soaring Society.

JUNE 10—BRIDGEWATER, MASS. FAI FF Trials. Site: Bridgewater. S. Colson CD, 47 Sammet St., Everett, Mass. Sponsor: New England Wakefield Group.

JUNE 10—ELSINORE, CALIF. (A) 4th Annual R.O.W. Scale FF & RC Contest. Site: Lake Elsinore. C. Hatrak CD, 3825 W. 144th St., Hawthorne, Calif. 90250. Sponsor: N.A.R. Flightmasters.

JUNE 10—SACRAMENTO, CALIF. (AA) 3rd Northern Calif. FF Council Contest. Site: Waegell Field. W. Vanderbeek CD, 459 Woodcock Ct., Milpitas, Calif. 95035.

JUNE 10—ENDICOTT, N.Y. (AA) 8th Annual Aeroguidance Society RC Meet. Site: Tri-Cities Airport. W. Johnson CD, 833 W. Circle Dr., Vestal, N.Y. 13850. Sponsor: Aeroguidance Society, Inc.

JUNE 10—COUNCIL BLUFFS, IOWA (AAA) 10th Annual Midwest CL Model Meet. Site: Iowa School for Deaf. D. Hutcheson CD, 317 Spencer Ave., Council Bluffs, Iowa 51501. Sponsor: Balsa Busters.

JUNE 10—CHICAGO, ILL. (AAA) Aero Angels Annual CL Meet. Site: Forest Preserve. D. Buker CD, 4337 N. Osceola, Norridge, Ill. 60634. Sponsor: Aero Angels, Inc.

JUNE 10—QUEENS, N.Y. (AAA) Forest Park 5th Annual CL Contest. Site: Flushing Meadow Park. R. Moore CD, 128 N. Elm St., N. Massepequa, N.Y. 11758.

JUNE 10—VALKARIA, FLA. FMPRA RC Meet. Site: Valkaria. M. Holland CD, 1201 Willowbrook Tr., Maitland, Fla. 32751. Sponsor: R.C.A.C.F.

JUNE 10—OHIO CITY, OHIO (A) 1st Annual CL Combat Bash. Site: Club Field. G. Grunden CD, 813 Elm St., Gelina, Ohio 45822. Sponsor: S.H.O.O. Flyer M.A.C., Inc.

JULY 10—YOUNGSTOWN, OHIO (A) Annual CL Combat "Smasher" Site: Austintown Park. J. Peters CD, 315 Bradford Dr., Canfield, Ohio 44406. Sponsor: Ohio Flying Aces.

JUNE 16-17—DELAVAN, ILL. (AA) Golden Age of Flight CL & RC Meet. Site: Delavan. D. Shipton CD, RR No. 2, Box 68, Delavan, Ill. 61734.

JUNE 16-17—DENVER, COLO. (AA) 15th Annual Mile-Hi RC Meet. Site: Lowry A.F.B. H. Geller CD, 6920 E. Exposition, Denver, Colo. 80222. Sponsor: Mile-Hi RC Club.

JUNE 16-17—MESQUITE, TEX. (AA) 4th Annual CMC FF Championships (Cat. II). Site: Samuels East Park. D. Horn CD, 5956 Burgandy, Dallas, Tex. 75230. Sponsor: Cliff Cloud Climbers of Dallas

JUNE 16-17—PENSACOLA, FLA. (A) Fiesta of Five Flags Southeastern CL & RC Model Meet. Site: NCTC Corry Field. R. Fritz CD, 1005 Revere Dr., Pensacola, Fla. 32505. Sponsor: Pensacola Aeromodelers.

JUNE 16-17—RIDGEFIELD, CONN. (AAA) Eastern RC Aerobatic RC Championships. Site: Richardson Field. R. Noll CD, 8 Seneca Rd., Danbury, Conn. 06810. Sponsor: Fairfield League of Yankee Radio Controllers, Inc.

JUNE 16-17—FT. WORTH, TEX. (AAA) Texas State CL Model Airplane Championships. Site: Z. Boaz Park. J. Storrie CD, 1415 Austin, Denton, Tex. 76201. Sponsor: Cowtown Circle Burners.

JUNE 16-17—ELSINORE, CALIF. (AA) Max Men Annual 14th FF (Cat. I) Meet. Site: Lake Elsinore. V. Cunnyngham, Jr. CD, 19616 Benwood, Covina, Calif. 91724.

JUNE 16-17—DAHLGREN, VA. (AA) Annual Northern Virginia RC Contest. Site: Dahlgren Naval Weapons Laboratory. R. Burnett CD, 2113 Sheriff Ct., Vienna, Va. 22180. Sponsor: Northern Virginia RC Club.

JUNE 17—NORFOLK, VA. (AA) Norfolk Aeromodelers Annual CL Meet. Site: Norfolk. E. Regan CD, 4200 Mayflower Rd., Norfolk, Va. 23508. Sponsor: Norfolk Aeromodelers.

JUNE 17—MANVILLE, N.J. Somerset Signal Senders Interclub Meet. Site: SSS Field. H. Wachter CD, 139 New Amwell Rd., Somerville, N.J. 08876. Sponsor: Somerset Signal Senders.

JUNE 17—FELTON, DELA. (A) ECSS Thermal Soaring RC Contest. Site: Felton. G. Durney CD, 107 Silver Lake Dr., Dover, Dela. 19901. Sponsor: Dover Mosquitoes.

JUNE 17—HENRICO COUNTY, VA. Curles Neck RC Glider Fun Fly. Site: Curles Neck Farm. J. Novak, Jr. CD, P.O. Box 539, Chester, Va. 23831. Sponsor: Curles Neck FF & Soaring Soc.

JUNE 17—LAKEHURST, N.J. N.J. RC Club 3rd Annual Old Timers Meet. Site: Lakehurst N.A.S. R. Glasgow CD, 48 E. Maltbie Ave., Suffern, N.Y. 10901. Sponsor: North Jersey RC Club.

JUNE 17—ST. CHARLES, ILL. (A) Flying Fools RC Pylon Races. Site: St. Charles RC Field. F. Morosky CD, 6416 W. 33rd St., Ber-

wyn, Ill. 60402. Sponsor: Chicago Pylon Club & Flying Fools.

JUNE 17—DANSVILLE, MICH. (A) C.A.R.D.S. First Annual RC Stand-Off Scale Jamboree. Site: Dansville. C. Spencer CD, 236 Theo St., Lansing, Mich. 48917. Sponsor: Capital Area Radio Drone Squadron.

JUNE 17—CINCINNATI, OHIO (AA) Queen City CL "Summer's Here Contest." Site: Lunken Airport. W. Messerly CD, 1122 Eight Mile Rd., Cincinnati, Ohio 45230. Sponsor: Queen City U-Control.

JUNE 17—W. SUFFIELD, CONN. (A) Nor'East RC Air Races '73. Site: W. Suffield. B. Williams CD, 347 Southwick Rd., Westfield, Ma. 01085. Sponsor: Northern Connecticut RC Club.

JUNE 17—JAMESTOWN, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Jamestown. W. Johnson CD, 153 Hallock St., Jamestown, N.Y. 14701.

JUNE 17—SALEM, N.H. (AA) 4th Annual Salem CL Model Airplane Fair. Site: Salem High School. R. Sherman CD, 408 River Rd., Tewksbury, Mass. 01876. Sponsor: Merrimac Valley Air-Istocrats.

JUNE 17—SPRINGFIELD, MO. (AA) Spring Balsa Bust CL Meet. Site: Meador Park. B. Akers CD, 1126 Mt. Vernon, Springfield, Mo. 65806. Sponsor: Springfield Balsa Busters.

JUNE 22-24—SPOKANE, WASH. (AAA) Spokane CL Nationals. Site: Geiger Field. D. Carson CD, N. 6626 Freeman, Spokane, Wash. 99205.

JUNE 23-24—DAHLGREN, VA. (AA) National Capitol RC Pattern Tournament. Site: U.S. Naval Weapons Laboratory. T. Carey CD, 17900 Cliffbournela, Derwood, Md. 20855. Sponsor: DC/RC Club.

JUNE 23-24—MELBOURNE, FLA. (AA) Fingercrackers 2nd Annual CL Championships. Site: Brevard Jai Alai Fronton. B. Day CD, 4353 Thistleberry Dr., Melbourne, Fla. 32935. Sponsor: Fingercrackers.

JUNE 23-24—MARSHALL, TEX. (AAA) N.E. Texas FF & CL Championships. Site: Harrison County Airport. T. Southern CD, 2207 Paul, Longview, Tex. 75601. Sponsor: N.E. Texas M.A.C.

JUNE 23-24—COLUMBIA, MO. (AA) Mid-Missouri First Open RC Meet. Site: Old Municipal Airport. B. Webb CD, P.O. Box 475, Columbia, Mo. 65201.

JUNE 23-24—HILLSBORO, ORE. (AA) Nor'Westers 5th Annual FF Contest. Site: Hillsboro, J. Lenderman CD, Rt. 2, Box 460, St. Helens, Ore. 97051.

JUNE 23-24—DAYTON, OHIO (AA) Wright Brothers Memorial Annual RC Meet. Site: Wright Patterson A.F.B. D. Lowe CD, 3491 Clar-Von Dr., Dayton, Ohio 45430. Sponsor: Western Ohio RK Society.

JUNE 23-24—ANDREWS A.F.B., MD. (AA) National Capitol RC Pattern Tournament. Site: Andrews A.F.B. T. Carey CD, 17900 Cliffbournela, Derwood, Md. 20855. Sponsor: DC/RC Club.

JUNE 23-24—NEWARK, CALIF. (A) California Standoff Scale Championships. Site: Willow Ave. G. Horstman CD, P.O. Box 356, Milpitas, Calif. 95035. Sponsor: Southern Alameda County Radio Controllers.

JUNE 23-24—MARIETTA, GA. (AA) 5th Annual CCRC Pattern Meet. Site: CCRC Club Field. J. Harper CD, 900 Piedmont Cir., Marietta, Ga. 30062.

JUNE 23-24—VALLEY FORGE, PENNA. (A) Second Annual Valley Forge RC Scale Classic. Site: Valley Forge. N. Evans CD, 970 Steven Ln., Wayne, Pa. 19087. Sponsor: Valley Forge Signal Seekers.

JUNE 23-24—OSSEO, MINN. (AAA) 10,000 Lakes CL Championships. Site: N. Hennepin Junior College. R. Kampmann CD, 2443 Pillsbury Ave., S. Minneapolis, Minn. 55404. Sponsor: Minneapolis Piston Poppers, Inc.

JUNE 23-24—WICHITA, KANS. (AAA) 13th Midwestern FF, CL & RC Championships. Site: 13th & Webb Rds. M. Tallman CD, 3014 Exchange, Wichita, Kans. 67217. Sponsor: Wichihawks.

JUNE 23-24—MONROE, N.C. (AA) MR/CC RC Air Races. Site: Monroe. C. Whilden CD, 4735 Emery Ln., Charlotte, N.C. Sponsor: Monroe RC Club.

JUNE 23-24—CORPUS CHRISTI, TEX. (AA) Corpus Christi RC Club Meet. Site: Waldron Field. G. Stephens CD, 705 John Lee, Corpus Christi, Tex. 28412. Sponsor: Corpus Christi RC Club.

JUNE 24—LINCOLN PARK, N.J. (A) G.S.C.B. Mid Summer CL Meet. Site: Lincoln Park. E. Dickson CD, 36 Vreeland Ave., Clifton, N.J. 07011. Sponsor: Garden State Circle Burners.

JUNE 24—BRIDGEWATER, MASS. FAI FF Trials. Site: Bridgewater, S. Colson CD, 47 Sammet St., Everett, Mass. Sponsor: New England Wakefield Group.

JUNE 24—SUAMICO, WISC. Annual Fun-Picnic for Misc. Activities. Site: Suamico Airport. R. Cowles, Jr. CD, 2424 Ducharme Ln., Green Bay, Wisc. 54301.

JUNE 24—LAKEHURST, N.J. Old Timers FF by RC Eastern States Championships. Site: Lakehurst N.A.S. A. Thoms CD, 33 Cambridge Dr., Berkeley Hgts., N.J. 07922. Sponsor: Central Jersey RC Club.

JUNE 24—SPRING VALLEY, ILL. (A) IVRC Annual RC Contest. Site: Spring Valley Airport. H. Sutherland CD, 303 Thompson, Princeton, Ill. 61356. Sponsor: Illinois Valley Radio Control Club.

JUNE 24—FRESNO, CALIF. (A) F.G.M.C. Monthly FF (Cat. I) Meet. Site: Ave. 12, Road 37 1/2. F. Ginder, Jr. CD, 5740 E. Ashlan Ave., Fresno, Calif. 93727. Sponsor: Fresno Gas Model Club.

JUNE 24—WASHINGTON, D.C. (AA) Summer CL Meet. Site: Anacostia Naval Air Station. M. Strieter CD, 459 University Blvd. E., Silver Spring, Md. 20784. Sponsor: Sky Lancers of Washington, D.C.

JUNE 24—HADLEY, MASS. (A) Hampshire County Wind Free Glider RC Meet. Site: Hadley. R. Barkowski CD, 32 Lyman St., Easthampton, Mass. 01027. Sponsor: Hampshire County Radio Controllers.

JUNE 24—CHAGRIN FALLS, OHIO (B) 2nd Annual Great Lakes Rubber Scale Indoor Meet. Site: Savage Road. V. Didelot CD, 4410 Lorna Ln., Erie, Penna. 16506. Sponsor: Erie Model Aircraft Assn.

JUNE 24—CLEVELAND, OHIO (AA) Cleveland CL Rally. Site: Cleveland CL Model Field. J. Grega CD, 355 Grand Blvd. Bedford, Ohio 44146. Sponsor: Lakewood Flightmasters & Lake Erie Gas Model Club.

JUNE 24—BALLSTONSPA, N.Y. (A) Empire State RC Racing Meet. Site: Saratoga County Airport. A. Sattler CD, 29 Waldorf Pl., Schenectady, N.Y. 12307. Sponsor: Thundervolts RC Club, Inc.

JUNE 24—OLEAN, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Olean. B. Brown CD, 1255 High St., Bradford, Pa. 16701.

JUNE 24—RICE LAKE, WISC. (A) Hawks Friendly Summer FF (Cat. II) Contest. Site: Barron County Campus. F. Kelley CD, 20 Phipps Ave., Rice Lake, Wisc. 54668. Sponsor: Hardscrabble Hawks Model Airplane Club.

JUNE 24—DALLAS, TEX. (A) 1/4 Midget RC Pylon Race. Site: Northlake Field. D. Hyde CD, 207 Leda Dr., Dallas, Tex. 75218. Sponsor: Dallas RC Club.

JUNE 24—GREENVILLE, PENNA. MERCO MACS RC Fun Fly. Site: Club Field. W. Curtis CD, RD No. 2, Greenville, Penna. 16125. Sponsor: MERCO MACS.

JUNE 24—ROCKFORD, ILL. (AA) Annual Rockford Aeromodelers CL Meet. Site: Riverdahl School. J. Tappainer, Sr., CD, 508 Pearl St., Rockford, Ill. 61108. Sponsor: Rockford Aeromodelers

JUNE 24—BENTON HARBOR, MICH. (A) 2nd Annual RC Glider Meet. Site: Benton Harbor. A. Lukaszewski CD, 3310 S. Lakeshore Dr., St. Joseph, Mich. 49085. Sponsor: Whirlwinds of SW Michigan.

JUNE 29-30—ANAHEIM, CALIF. (B) Orbit Invitational RC Helicopter Meet. Site: Anaheim Convention Center. J. Elliot CD, 19412 Olana Ln., Huntington Bch., Calif. 92646.

JUNE 30-JULY 1—CLEVELAND, OHIO (AA) 7th Annual Cleveland Aeromodel Sport CL Race. Site: Cleveland Hopkins CL Field. R. Sargent CD, 1694 Wright Ave., Rocky River, Ohio 44116.

JUNE 30-JULY 1—OKLAHOMA CITY, OKLA. (AA) TORKS Annual RC Meet. Site: TORKS Field. R. Freeland, JR. CD, 7308 N. Western, Oklahoma City, Okla. 73116.

JUNE 30-JULY 1—CHATTANOOGA, TENN. (AA) 3rd Annual T.V.R.C. RC Meet. Site: T.V.R.C. Field. J. Wyatt CD, 502 Young Ave., Chattanooga, Tenn. 37405. Sponsor: Tennessee Valley RC Club.

JUNE 30-JULY 1—SYRACUSE, N.Y. (AA) Syracuse ARCS 2nd Annual RC Pattern Meet. Site: A.R.C.S. Field. W. Thorne CD, 208 Windemere Rd., Syracuse, N.Y. 13219. Sponsor: Aero Radio Club of Syracuse.

JUNE 30-JULY 1—ABILENE, TEX. (AAA) 5th Annual Key City Prop Twisters CL Meet. Site: Sea Bee Park. R. Patty CD, 1718 Highland, Abilene, Tex. 79605. Sponsor: Key City Prop Twisters.

JUNE 30-JULY 1—MANKATO, MINN. (AAA) Annual Midwest CL Championships. Site: Madison East Shopping Center. D. Nirk CD, 821 N. 2nd St., Mankato, Minn. 56001. Sponsor: Mankato Modeleers.

JUNE 30-JULY 1—MOWEAQUA, ILL. (A) Blunderbirds RC Thermal Soaring Contest. Site: Kroenlein's Airport. D. Holtfreter CD, P.O. Box 366, Blue Mound, Ill. 62513. Sponsor: Decatur Blunderbirds.

JULY 1—MENTOR, OHIO (A) MARCS FireCracker Class RC Meet. Site: Tyler Blvd. R. Penko CD, 21151 Westport Ave., Euclid, Ohio 44123. Sponsor: Mentor Area RC Society.

JULY 1—EDWARDSVILLE, ILL. East Side 2nd RC Fun Fly Jamboree. Site: Edwardsville. G. Shade CD, 3017 Maryville Rd., Granite City, Ill. 62040. Sponsor: East Side RC Club.

JULY 1—LOCKPORT, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Lockport. R. Danilowicz CD, Creek Rd., Youngstown, N.Y. 14174.

JULY 1—LAKEHURST, N.J. Old Timers FF-RC Meet. Site: Lakehurst N.A.S. E. Woodman CD, 389 Floral Ln., Saddle Brook, N.J. 07642.

JULY 1—LIVINGSTON, N.J. (AA) Second Annual Flying Tigers CL Air Meet. Site: G.V. Controls. C. Schaefer CD, 514 N. Chestnut St., Westfield, N.J. 07090. Sponsor: Livingston Flying Tigers.

JULY 1—TULSA, OKLA. (A) Tulsa Glue Dobbers Spring RC Soaring Meet. Site: Oral Roberts University. D. Darnell CD, 1618 E. 45th Pl., Tulsa, Okla. 74105. Sponsor: Tulsa Glue Dobbers.

JULY 1—ELK GROVE VILLAGE, ILL. (AA) Skylarks Annual RC Meet. Site: Ned Brown Preserve. D. Gauer CD, 832 C Colonial, Wheeling, Ill. 60090. Sponsor: Skylarks.

JULY 1—CHAGRIN FALLS, OHIO (AA) Summer Old Timer FF Bash. Site: Chagrin Falls. R. Reuter CD, 4670 Columbia Rd., N., Olmsted, Ohio 44070. Sponsor: Northern Ohio FF Assn.

JULY 4—VINELAND, N.J. (A) 4th of July Annual CL Meet. Site: Lanois Park. P. Haley CD, Braddock Ave., RD No. 5, Hammonton, N.J. 08037. Sponsor: South Jersey Aeromodelers.

JULY 7-8—ALBANY, GA. (AAA) Georgia State FF, CL & RC Championships. Site: Albany N.A.S. H. Myers CD, 1565 Crider Rd., Apt. 34C, Marietta, Ga. 30062. Sponsor: Albany RC Club & Cobb County Sky Rebels.

JULY 7-8—KENT, WASH. (AAA) BMA Scholarship Contest-4th Annual FF, Ind, CL & RC Meet. Site: Kent Space Center. H. Smith CD, 1417 NW 191st St., Seattle, Wash. 98177. Sponsor: Boeing Charterhawks.

JULY 7-8—DAVENPORT, IOWA (AA) Davenport RC Annual Aerobatic Contest. Site: Scott County Park. J. Duda CD, 2205 Gaines St., Davenport, Iowa 52804.

JULY 7-8—LYONS, N.Y. 2nd Annual New York State Fly for Fun. Site: Layton St. Road. H. Ford CD, 11 Stephens St., Clifton Springs, N.Y. 14432. Sponsor: Sky Rovers Flying Club, Inc.

JULY 7-8—MONROE, N.C. (A) 1st Annual MR/CC Grand Glitch-In. Site: Monroe. B. Helms CD, 800 Tyvola Rd., Charlotte, N.C. 28210. Sponsor: Monroe RC Club.

JULY 7-8—SPRINGFIELD, MO. (AA) Springfield RC Club 3rd Annual AMA RC Contest. Site: Springfield RC Airport. G. Langston CD, P.O. Box 985, Springfield, Mo. 65801. Sponsor: Springfield RC Club.

JULY 8—HEMPSTEAD, N.Y. (AA) Meroke 9th Annual RC Meet. Site: Mitchel Field. R. Geyer CD, 913 Washington St., Baldwin, N.Y. 11510. Sponsor: Meroke RC Club.

JULY 8—AUSTIN, TEX. (AA) Capitol Aeroneers June CL Contest. Site: Pending. J. Yesenik, CD, 408 Radam Ln., Austin, Tex. 78745. Sponsor: Capitol Aeroneers.

JULY 8—ST. LOUIS, MO. (AA) Pre-Nats CL Championships. Site: Buder Park. M. Heard CD, 11051 Mollerus, No. 101, St. Louis, Mo. 63138. Sponsor: Hot Heads Model Airplane Club.

JULY 8—SALINA, KANS. M.A.R.C.S. 1st Annual Fun Fly. Site: Old Municipal Airport. D. Moden, CD, 410 Hart, Salina, Kans. 67401. Sponsor: M.A.R.C.S.

JULY 8—DENVER, COLO. (A) MMM Monthly FF (Cat II) Meet. Site: E. Colfax Airpark. J. Murphy CD, 2432 Astron Dr., Colorado Springs, Colo. 80906. Sponsor: Magnificent Mountain Men.

JULY 8—YORK, PENNA. York Area RC/ECSS Glider Meet. Site: York. D. Goughnour CD, RD 2, Red Lion, Penna. 17356. Sponsor: York Area RC Club.

JULY 8—DAYTON, OHIO (AA) Mid Summer Spectacular CL Meet. Site: Municipal Flying Circles. C. Short CD, 346 Lawvery Ln., Dayton, Ohio 45431. Sponsor: Dayton Buzzin Buzzards.

JULY 8—BUFFALO, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Buffalo. H. deBolt CD, 49 Colden Ct., Buffalo, N.Y. 14225.

JULY 8—PORTLAND, ORE. March of Dimes Fun Fly. Site: Portland. R. Wright CD, 401 NE Bridgeton Rd., Portland, Ore. 97211. Sponsor: Barnstormers.

JULY 8—ODESSA, TEX. Odessa, Tex. Odessa Prop Busters RC Annual Fun Fly. Site: Odessa RC Flying Field. J. Davis CD, 4405 Buffalo, Odessa, Tex. 79760. Sponsor: Odessa Prop Busters RC Club.

JULY 8—APPLETON, WISC. (A) Valley Aero Annual Meet. Site: Wijand E. J. Schmieding CD, 2118 N. Division St., Appleton, Wisc. 54911. Sponsor: Valley Aero Modelers.

JULY 8—E. GRANBY, CONN. (A) NCRCC RC Pylon Race. Site: NCRCC Field. R. Bernier CD, 761 Mather St., Suffield, Conn. 06078. Sponsor: Northern Conn. RC Club.

JULY 14-15—FREMONT, NEBR. (AA) 1st Annual Frontier Flyers RC Meet. Site: Fremont. R. Stansbury CD, 9348 Camden Ave., Omaha, Neb. 68134. Sponsor: Frontier Flyers, Inc.

JULY 14-15—MENOMONEE FALLS, WISC. (AA) 3rd Annual Pre-Nats RC Warmup. Site: Aero Park Airport. F. Morrissey CD, 14100 W. Park Ave., New Berlin, Wisc. 53151. Sponsor: Milwaukee Flying Electrons, Inc.

JULY 14-15—WALLOPS ISLAND, VA. (AA) "MARKS" 8th Annual RC Contest. Site: Wallops Station. H. Jones CD, 59 Aigburth Ave., Towson, Md. 21204. Sponsor: Mid-Atlantic RK Soc.

JULY 14-15—CHARLESTOWN, R.I. (AA) Southern New England RC Championships. Site: Charlestown N.A.S. A.M. Schindler CD, Bolduc Dr., Ledyard, Conn. 06339. Sponsor: RC Propbusters, Inc.

JULY 14-15—FARGO, N.D. (AA) 16th Annual Red River Valley CL Championships. Site: F.M. Skylarks Field. M. Olson CD, 305 27th Ave., N., Fargo, N.D. 58102. Sponsor: F.M. Skylarks.

JULY 14-15—ENDICOTT, N.Y. (AA) 18th Annual Aeroguidance Society RC Contest. Site: Tri-Cities Airport. W. Johnson CD, 833 W. Circle Dr., Vestal, N.Y. 13850. Sponsor: Aeroguidance Society, Inc.

JULY 14-15—HOUSTON, TEX. (A) Houston RC Soaring Meet. Site: Houston RC Field. B. Striegler CD, 5831 McKnight, Houston, Tex. 77035. Sponsor: Houston RC Club.

JULY 14-15—TULLAHOMA, TENN. (AA) Coffee Airfoilers 14th Annual RC Contest. Site: Airfoilers Field. C. Anderson CD, Rt. 4, Box 154, Tullahoma, Tenn. 37388. Sponsor: Coffee Airfoilers Model Airplane club.

JULY 14-15—POCATELLO, ID. (AA) PGA 4th Annual CL Invitational Model Airplane Contest. Site: Highland High School. B. Diegel CD, P.O. Box 2307, Pocatello, Id. 83201. Sponsor: Pocatello Glue Angels.

JULY 15—BLAINE, MINN. (AA) Annual Summer FF (Cat. II) Meet. Site: Hentges Sod Farm. L. Stockstad CD, 2648 Carlson Dr., Coon Rapids, Minn. 55433. Sponsor: Minneapolis Model Aero Club.

JULY 15—DANSVILLE, MICH. (A) C.A.R.D.S. 3rd Annual RC Soar-In. Site: Dansville. T. Kelley CD, 2929 Grandell Ave., Lansing, Mich. 48906.

JULY 15—MULBERRY, FLA. (A) Southeastern Sailplane RC Championships. Site: Imperial RC Club Mulberry Field. R. Meland CD, P.O. Box 886, Lakeland, Fla. 33803. Sponsor: Imperial RC Club, Inc.

JULY 15—FT. LEWIS, WASH. (A) 1st Annual Old Timers "Hot Lumber" Meet. Site: Harts Lake Prairie. D. Dodd CD, 10848 32nd Ave., SW, Seattle, Wash. 98146. Sponsor: Boeing Charter Hawks.

JULY 15—ST. LOUISVILLE, OHIO (AA) Licking County RC Meet. Site: A. Neithers Farm. A. Dupler CD, Box 186, Millersport, Ohio 43046. Sponsor: Licking County RC Club.

JULY 15—PIKE, N.Y. (A) Western New York FF Society FF Meet. Site: Pike. D. Evans CD, 175½ South First, Bolivar, N.Y. 14715.

JULY 15—TUCSON, ARIZ. (A) CCMAC Summer CL Slow Fest. Site: Rodeo Park. E. Hagerlin CD, 8331 E. 3rd St., Tucson, Ariz. 85710. Sponsor: Cholla Choppers M.A.C.

JULY 15—NAPERVILLE, ILL. (A) 1st Naperville CL Railey. Site: Naperville. R. Vojslavek CD, 7819 Chestnut Ave., Woodridge, Ill. 60515. Sponsor: Fox Valley Falcons & Naperville Barnstormers.

JULY 15—HADLEY, MASS. (A) Hampshire County Grand Prix RC Air Races. Site: Hadley. B. Sparrow CD, 418 Meadow St., Agawam, Mass. 01001. Sponsor: Hampshire County Radio Controllers.

JULY 15—DES MOINES, IOWA (AA) Central Iowa Aeromodelers CL Meet. Site: South East Hartford. R. Baldus CD, 6719 Colby, Des Moines, Iowa 50311. Sponsor: Central Iowa Aeromodelers.

JULY 21-22—TORONTO, CANADA. A, B & C Pattern & Standoff Scale Meet. Site: Markham Rd. & Finch Ave. D. Crichton CD, 119 Wildwood Cres., Toronto, Canada.

JULY 21-22—TULSA, OKLA. (AAA) Tulsa Glue Dobbers Annual No. 24 FF (Cat. II) & RC Meet. Site: Tulsa. R. Sewell CD, 9320 E. 3rd Pl., Tulsa, Okla. 74112. Sponsor: Tulsa Glue Dobbers.

JULY 21-22—COUNCIL BLUFFS, IOWA (AA) Cobras RC Pattern & Scale Meet. Site: Cobras Flying Field. D.K. Hutcheson CD, 317 Spencer Ave., Council Bluffs, Iowa 51501.

JULY 21-22—ALEXANDRIA, MINN. Golden Eagles Model Plane Club CL Meet. Site: West 17th & Ash Flying Field. C. Newstrom CD, 117 5th Ave., W., Alexandria, Minn. 56308.

JULY 22—OLEAN, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Olean. B. Brown CD, 1255 High St., Bradford, Penna. 16701.

JULY 22—ELK GROVE, ILL. (A) RC Pylon Races. Site: Chicagoland. D. Swindell CD, 842 C Colonial, Wheeling, Ill. 60090. Sponsor: Chicago Pylon Club.

JULY 22—PLEASANTON, CALIF. WAFFC Fifth Annual Cat. II Meet. Site: Pleasanton. R. Douglas CD, 5303 Calderwood Ln., San Jose, Calif. 95118. Sponsor: Oakland Cloud Dusters.

JULY 22—WHEELING, ILL. (AA) Red Barons 3rd Annual CL Meet. Site: Wolf and Palatine Roads. H. Cain CD, 525 Weidner Rd., Buffalo Grove, Ill. 60090. Sponsor: Red Barons M.A.C.

JULY 22—MYSTIC, CONN. SAM-7 Old Timer Summer Outing. Site: Lantern Hill. J. Whittles CD, 43 Farview Ave., Saybrook, Conn. 06475. Sponsor: Society of Antique Modelers Chapter 7.

JULY 22—ELSINORE, CALIF. (AA) Thunderbugs Summer FF (Cat. II) Fling. Site: Lake Elsinore. J. Norcross CD, 4836 W. 123rd St., Hawthorne, Calif. 90250. Sponsor: Thunderbugs.

JULY 22—MANSFIELD, OHIO (AA) Electronic Flyers RC Pylon Races. Site: Mt. Zion Road. M. Kalish CD, 235 Cline Ave., Mansfield, Ohio 44907. Sponsor: Electronic Flyers.

JULY 22—HUNTSVILLE, ALA. (AA) MACH OT and FAI Meet. Site: Old Huntsville Airport. L. Baker, Jr. CD, 701 Esslinger Rd., Huntsville, Ala. 35802. Sponsor: Model Airplane Club of Huntsville.

JULY 28-29—MINNEAPOLIS, MINN. (AA) 17th Annual T.C.R.C. RC Meet. Site: T.C.R.C. Field. J. Duncan CD, 3835 Tonkawood Rd., Minnetonka, Minn. 55343. Sponsor: Twin City Radio Controllers, Inc.

JULY 28-29—GREENWOOD, S.C. 5th Annual Piedmont Fun Fly. Site: Greenwood County Airport. C. Boyd CD, 321 E. Boundary, Aiken, S.C. 29801.

JULY 28-29—FLOSSMORE, ILL. (AA) 6th Annual S.A.C. RC Meet. Site: Flossmore. J. Grier CD, 20824 Sparta Ln., Olympia Fields, Ill. 60461. Sponsor: Suburban Aero Club of Chicago.

JULY 29—FRESNO, CALIF. (A) F.G.M.C. Monthly FF (Cat. I) Meet. Site: Ave. 12, Road 37½. F. Ginder, Jr. CD, 5740 Ashlan Ave., Fresno, Calif. 93727. Sponsor: Fresno Gas Model Club.

JULY 29—HOUSTON, TEX. (A) MSCRCC 2nd Annual RC Soaring Meet. Site: Manned Spacecraft Center. O. Morris CD, 130 Driftwood, Seabrook, Tex. 77586. Sponsor: Manned Spacecraft Center RC Club.

JULY 29—LAKEHURST, N.J. (A) Monmouth M.A.C. Third Annual RC Soaring Meet. Site: Lakehurst N.A.S. R. Roane CD, 39 Monroe St., Keyport, N.J. 07735. Sponsor: Monmouth Model Airplane Club, Inc.

JULY 29—VALLEY PARK, MO. All Model Air Show. Site: Buder Park. R. Underwood CD, 4109 Concord Oaks Dr., St. Louis, Mo. 63128. Sponsor: Greater St. Louis Modeling Assn.

JULY 29—MUNCIE, IND. (A) 2nd Annual Muncee Skychiefs Fun Fly. Site: Club Field. G. Bussell CD, RR No. 7, Box 228D, Muncie, Ind. 47305. Sponsor: Muncee Skychiefs.

JULY 29—HADLEY, MASS. (A) Hampshire County Grand Prix RC Air Races. Site: Hadley. R. Barkowski CD, 32 Lyman St., Easthampton, Mass. 01027. Sponsor: Hampshire County RC.

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MOONEY ON FF

(Continued from page 34)

Beardmoe Wee Bee. Clarence Mather had his beautiful PT-19 flying very smoothly until it collided with the wall. He caught it in compression between himself and the wall to the groans of sympathy from the rest of the contestants. Clarence took first in open Peanut with his Nesmith Cougar. Doug Fronius took first in Junior Peanut with his clipwing cub. He had the Peanut with the most wing area in his Staib midget low wing, the lowest aspect ratio model at the contest.

This is an Ord Hume OH-7 by Ernie Wrisley. At the night indoor meet it really scored on duration (pinned to the light fixture).

CHECK PLANS SERVICE PG 84

DON LOWE ON RC

(Continued from page 46)

Starters: Some time ago Horace Hagen of helicopter fame performed some tests with various commercial engine starters. His tests were simple but revealing in the large variance in torque available and power consumption between the different brands. Most commercial starters available will crank your favorite engine up to about 60 size, but helicopters require *lots* of torque as I've been finding out. Horace's tests revealed about a 2.5 to 1 difference in torque available from the weakest to the strongest and a power consumption difference of 5 to 1! So, if you're in the market for a starter, ask about stalled torque and power consumption. It's interesting to note that one starter had twice the torque of another for the same power consumption!

Incidentally, Horace uses a 7 amp hour Ni-Cad pack with his starter. This is good since a NiCad will drop less under load than a common lead-acid battery and will, therefore, provide more torque—but, of course, it's more expensive. Ah, well, that's life.

Unique Pattern Contest: We're always looking for better ways to run the pattern events. Of course, the present A, B, C concept was established to separate fliers on the basis of proficiency and to provide a systematic mechanism for moving up the capability ladder. The DCRC Club came up with a scheme for their annual contest this year which is an interesting variant. It works like this: Every-

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body flies an initial round without categorization in regard to class. On the basis of scores in this one round, five competition classes are established by grouping similar scores. The presumption here, of course, is that the individual capability is demonstrated in one flight and allows categorization on the basis of proficiency. The remaining flights are then flown with each flier competing against only those in his own grouping—different, eh? What do you think?

Something That We've Needed For A Long Time: Have you ever wished for some gadget to warn you of impending fuel exhaustion or time remaining in your pattern flight? Ron Wiensch, one of our local electronic geniuses has developed an electronic timer to zap a buzzer providing such warning. The amazing thing to me is that we haven't had such a device up to now, and, secondly, no sooner had Ron and I gotten our heads together on this little project when I read about a similar device in the Long Island Radio Control Society (LIRCS) Newsletter of a similar development by one of their own, Bob Aberle. Understand Bob's device will be marketed by Telecraft, 14203 121st Ave., N.E., Kirkland, Wash. 98033. His gadget works off the transmitter batteries and emits a loud buzz at intervals from one to ten min. (adjustable). It also keeps telling you to shut off your transmitter when through flying—if you happen to leave it on. Now, nobody does that—right?!

AL RABE ON CL

(Continued from page 46)

cleaned, inspected and reassembled using new vents. If you haven't much experience rebuilding tanks, try these suggestions.

To disassemble a tank, place it over the flame of a gas range until the solder runs. Then lift the tank from the flame and strike the bottom of the tank with a pair of pliers to knock it off. Remove the vents and pickup with a soldering iron.

Clean and inspect the inside of the tank. I clean my tanks with a toothbrush, steel wool and thinner. I've heard that Easy-Off oven cleaner works better and easier. Inspect the inside of the tank for securely installed baffles and, in conventional tanks, proper baffle location. Longitudinal baffles should clear the aft vent of the tank by about 1/16". Engine runs will be poor if the baffle touches the end of the tank.

Before reinstalling the tank ends, replace the vents and pickup with new tubes made from annealed copper. The original brass tubes frequently crack and split along their seams due to vibration and the chemcial action of fuel. Anneal copper tubing by holding it in the flame of a gas range until it glows red. This softens the tubing so that it can be bent by hand. Grind the tubing ends which are to be pointed inside the tank at a 45°

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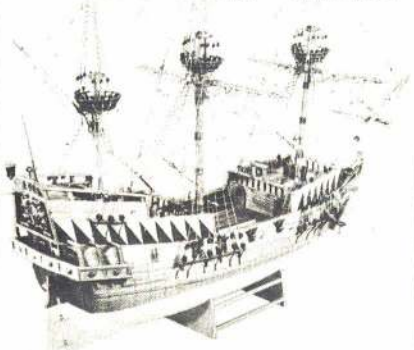

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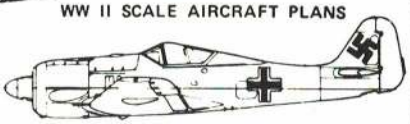

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angle and solder them into place. The pointed ends of the vents should touch the opposite side of the tank. The pointed end of the pick-up should reach the end of the tank. Soldering the pointed ends of the vents is optional but the aft end of the pickup and Uni-flow vents must be soldered in place.

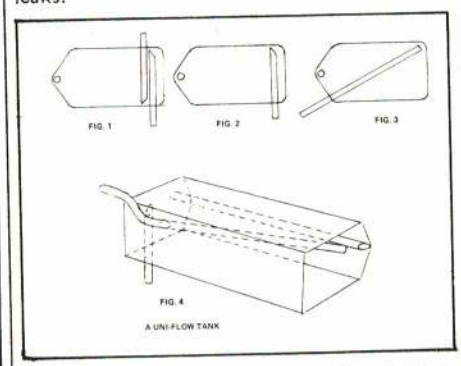
Replace the tank ends using a soldering gun or mini-torch, resin core solder and a good flux. I use a Weller 100/140 gun, Kester "44" solder and Nokorode soldering paste.

Twin engine and semi-scale stunter by Donald Gerber uses two Fox 25s. Its sound would really catch the judges, too.

Both original and attractive, model is called Apogee by builder Bruce Cousins. ST 35 for power, 44 oz. and 45-in. span, covered in white Solarfilm with black and red trim.

Use plenty of heat to really flow the solder around the tank ends.

Finally, pressure test the tank by plugging the vents and pumping air into the pickup with a fuel bulb while holding the tank under water. Bubbles will indicate leaks. Put your entire weight on that bulb to make sure that your tank is free of even the tiniest of pinhole leaks.



After installing the tank in the airplane, bend the soft vents forward into the slipstream to prevent siphoning of fuel overboard. Siphoning wastes fuel, shortens the run and damages the airplane's finish.

Most of my correspondence so far has been from novice stunt fliers. While I sincerely appreciate their letters, I need contributions to the column from experienced fliers who can offer valuable experiences, new techniques and interesting photos. Please send your pictures and information to: Al Rabe, 1904 Valley Oaks Ct., Irving Tex. 75061.

BOB STALICK ON FF

(Continued from page 70)

materials can be heavier than tissue or silk, and they provide little rigidity to the framework, which means that there may be a need to beef up the wing structure with geodetic ribs or additonal spars.

Are there any books, magazines or other literature recommended for a beginner?, asks W.M. Dunlop. You bet, Mr. Dunlop. Some of the best resources for the beginning free flighter are the *Model Aeronautics Yearbooks* by Frank Zaic, available through the AMA or from NFFS Supplies and Services. More recent and more specialized are the NFFS Annual Symposium Reports. There are others, but they are even more specialized. I'd suggest subscribing to all of the general interest magazines, especially **Junior American Modeler.** Of course, you should continue reading **AAM.** Consider joining NFFS and benefit from their newsletter, *Free Flight.* That should get you off to a good start. Information about NFFS can be obtained from NFFS Supplies and Services, P.O. Box 322, Dallas, Ore.

JOHN BLUM ON CL

(Continued from page 70)

this model being Senior Champ several times. The model depicted is a much reworked competition machine, with power unit under constant refining. Model is of basic construction with a tissue-covered balsa skin. The lines used are solid with internal hook-up. The insignia on the lower left wing is used as an access panel.

The engine was originally an ST 29 RV. Then was reworked to convert it to a "35" using a plugged front rotor .35 shaft and a 35 BB piston and sleeve. The carburetor/fuel system is involved. The high-speed system uses a pen bladder with high nitro fuel and an unrestricted venturi with a Tigre needle assembly. Low-speed uses a uniflow suction tank with a restricted Cox TD 049 venturi

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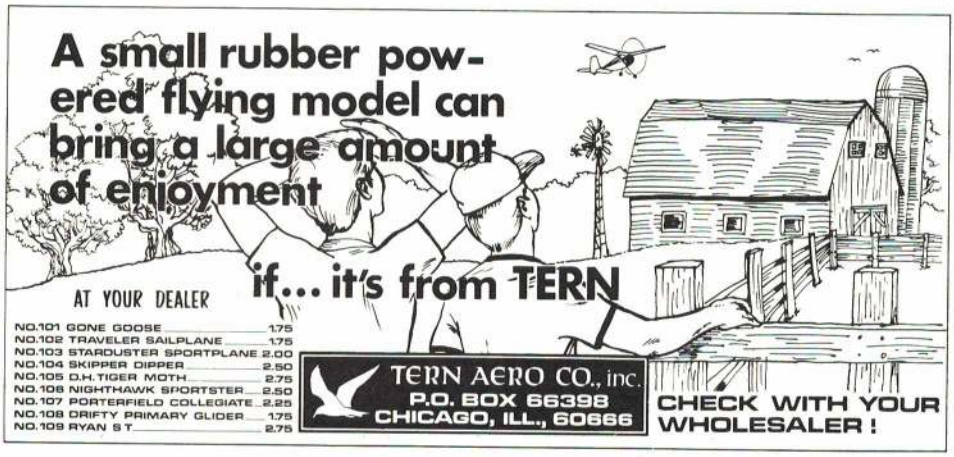
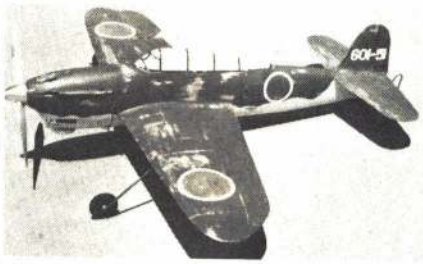


and TD needle assembly. A lower nitro fuel with various idle improvers is used for the lower speed system.

The scale oil cooler inlet duct provides ample cooling for the engine. The machine gun and cannon ports are used for crankcase cooling and venturi air.

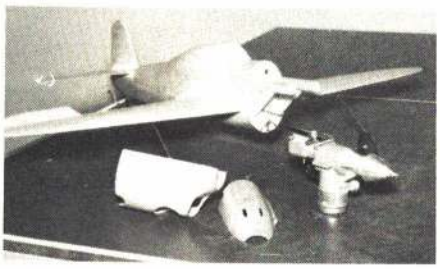
The 1973 season should also present a Class II version of the *Judy*.

Of Important Note: 1973 NATS at Oshkosh, Wisconsin, and the FAI Team Finals for UC at St. Louis, Missouri.



Mean looking plane is the Japanese "Judy" by Terry Herron. Has separate fuel tanks for high and low speed with different fuels, too!

Neatly made and well detailed, still with plenty of access. The model is technically a Yokosuka D4Y2 Suisei Judy—and that's a mouthful.



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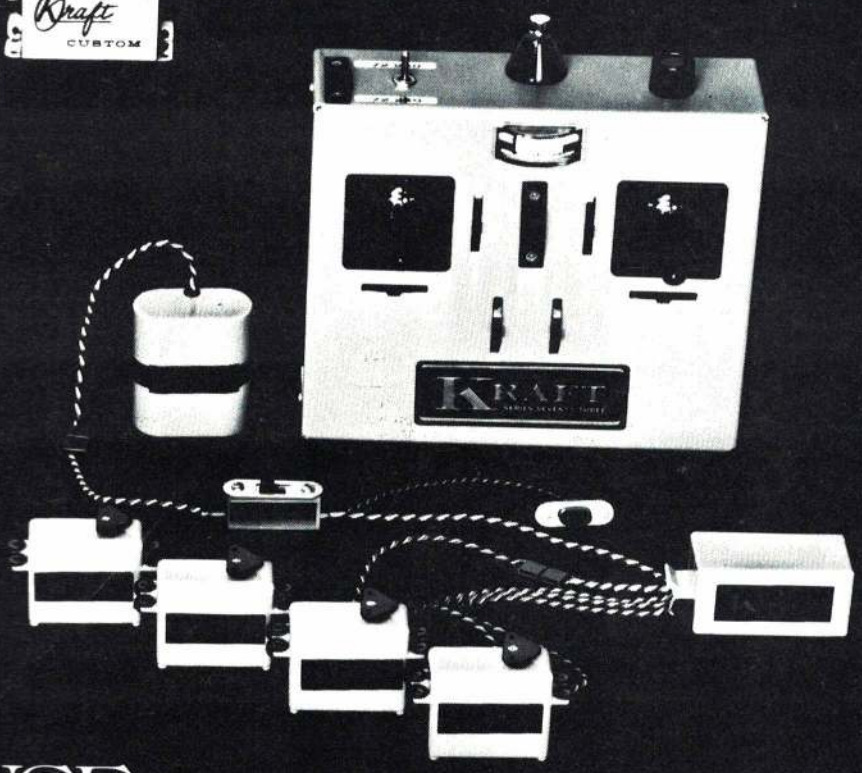

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