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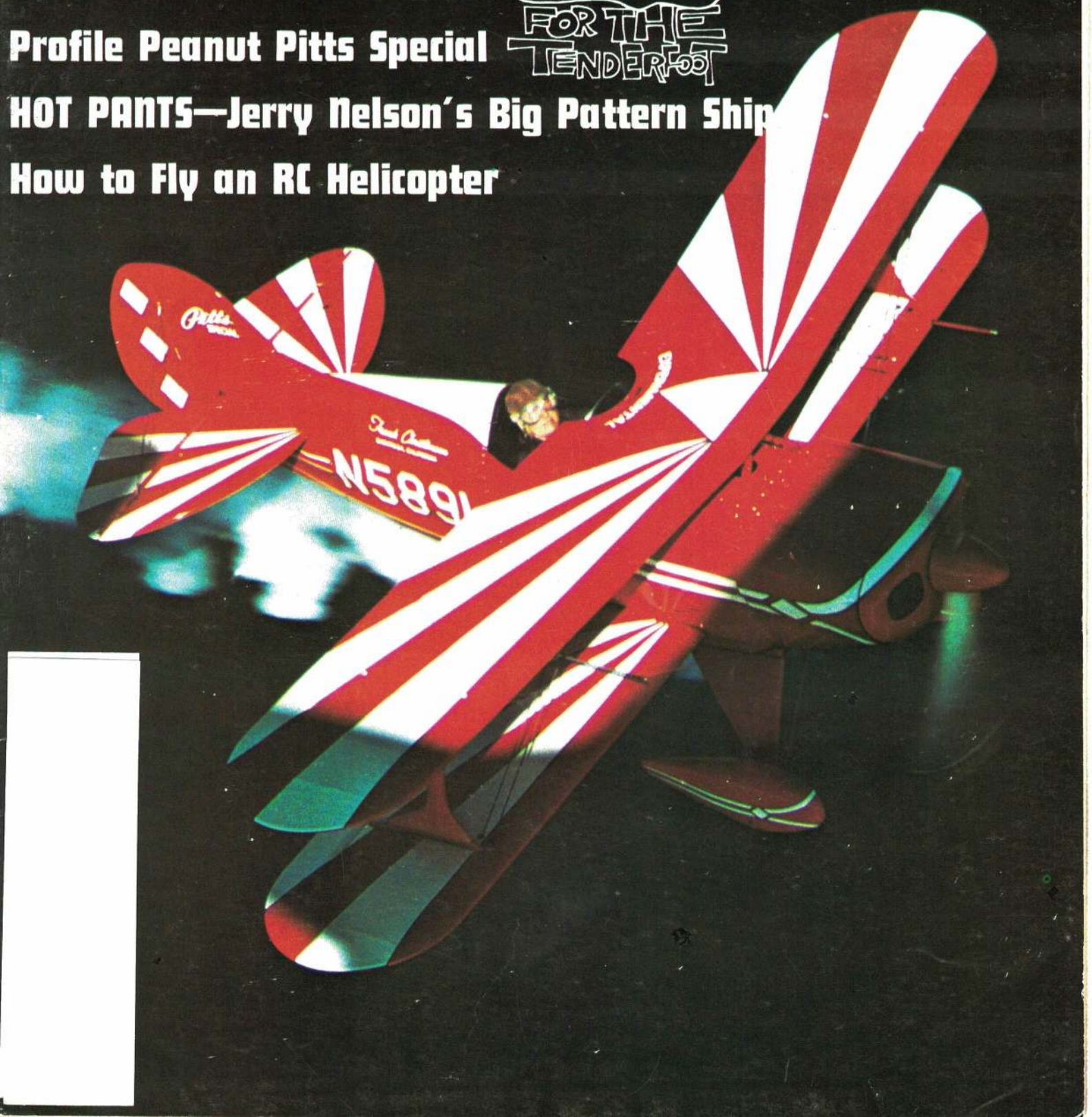

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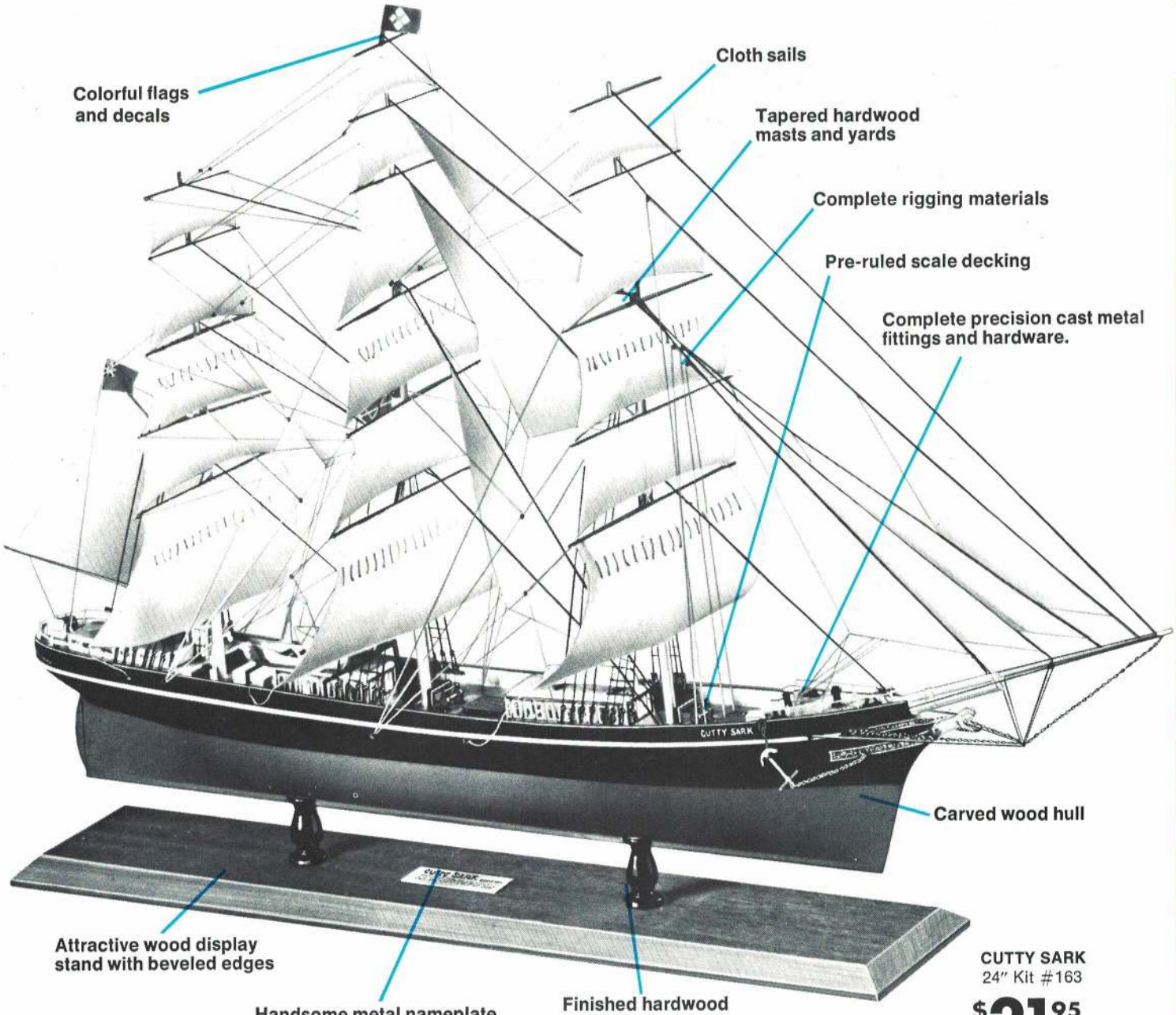

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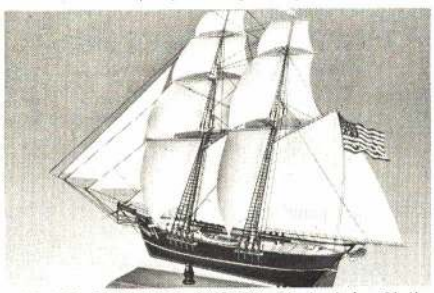

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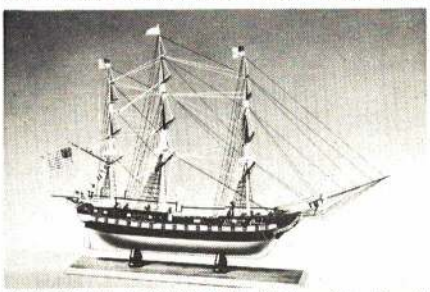

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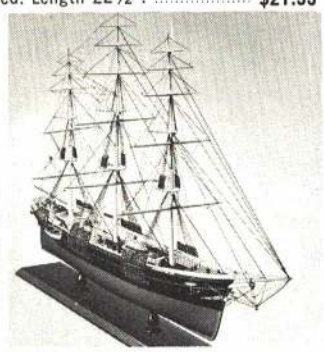

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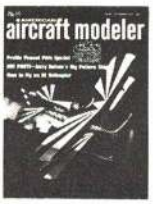

Cover Photo: Jim Caparelli's close-up of Frank Christiansen flying his fully-aerobatic Pitts Special. Tenderfoot Pitts this month could be colored to match this lovely biplane.

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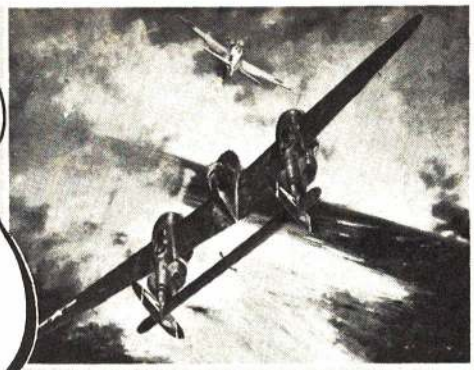

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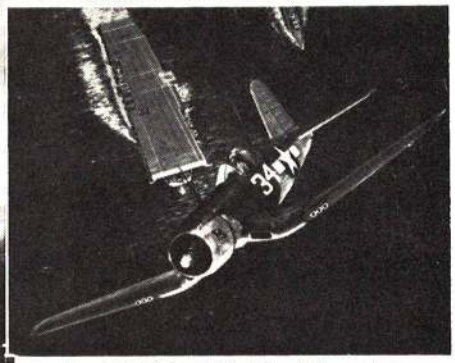

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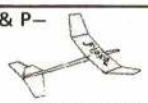

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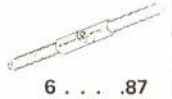

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WHO SAID AEROBATIC MODELS COULDN'T BE PRETTY? YOUR FLY BOY WILL BE AN IDEAL LOW WING R/C TRAINER. WITH ITS MEDIUM SIZE ENGINE, ITS FORGIVING RATE OF ROLL AND ITS GENTLE APPROACH, IT WILL BE JUST THE TICKET AS THE ONE PLANE TO HAVE BEFORE YOU STEP UP TO ALL OUT COMPETITION MODELS. COMES IN A VERY COMPLETE KIT! SPAN 58 IN. ENGINES FROM .29–.36 (R/C TRAINING) TO .40–.50 (PATTERN) FOR 4 CHANNEL PROPORTIONAL.

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ESPECIALLY DESIGNED FOR ALL COX ½A ENGINES! MADE OF CAST ALUMINUM, WEIGHS JUST OVER ½ OUNCE AND IS EASILY ATTACHED TO THE CYLINDER WITH TWO SCREWS. FOR CONVENIENCE, THE TAIL TUBE CAN BE POINTED TO EITHER SIDE OF THE ENGINE!! QUIETS ENGINE WITH LITTLE POWER LOSS. KEEPS PLANE CLEANER BY DIVERTING EXHAUST. KEEPS DUST AND DIRT OUT OF CYLINDER. NO POWER LOSS WHEN TAIL TUBE RESTRICTOR IS REMOVED!

EM-7A–FITS ALL CURRENT MODEL COX 1/2A ENGINES (THICK CYLINDER WALLS)
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REG. $2.98 **$2.76**

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	LIST	SALE
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#8029–.29STD.	$15.95	$10.75
#8035–.35STD.	$16.95	$11.43
#8040–.40STD.	$17.95	$11.99
#8119–.19R/C.	$22.95	$15.48
#8129–.29R/C.	$23.95	$15.99
#8135–.35R/C.	$24.95	$16.83
#8140–.40R/C.	$26.95	$17.47
#8000–.049 WITH TANK MOUNT & PROP.	$ 5.95	$ 2.99

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UNIT OPERATES FROM 1½ VOLTS TO 6 VOLTS AND UP TO 12 VOLTS WITH A MINOR FIELD MODIFICATION (SEE INSTRUCTION SHEET) IT DRAWS LESS CURRENT THAN OTHER ELECTRIC PUMPS SO AS TO EXTEND YOUR BATTERY LIFE. THIS PUMP IS REVERSIBLE. IT BOTH FILLS AND EMPTIES THE FUEL TANK, WITHOUT A DOUBT THE FINEST AND MOST ADVANCED DESIGN ELECTRIC FUEL PUMP EVER AVAILABLE. HAS A 2 YEAR WRITTEN GUARANTEE. AVAILABLE NOW FROM HOBBY PEOPLE! THIS PUMP SELLS REGULARLY FOR $11.95.

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modeler mail

Tall order

I would appreciate all the information you can give me on airplane modeling (gas). Thank you.

Mark Ritter, Lewes, Delaware

That's a tall order, Mark and we would have to write a book. May we suggest that you subscribe to **Junior American Modeler.** *It will prove to be a big help.*

—Publisher

Modeling is kosher

I would like to let some people in on the good side of model aviation for a change. It appears that as long as someone is not disturbed from his regular routine, nothing is wrong with what is happening near him. You can always read about the noise, the danger, the possibilities of this and possibilities of that, so let's alleviate the possibility.

Let's take a look at the bright side. A kid could be sitting at a table building a model plane, rather than out destroying the neighbor's window, or the involved husband could be working on a radio ship, rather than out somewhere doing something that may not be quite kosher.

These are the "big kids" so to speak, kids that develop patience to become scientists, kids that develop dexterity in the ability to use their hands to become doctors. How many of our fine astronauts have built models, or belonged to AMA at some time?

I think the typical John Doe should sit down and make a diversion from "what's wrong," or "what can I find to complain about," to "what's the potential of this. What can this develop into?"

Clay Ott, Bethlehem, Penn.

Airships ain't simple

Spurred by the recent letters about the rigid airships, I thought I might add a few points that I discovered in researching the possibility of an RCRA (Radio Control Rigid Airship) model.

After reading as many books and articles on the subject as I could find, I sat down with slide rule, reference books, and several sheets of paper. I discovered that my experience as a full-scale pilot (fixed wing, jet) and as a small-scale pilot (fixed wing, prop, RC) provided absolutely no help in computing buoyancy problems. However, after some figuring I came up with a theoretically possible model. Unfortunately, using the advertised weight of the lightest radio at that time—and assuming the whole contraption could be built with an empty weight of six pounds—it needed to be slightly under seven feet in length: this assumes that all the internal space could be used for buoyant gas.

The problem in scale airships is that buoyancy (volume) decreases as a cubic function. Cut the linear dimensions of an airship down to ¼, and the volume drops by 4^3 or to 1/64th. At this rate, it takes very few reductions before you have a heavier-than-air model.

Add to this the problem of containing light gases, and the whole question moves out of range for individual modelers. According to publications, the big ships used an exotic substance known as Goat-Beaters skin for the gas bags, since the space between molecules of ordinary rubber or plastic allows the escape of gas molecules at a rapid rate. You can test this quickly by noticing what a short time a helium balloon will stay parked on the ceiling. In fact, the few experiments I did with helium-filled balloons and bags evidenced a very rapid change from a state of neutral buoyancy to one of negative buoyancy.

Add one more factor—the cost of filling a seven-foot ship with helium (which is going to leak out anyway)—and even the affluent modeler is easily discouraged.

As a result, I stuck the several sheets of paper away with other dream items of the past, and got busy on my plain, conventional, much-heavier-than-air model.

One last thought: while the problems and expense of a lighter-than-air ship may be too much for the individual modeler, or even the average club, it seems to me it could be an impressive, easily noticed advertising medium at the big contests if the right companies got together on it.

Dennis J. Lenahan, Wichita Falls, Tex.

More on RC trainers

In response to George Wilson's letter (June 1972 AAM), I must add that I have been the whole route. Single-channel escapement radio-equipped free flight, to reeds, to analog and finally to five-channel proportional.

For the serious-minded starter in RC there is a trainer. Not a kit, but Bill Northrup's *Apprentice*. A large (72") high wing cabin type model, it looks like a Cessna in the air. The plans call for a 19 engine, but I used a 29 for more power for safety in the trouble spots. This model uses rudder, elevator and motor (three-channels) for wonderfully controlled slow flight and an extended glide path. Several of the new members of our Tri-State Radio Controllers Club have had their first flying lesson with this model. I even handed the transmitter to one of the wives, a control-line flier, and with a little verbal help she did a good job of flying. This model, with plenty of altitude and about half throttle, will right itself from any position—inverted, straight up, spins—if you just let go of the sticks. A beautiful trainer plane. It even took first place in the Sportsman event last summer. This model is starting its fourth summer.

Now after mastering this type of model I suggest an advanced trainer to our members—an Ugly Stick. We are using 60 engines in most of them. I built the first one of these planes, part scratch and part kit, about four years ago and powered it with an ST 46. After

(Continued on page 10)

Power play.

That's when you have the advantage. And use it.

It's when you're one up.

And we've built the Champion to get you there. The Champion's our workhorse, designed to give you the power and control.

It's reliable. It's fun.

The Champion has adjustable sticks, allowing you to regulate stick tension to your own individual preference.

The Champion has a highly selective, solid state receiver.

The Champion has the smallest, lightest servos available anywhere.

All Champions have six channels. And you can choose either one or two sticks.

What price, power?

$329.95 for the two-stick, six-channel Champion.
$349.95 for the one-stick, six-channel Champion.
That includes transmitter, receiver, 4 servos, battery pak and charger. Reasonable.

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Try it. Price it. Fly it.

And if you mean to stay in the air, take the controlled approach.

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140 flights, during which time I learned to fly proportional, I lost a wing and extensive repairs were necessary. Same airplane is now powered by a Veco 61 and does a beautiful job.

The Ugly Stick is not a competition plane but it sure does its part in teaching a fledgeling to fly. We now have about ten Ugly Sticks in the club.

This can't be beat for an advanced trainer. Try it, you'll like it!

Stan Edwards, Coal Grove, Ohio

Modeler Poetess

Being a modeler and a *woman*, I say "humbug!" to all the women who claim to be modelers' widows. They don't know all the fun they are missing! My husband and I build and fly together and really enjoy each other's company.

I believe it would be of interest to your readers to know there are plenty of us gals that have the knack and skill to build and fly some pretty marvelous models.

I've written the following poem about our modeling life:

The man I married said to me,
"Come on, give it one try.
It's easy and it's fun to do,
I'm sure that you can fly."

Reluctantly I took the line,
The plane had soared with ease,
All the lumps in my throat left me
So did the wobble in my knees.

I loved it right there from the start,
I just *had* to build one too.
Not perfect, but it turned out fine.
The best that I could do.

But that was many planes ago
And many crashes, too.
But I'm still down there sanding
Midst the balsa wood and glue.

I'm doing what is fun for me
Making a plane fly like the birds.
The beauty of it can't be told
In just a few short words.

You can find us many nights
At the workbench made for two
Talking all about 0 two 0's
And globbing on the glue.

We like this nice arrangement
A lovely way to spend our life,
My husband says he's glad he's got
An *airplane building wife!*

Carol Layton, Galesburg, Ill.

Likes Old-Timer ignition jobs

I just wish to express my appreciation for the enjoyment I receive from your publication. I am always delighted to find each new issue in the mail. I find that I can read them several times, and always gleen some new item of interest.

I particularly enjoy your articles and candid photos of Old-Timer ignition jobs. Keep them coming.

Ronald Occhiovero, Maple, Ont., Canada

Strictly West Coast

The May 1972 issue of AAM headlined the "Satellite" article by giving this design the title of the "winningest AMA power ship today."

I take issue with this statement and can easily back it up with facts if you wish. I have attended most of the major meets in the midwest and southwest area, and other than the ½A Satellite which was kitted for a while, I have never seen the larger versions at any meets. The design has not won any places at the recent Nationals meets, these places being dominated by Stardusters, Wichdoctors, Galaxies and originals.

I do believe that your ballyhoo should at least be amended to read the "winningest AMA Power ship on the West Coast today," and even then there could be room for argument. Its win record is impressive but is strictly limited to West Coast meets, and hardly a yardstick of winning ability nationwide. Give it time, maybe.

Robert J. Dunham, Tulsa, Okla.

Get off RC-ers' backs

This letter is from a die-hard contest free flighter, and sport CL flier, and is in response to the recent, and *growing*, trend of "bad mouthing" the RC crowd. It seems to have become fashionable to criticize the RC-ers because they get all the publicity, have all the $$$, etc. Has anyone stopped to think that many of today's RC fliers are ex-free flight and control line fliers? It so happens that my local hobby dealer, and RC flier (well-known in Pylon Racing), knows more about FF and CL than the average guy, having built and flown every type of model over the years. *He* doesn't knock *my* taste because I happen to like free flight—in fact, I've learned many things about engines, coverings, etc., from this guy (and others like him).

Please, let's all try to remember that this hobby of ours comprises men and women who build and fly because they *love airplanes*. Who cares if it's guided by wires, radio waves, or has no guidance at all? It's all in the thrill of seeing one's handiwork against the blue sky.

Sure, RC occupies 90% of the magazine coverage today, both in construction articles and advertisements. That's what pays the rent, and that's what the public likes—"Them Remote Control Jobs."

With all the problems of daily life in the 1970s, isn't it a little ridiculous to be running down a fellow airplane lover? We're *all* on an aircraft "trip," so please guys, let's get off the RC-ers backs. They have feelings too, you know.

Mike Keville, Lakewood, Calif.

Satisfied reader

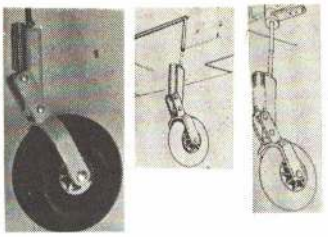
I believe that your magazine is the best in its field because, as its name implies, it deals with *all* aspects of the hobby and does not try to "hard sell" RC like so many other model aircraft magazines do. As an avid UC and FF nut, I feel that these ways of modeling have been pushed aside in favor of RC. Don't get me wrong though. I think that RC offers great challenge and the utmost satisfaction, but as a college student supporting myself, my wife and my baby boy, I just don't have the time or the *money* to invest in RC.

So keep those UC and FF articles coming and keep up the good work!

C. John Colaluca, Port Orange, Fla.

NEW!

Sullivan "REALISTIC" LANDING GEARS



The numerous advantages of these landing gears were described in July, 1972 RC Modeler Magazine.

All REALISTIC landing gears mount with 2 set screws on to 5/32 music wire nose or main gear struts. The total added weight of a set of the 3 largest gears is only 2¾ ounces.

Individual REALISTIC gears	Set of 3 Gears
G-1 for 1¾" & 2" wheels $3.50	GS-1 $9.95
G-2 for 2" & 2¼" wheels $3.50	GS-2 $9.95
G-3 for 2½" & 2¾" wheels $4.00	GS-3 $10.95
G-4 for 2¾" & 3" wheels $4.00	GS-4 $10.95
(Wheel Not Included)	

SPECIAL! **World Engines HAWK 460 A-R-F**

List price $24.95
SPECIAL $17.97

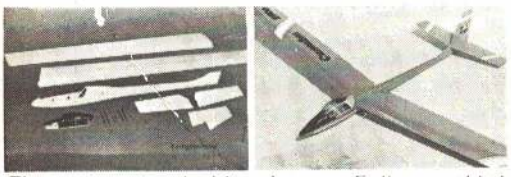
52" span, 460 sq. inch wing for .19 to .40 engine. This excellent flying multi differs from the conventional "ARF" in that the foam portions are used as "jigs" for wood sheeting. The end result is an easy-to-assemble plane that is the creation of the modeler rather than the manufacturer. It is more repairable than a standard ARF.

SPECIAL! **J & N HEAT GUN**

Here's a time limited oportunity to get this handy heat-shrinking tool at a "steal" of a price. Shrinks monokote, Solarfilm, Coverite faster than a heating iron.

List price $24.95
SPECIAL $19.97

NEW! **Graupner CUMULUS A-R-F GLIDER $99.00**

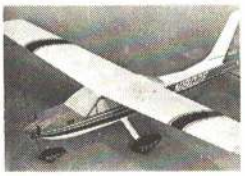


The most spectacular kit we've seen. Fully assembled injection molded fuselage. The foam wings have been balsa sheeted and sanded and are ready for doping. Rudder and elevator are "flying surfaces" and are shaped and sanded balsa covered foam. 110" wing span (swept wings), 753 sq. in. wing area.

NEW! **Rocket City LOW PROFILE WING MOUNTING BOLTS 59¢ PAIR**

Note the small screwdriver slot which prevents screwdriver from slipping off bolt. Size ¼-20, 1½".

Graupner CESSNA CARDINAL A-R-F $70.00



Semi-scale. Foam wing and stab come covered with sheet balsa. ABS plastic injection molded fuselage. 61" wing span for .30 to .40 engine. Spectacular appearance. 606 sq. in. wing area gives gentle handling characteristics.

NEW!

72 mhz. Blue Max 4 Channel Semi-Kit

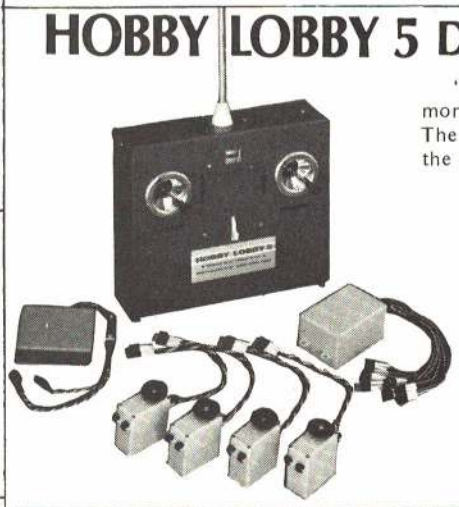
$179.

NOW the excellent SEMI-KIT Blue Max digital proportional is available on desirable 72 or 75 mhz frequencies.

By building the SEMI-KIT version of the Blue Max you are saving $40 because we sell the assembled version for $219.

All factory assembled electronic portions carry World Engines' full 90 day warranty. System includes semi-kits for transmitter, receiver-decoder, 4 servos, n-cads for transmitter and receiver, charger.

HOBBY LOBBY 5 Digital Proportional $209.



"The Hobby Lobby radio I got from you a couple of months ago is in a V. K. Cherokee and flying up a storm. There is not one thing I can find wrong with the radio and the range is fantastic.

I had the Cherokee almost out of sight and collapsed the antenna all the way down. To my amazement it answered every command instantly.

This is kind of ironic . . . a couple of the fellows here bought . . . a new ( ) to the tune of $347.00 . ...and a new ( ). The ( ) . . . is back at the factory . . . and the transmitter is dead on the ( ).

So, I guess I shouldn't do it, but I keep rubbing it it in about a good $200 set they could have bought."

John W. Young
Redway, California
95560

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"I think it is the finest hobby catalog of any we have seen to date . . . the added information about each product really help the guy who is considering a purchase."

E. S.
Washington, D. C.

SPECIAL! NEW! **Pilot A-R-F "BOX FLY"**

List price $29.95
SALE $23.97

This is a hybrid kit. It has 52" wing span (430 sq. in.) plastic covered foam wing, a flat balsa stab and fin, and the most perfectly die cut PLYWOOD fuselage sides you'll ever see! This VERY easy-to-assemble "kit" has complete hardware, takes a .19 to .25 engine, is a stable trainer (2 or 3 channels), is enjoyably aerobatic and DURABLE!

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G. B.; Beltsville, Md.

NEW! **JUMPER CABLE SETS**

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10 color coded test leads, each lead 15" long with insulated alligator clips at both ends. Great for charging and checking batteries, and all around electronics uses.

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getting started in RC

CHOOSING A RADIO

by JIM McNERNEY

Time was when an RC enthusiast had to be part electronics engineer, part practitioner of witchcraft, and a little bit round the bend. Nowadays, all you have to be is a little bit weird. Technology, mass production and quality control have created a wide range of ready-to-fly radio equipment. So, you don't need to be a brain surgeon to give haircuts and you don't need a Ph.D. in electronics to fly RC.

It is neither necessary nor desirable for you to fiddle around inside your black, gray, white, brown, green, red or whatever, boxes. You should, however, treat your equipment with the care and respect normally accorded expensive, precision electronic instruments. Your radio should not suffer the indignities of soaking with fuel, dropping, kicking, loading with epoxy, tugging on plugs and wires or other abuse. You must understand enough about radio performance to be able to pick the best radio for your money. You must know enough about the care and feeding of radios to assure long, faithful service; you must also know when to seek the help of a technician or the manufacturer.

In this article we will deal with the basics of radio performance. We don't mean to discuss the fundamentals of radio nor application of circuit theory. There are plenty of excellent treatises on the theory of RC; for two dollars you can buy the Heathkit construction manual which includes a fine section on circuit theory. The ultimate performance of a radio is its ability to translate and transmit your commands (and only your commands) to the control surfaces, throttle and auxiliary equipment in your aircraft.

The key elements in radio performance are accuracy, range, endurance, stability, ruggedness and reliability. Let's talk about each one of these elements and the performance measures associated with them.

Accuracy: This element is the ability of the airborne system to impart to the control surfaces the exact command applied to the transmitter through the manipulation of the sticks. This includes proportional movement, and the time lag for response. The measures of system accuracy are system resolution, control linearity and servo transit time. System resolution and control linearity are illustrated in Figure 1. If a system is completely linear, its trace would be represented by the straight dashed line in the figure. Non-linearity causes the plot to be wavy and means the servo doesn't always move proportionally to the stick. This non-linearity can be caused by non-uniformity of the stick potentiometer, the servo feedback potentiometer or other electronic variations. The hysteresis loop, or solid line, represents the trace of system performance through one complete control cycle. Besides being non-linear, the return trace does not lie directly over the forward trace.

The difference between the forward and return trace (x) represents the system resolution error. This is manifested as a difference in servo position for the same stick position, arrived at from opposite directions. The wider the gap, the worse the system resolution. This will show up in flight as a "dead spot" or a requirement to re-trim constantly. This type of error can be caused by various mechanical "slop" such as stick gimbal play, gear lash, etc., as well as by low servo amplifier gain.

Servo transit time is how long it takes for the servo to travel from one extreme position to the other. This is an indication of the delay between the time you tell the radio to do something and the time something happens in the airplane to obey your command. Transit times of less than 0.5 sec. are fast enough to recover from most hairy attitudes near the ground. The faster the transit time the better. There is a practical limit below which the servo becomes unstable and will overshoot or hunt. There is also some inertia in the mechanics which must be overcome. This means we will never have instantaneous response. For small movements of the controls, the lag normally is not enough to notice.

Range: How far away can you fly and still have control of the airplane? Two parameters which determine this are transmitter output power and receiver sensitivity. Range can also be affected by system stability to be discussed later. Transmitter output power is limited both by input power requirements (reasonable battery size), heat dissipation requirements and FCC legal limitations. Output power of 0.5 to 1 watt, with a reasonable antenna pattern, will allow you to fly a model to safe visible limits. Receiver sensitivity is a measure of how small a signal level can be detected. This is a compromise, because if a receiver is made too sensitive it becomes unstable.

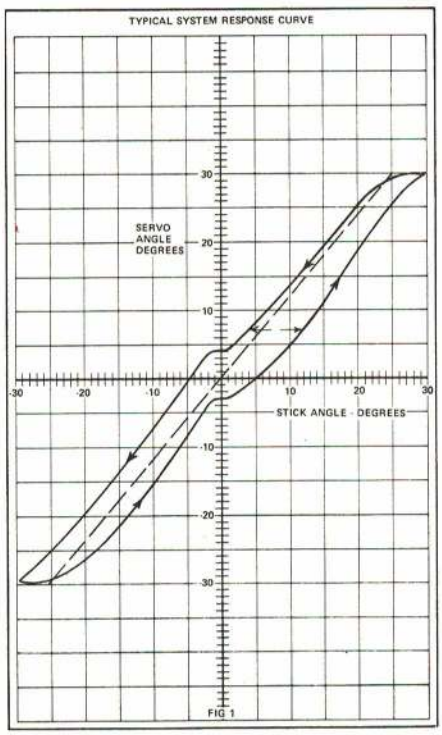
Endurance: Radio endurance is determined by the stored power within the radio and the rate at which the power is used. Most systems use batteries that, when fully charged, will deliver 500 milliampere hours of operation. If the average system current requirement is 100 milliamperes, the system will operate five hours on a single charge. The radio manufacturers generally advertise four hours of normal system operation on a single charge.

The airborne system drain will vary depending on the number of functions being used and the type of aircraft flown. For example, the rate will generally be higher for a pattern aircraft than a glider. Transmitter power consumption is constant for digital proportional systems. Extreme temperatures can affect battery drain, and thus system endurance. Indications of degraded power output are: reduced transmitter output meter reading, reduced range (glitches when the plane goes any distance from the transmitter), sluggish servo response, erratic or continuous trim change.

Stability: System stability is a measure of how well it will perform in the presence of disturbing influences. For instance, can it operate over a wide range of temperatures? Does it reject adjacent frequencies and other radio interference? Is it self-compensating for distance from the transmitter to the receiver and for changes in antenna orientation? Normal temperature ranges are 0° to 150° F. Measures of interference immunity are image rejection and harmonic rejection capability. Automatic Gain Control (AGC) is the method used by most radio manufacturers to compensate for distance and orientation.

Ruggedness and Reliability: A small, light, highly sophisticated and reliable radio which is also extremely rugged is a paradox. The most sensitive components are the electronic bits and pieces. The next most susceptible components

(Continued on page 104)



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NEW RANGER 42

The Versatile Almost-Ready-To-Fly Fun Model.

$19.95

Takes Single To 4 Channel Proportional Radio. Molded Fuselage...One Piece Molded Wing, Stabilizer and Vertical Fin. Also Free Flight. Span 42". Weight 26 oz. For .049–.10 Engines.

SKYLARK 56

$22.95

1-Piece Full-Length Sides

Now With 1-Piece Full-Length Sides. Takes 2 to 4 Channel Proportional. Span 56". Weight 3½-4½ lbs. For .15-.19-.35 Engines.

FEATURES:

- Semi-symmetrical wing section
- Coil-sprung nose gear . . . formed main gear
- Shaped and notched leading and trailing edges
- Cleanly die-cut ribs, fuse sides, formers, etc.
- New simple "Symmet-TRU" wing construction

JR. SKYLARK

For Single or 2 Channel, Pulse or Digital. Span 37" Weight 18 oz. For .049 Engines. - **$8.95**

Shoestring

$29.95

The Goodyear Racer With Enough Area and Stability So **You** Can Fly It! For 4 Channel Proportional. Span 54"; Area 540 sq. in.; Weight 4½-5 lbs. For .19-.40 Engines.

FEATURES:

- Shaped leading edges plus sheeting
- Symmet-TRU wing construction
- Full-length sides, sheeted trailing edges
- Cleanly die-cut ribs, formers, etc.
- Formed spring aluminum landing gear
- Semi-symmetrical wing section.

THE FLYING FALCONS

More Falcons have been built and flown in the past 10 years than any other R/C. For values and features in a functional, rugged airplane, your best bet is a Falcon. Every design element engineered for simplicity and fast-building.

FALCON 56 $19.95 Medium-Size Trainer. Single To 4 Channel Proportional. Span 56". For .15-.19-.35 Engines.

SR. FALCON $36.95 Standard Big Trainer. 4 Channel Proportional. Span 69". For .35 To .60 Engines.

JUNIOR FALCON $7.95 Small Trainer. Single or 2 Channel. Span 37". For .049 Engines.

MODELS THAT ARE REALLY GREAT TO FLY!

SKYLANE 62

Semi-Scale Beauty in a Great Flying Model!

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Tough, Roomy Cabin and Front End. For 2 To 4 Channel Proportional. Steerable Nose Gear. Span 62". Weight 4½-5 Lbs. . . . For .35 To .45 Engines.

FEATURES:

- See-through cabin, with die-cut plywood cabin sides
- Shaped leading edges plus sheeting
- Cleanly die-cut parts that fit
- Clark Y wing section, hardwood struts
- Steerable nose gear, formed main gear

1/2A SKYLANE $9.95

For Single or 2 Channel, Pulse or Digital. Span 42". Weight 22 oz. For .049 To .10 Engines.

All Carl Goldberg Models Come With All Major Fittings Such As Nylon Snap-Links, Control Horns, Snap 'R Keepers, Full Size Plans, Illustrated Step By Step, And Folder on How to Set Up and Operate R/C Models.

LOOK WHAT A MODELER SAYS!

"Enclosed is a photo of a model of your SKYLANE 62 which I have just completed. I enjoyed building this plane, it is the first model that I have built in 25 years. Several months ago I observed a group of men flying some R/C models and this rekindled my interest in model planes. Having never built an R/C model, I was dubious which model to build. After some investigation I settled on your kit and I was not disappointed. It was so different from anything that I had built previously and I must say that it went together very easily. The plans were complete, left nothing to guess work. I followed the plans exactly with the exception of the motor and I installed a slightly larger motor, a Max OS 40. I am very pleased with the results. I felt I should write and let you know how much I appreciate this kit and I hope to be able to build all of your planes eventually. Again thanks for such a fine kit."

Arnold B. Johnson
Troutville, Virginia

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P.S. For best service, see your dealer for items you want. If not available, write direct; add 35¢ per item (75¢ outside U.S.). Minimum order $1.

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I am sending 20¢ for 8 pg. Illustrated Catalog with "Recommendations in Starting in R/C," Basic Explanation of R/C Equipment, and Radio Control Definitions.

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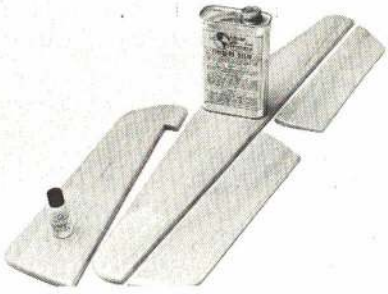
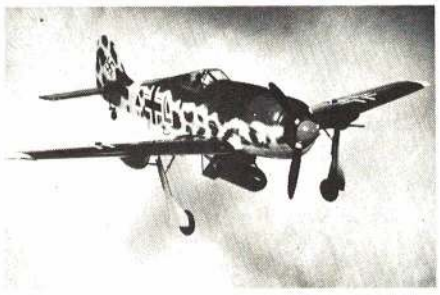
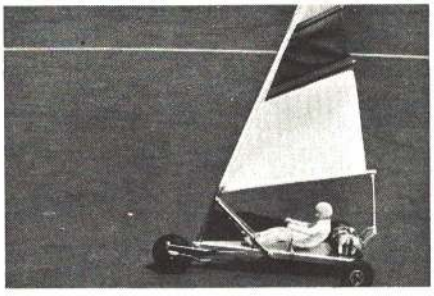
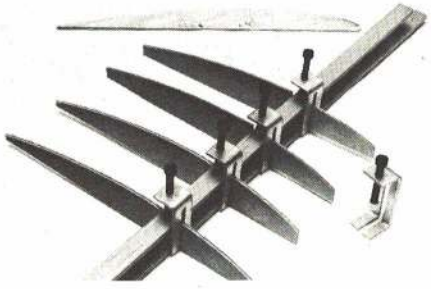
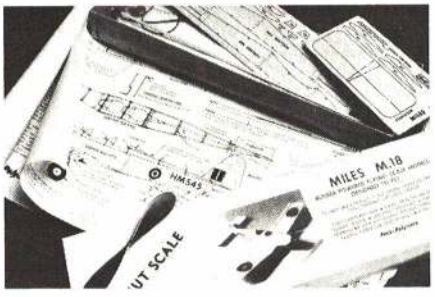
new products check list











U.S. Government Publication/Aviation History. Softbound book *"Into the New Realm"* provides a detailed documentary account of man's aspirations in the conquest of air and space. With facsimile reproductions of letters and documents on the subject from Ben Franklin, George Washington, the Wrights, Von Braun, up to John Kennedy's promise to land on the moon. Book is loaded with source data, beautifully printed and illustrated. 40 pages, 75 cents. Ask for National Archives Publication No. 70-10. National Archives, Washington, D.C. 20408

Royal Products/FW-190. Another in Royal's scale line, 1/8-scale Focke-Wulf fighter has span of 61 in., wing area 642 sq. in., recommended for 60 power. Kit is all built-up balsa with individually packed and numbered parts, all pre-cut and hand finished. With necessary hardware, $69.95. Royal Products Corp., 6190 E. Evans Ave., Denver, Colo. 80222

Deming Industries/Fuel transfer valve. To direct fill your tank, here is a valve for the fuel feed line of any two-line fuel system. Special nozzle moves the valve in the device, bypassing the line to the carb and eliminating feedline disconnection. The valve is machined from solid aluminum with stainless steel compression spring, sealed against fuel leakage. Has a built-in 100-mesh filter, Teflon dust cap, and special fueling nozzle. $3.95. Deming Industries Inc., 2945 Government Way, Rt. 4, Coeur D'Alene, Idaho 83814

Williams Bros./Model Mounts. Model Mounts may provide answer as to how best to display scale engines or aircraft. Two injection-molded styrene units of marbleized plastic fit together to form bookend, display board, what-have-you. Shown in picture is Williams Bros. 1-1/2" to 1' J5 Whirlwind engine displayed on Model Mount. Each mount, $1.95. Williams Bros., 181B St., San Marcos, Calif. 92069

Universal Developments/Land sailer. A unique product in the field, a radio-controlled land sailer which can be operated on single channel. "Silent Speed" kit is easily assembled, includes dacron sail, three pneumatic tires, torsion bar front suspension, steel chassis, complete steering unit. 27" high, 15" long. $19.95. Also, complete catalog of similar unusual kits, 25 cents. Universal Developments, Box 5253, Orange, Calif. 92667

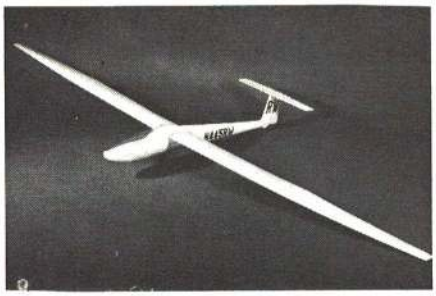
Peck Polymers/Peanut-scale model. Miniature size but designed to fly, 12"-span *Miles M.18* WWII British 2-seat trainer makes a very attractive kit. Built-up balsa fuselage, rib-and-tissue wing. Specially designed nylon thrust bearing provides accurate adjustment of thrust line, enhances kit's flyability. With Pirelli rubber, contest-grade balsa, $1.98. Peck Polymers, Box 2948, La Mesa, Calif. 92041

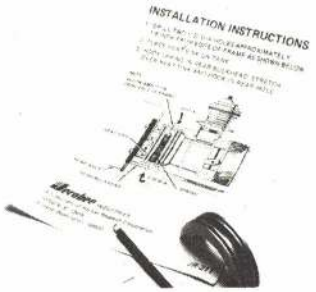
Model Air Products/Finishing Resin. Allows application of a truly solid, well-filled high-gloss finish on either balsa or fiberglass. Two-solution mixture of hardener and resin are combined in a 10-drop to 1-oz. ratio to provide super hardening after application. Three coats should provide mirror-like finish. 36-oz. can, $3.95. Model Air Products, Box 8085, Canton, Ohio 44711

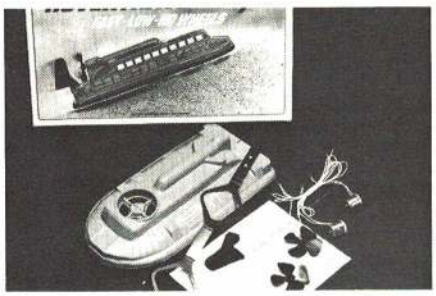
Rose Industries/Modeler's C-clamps. Pack of five C-clamps help ensure accurate 90-degree fit of wing ribs to spars. Unlike any other available C-clamp, units are designed especially for model applications. Two sizes, 1/16 and 3/32" slots. $1.50/package. Rose Industries, 1190 N. Rose St., Escondido, Calif. 92025

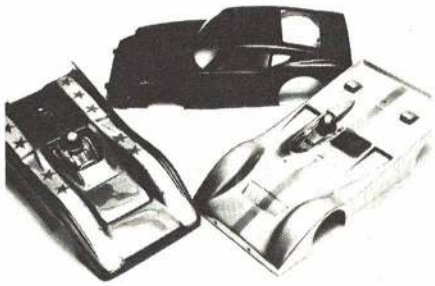
Sterling Models/DR-1 Triplane. Built-up "stick" model of colorful Fokker DR-1 in 1" to 1' scale. For free-flight, CL, or small single-channel RC, plane can be flown on rubber power, CO_2, or 020 to 049 engines. Kit contains authentic markings and insignia, plastic guns, cowling, etc. Built-up construction adds to overall scale effect, makes Fokker an excellent display model as well as flyer. Span, 23½", $6.95.

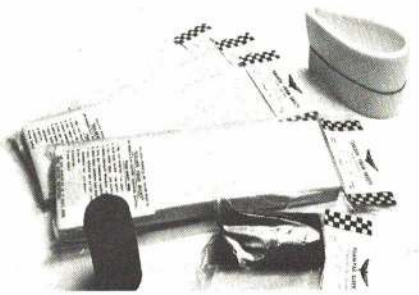
by FRANK PIERCE

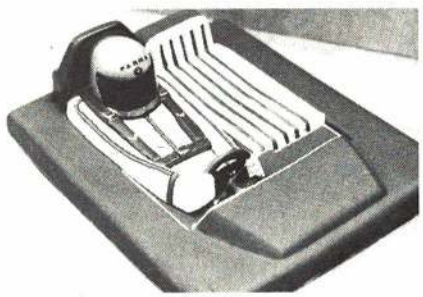












Also: Diamant sailplane, built-up balsa with eye-arresting T-tail configuration and 74" span, features detachable wing panels, Eiffel 400 airfoil, formed canopy, authentic colorful decals, die-cut parts. Proven flyer. $6.95. Sterling Models Inc., Belfield Ave. and Wister St., Philadelphia, Pa. 19144

Curtis Dyna-Products/Hovercraft. One-of-a-kind model, 18" long, 10" wide, rides on air cushion, and is powered by two electric motors which drive horizontal and vertically oriented propellers. Direction controlled by movable rudder. "Hovertravel" is made of sturdy ABS-type plastic. Curtis Dyna-Products Corp., Box 297, Westfield, Ind. 46074

Dumas/Evolution follow-on. Second generation successor to original Evolution, new Hi-Lo Evolution is even more versatile. High or low-wing configuration, 'T' or conventional tail, with engine pod or fuselage-mounted engine, with or without ailerons, short 48" or long 75" wing. Can be flown as everything from a 4-channel RC sports plane to a sailplane. $22.95. Dumas Products, Inc., 790 South Park Ave., Tucson, Ariz. 85716

Jerobee/Heat sink. Aluminum heat sink helps cool engine through fuel tank. A necessity for use with remote tanks where integral tank has no fuel to aid in self-cooling. Deters fuel loss through evaporation. $2.95. Jerobee Industries, Inc., 12702A NE 124th St., Kirkland, Wash. 98033

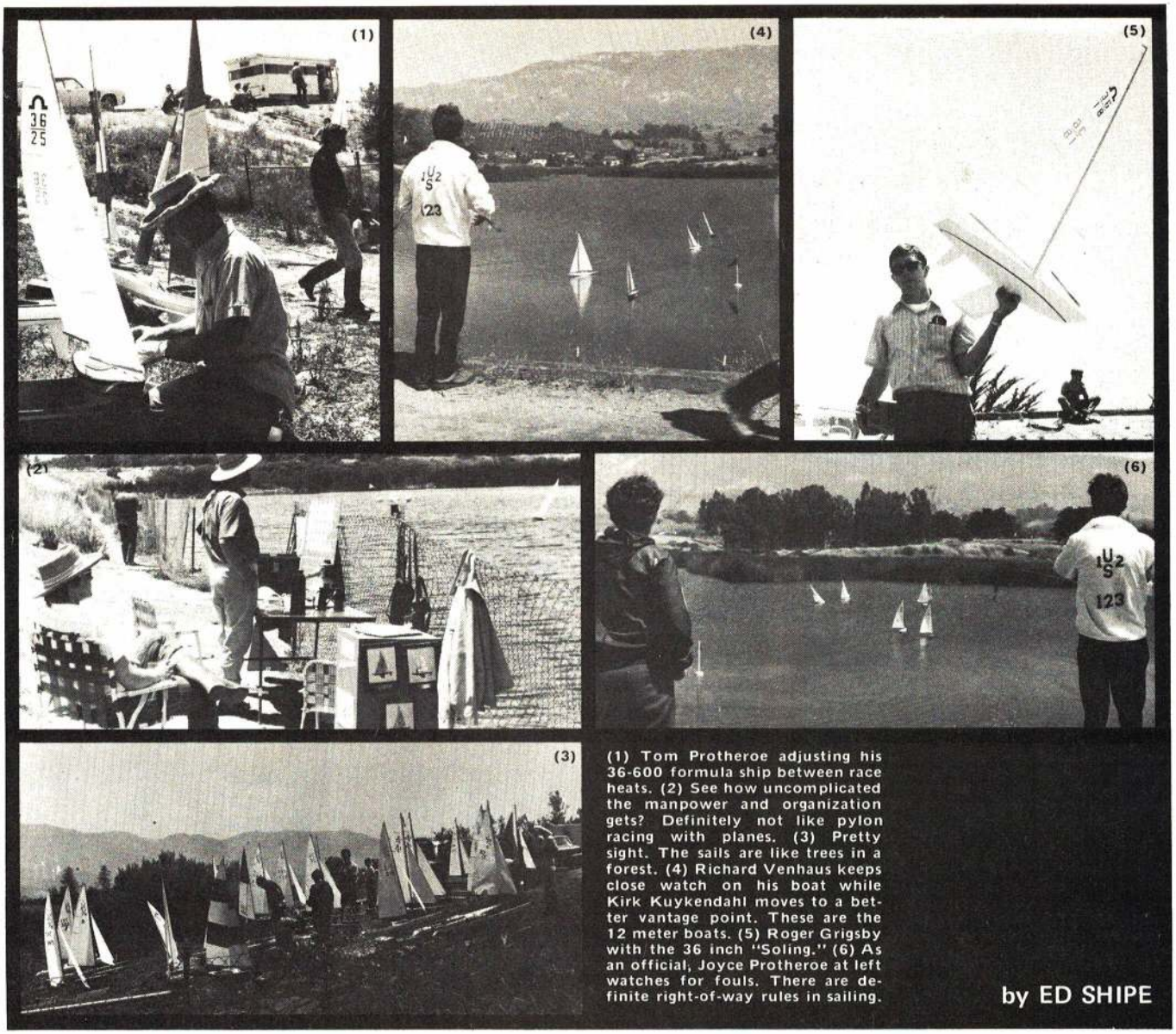
Riggen Industries/Scale bodies. 1/12-scale bodies directly adaptable to Jerobee racers are beautifully painted on inside for high-gloss durable finish. New design now available is Datsun 240Z (background) in dark racing green. About $7 each. Riggen Industries Inc., 1328 W. 130th St., Gardena, Calif. 90247

Pylon/Protective paddings. A line of accessory equipment designed to afford maximum protection to RC on-board equipment but has numerous other applications for the hobbyist. Golden Foam sheeting comes in a variety of thicknesses, in 4 x 12" sheets, with or without adhesive backing. Fuelproof, can be used as tank mount, bulkhead padding, receiver cushion, etc. Also, equipment sleeve, gray, 4" long in several thicknesses and diameters. Write for full line and prices to Sullivan Products, 535 Davisville Rd., Willow Grove, Pa. 19090

Allway Tools/Micro-knife Not a toy in spite of its small size—ideal for modeler's key chain for emergency splices, repairs, etc. Four lock-in blade positions, storage for two extra blades. Rugged honed steel cutting edge. 98 cents. Allway Tools, Inc., 1513 Olmstead Ave., Bronx, N.Y. 10462

C&F Mfg./Bugatti. Type 37A in 1/8-scale, kit features vacuum-formed body, genuine wire wheels, shown in picture in unassembled form. Completed racer shown in Check List of June issue. $34.95. C&F Mfg., 1047 Cheyenne St., Costa Mesa, Calif. 92626

Parma/Racer interior. Realistic finishing touch to 1/8-scale racers, driver is complete down to buckle on shoulder strap. Vacuum-formed from heavy butyrate, includes dashboard instruments. Easily mounted in car body. $1.49. Parma International, 5421 Pearl Rd., Cleveland, Ohio 44129



(1) Tom Protheroe adjusting his 36-600 formula ship between race heats. (2) See how uncomplicated the manpower and organization gets? Definitely not like pylon racing with planes. (3) Pretty sight. The sails are like trees in a forest. (4) Richard Venhaus keeps close watch on his boat while Kirk Kuykendahl moves to a better vantage point. These are the 12 meter boats. (5) Roger Grigsby with the 36 inch "Soling." (6) As an official, Joyce Protheroe at left watches for fouls. There are definite right-of-way rules in sailing.

by ED SHIPE

on the scene

SAILBOAT REGATTA PROMOTED BY A PARK OWNER

Do you want to get in on a fast-growing hobby? Try radio-controlled model sailboating for quiet and restful recreation—you won't have the residents of the neighborhood calling the police because you are making too much noise. The R/C Mariners of Santa Barbara, California recently had a regatta that helped promote a piece of land for a public park. The promoters of the park called the newspapers out to show that the property could be used for peaceful recreation and the regatta not only got good newspaper coverage but action footage was shown on the evening TV news broadcast.

Sailing RC sailboats may be restful, but regatta activity is anything but relaxing. Every race is a challenge and you have to be thinking all the time or somebody will steal your wind and leave you dead in the water, or get the privileged position and force you wide at the mark. Most of the rules that apply to full-sized sailboat racing apply to model sailboats and the top skippers know and use the rules to their advantage. There is one really good thing going for the sport—a beginner won't have to build a lot of boats because of crashes, and his first boat will be a potential trophy winner for years to come.

The R/C Mariners Spring Regatta had races for three classes of model sailboats. The 36-600 Class, a new development class, features boats with a maximum hull length of 36 in. and a maximum sail area of 600 sq. in. The West Coast 12 Meter and the Santa Barbara One Design classes require that all the hulls come from the same molds so that all the skippers have the same chance of winning depending on their own ability.

The 36-600 event was won by Tom Protheroe (Past President of NMPRA) sailing a new boat based on the Soling design. There were five entries in this class and all boats were on different frequencies. This made it possible for all skippers to race in each of the six races for the class. Ron Brewer, from National City, Calif., took second with his Starlet, while Don Prough took the third place trophy with another Starlet.

(Continued on page 94)

GREAT NEW HOBBY KITS

756 German Rz Kpfw V Ausf. A. Panther (1/32 scale) . . . $10.00

ON THE LAND

757 German Pz Kpfw VI Tiger II (1/76 scale) . $1.50
758 Russian KV-1A (1/76 scale) $1.50
759 Russian KV-II (1/76 scale) $1.50
760 German Jagd Tiger (1/76 scale) $1.50

IN THE AIR

779 F8-D Crusader (1/72 scale) $2.50
780 Douglas A-1H Sky Raider (1/72 scale) . $2.50
781 Northrop T-38 Talon (1/48 scale) $2.50
782 F-5A Freedom Fighter (1/48 scale) $2.50

783 Dassault Mirage 111C (1/48 scale) $3.00

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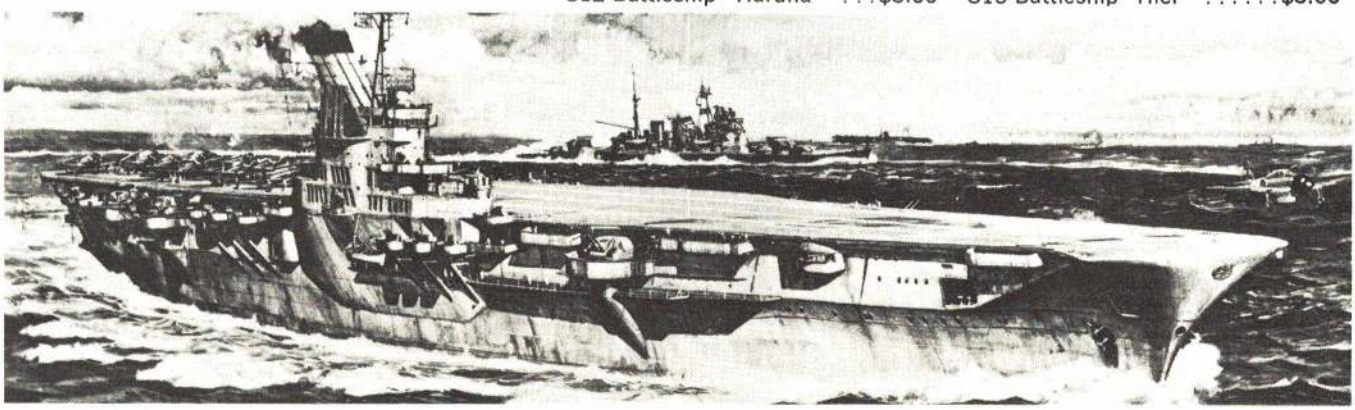
801 Battleship "Yamato"
(1/550 scale) . . . $8.00

WATERLINE SERIES (1/700 SCALE)

810 Cruiser "Tone" $2.50
811 Cruiser "Chikuma" $2.50
812 Battleship "Haruna" . . . $3.00
813 Battleship "Kongo" $3.00
814 Battleship "Kirishima" . . $3.00
815 Battleship "Hiei" $3.00



802 Aircraft Carrier "Taiho" (1/700 scale) $6.00

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Agent X-13 Does His Thing

by RAY GAREAU

MODEL HELPS MAKE AN IMPOSSIBLE SEQUENCE IN A FILM FOR THE NATIONAL FILM BOARD OF CANADA

The author with his garishly painted fantasy plane. Note two figure heads have been painted in the aircraft's windows. The plane is a Canuck by Universal Hobby of St. Laurent, Quebec, Canada.

The National Film Board of Canada, a government corporation, has received many awards for the quality, accurate storytelling and unusual effects of its productions. A recent film was based on a novel which was extremely popular in the late 1940s, *Agent X-13*. The protagonist, a super counter-espionage agent, solved cases all over the world. His favorite pastime was flying full-size aircraft, so the ingenious prop department prepared a fuselage center section installed on rockers with a dual cockpit. Complete with colorful paint, the plane was a tandem arrangement.

The film was almost completed when a problem arose: they had to shoot outdoor pictures of the airplane. A search for a real plane that would do the job proved to be unsuccessful. The producer was given my name as a possible source for a model—an ostensible solution to the dilemma.

Dates were set, but the weatherman didn't cooperate for over three weeks. The proper day finally arrived, and we met at the Film Board. I was briefed during the 20-mile ride to Mars Field.

As usual, my Canuck was showing its best side and the engine roared to life in one flip. After minor needle valve adjustment, we had an explanatory warm-up flight. The ship was landed for refueling, and this is when the hard work began. It is many times more difficult than contest flying: the presentation must be on call; the craft has to be at the right distance from the lens; the altitude factor is crucial—it must be high enough that the horizon is not visible, but low enough not to appear as though the scene were taken from the ground.

We performed a series of climbs and dives in quick succession to simulate the rocking action which was shot in the studio—all taking place between 20 and 40 ft. above the ground. The action had to synchronize with a song by the hero's girlfriend. Also, the agent takes advantage of the romantic interlude to propose marriage to her and passes the engagement ring to her in the cockpit. She drops it outside the plane, so our hero quickly performs a split-S and retrieves the ring! A series of split-S's were performed at that low altitude. One of these came too close to the ground and damaged the plane a bit (the reason for the rubber bands in the photo, as it was taken after the filming). The final scenes were of the model making passes at the camera from a distance of 350 to 400 ft. at about 60 to 70 ft. altitude, directly into the camera. The first pass was so precise that the cameraman, having only his view-finder as reference, dove to the ground. I pulled the plane to the left about six ft. above the crew.

After four hours, the batteries on my EK Logictrol were exhausted—so was the pilot! About a week later, Lou Barrette and I sat in the editors' viewing room to witness the sound and camera work together. The engineer set both at a matched start: the producer was enthusiastic, explaining that if they had worked for months to synchronize a scene shot separately, they could not have achieved a better job.

The film was scheduled for release in January 1972. I would like to extend my thanks to EK Products for the reliable equipment, and to the designer of the plane, L. Lynguel. The Canuck was made for this close work.

Perhaps my involvement will contribute a little toward public respect for model aviation. I would do it again, but if someone had asked me the night of the filming, my answer might have been difficult.

CARL GOLDBERG

CG ACCESSORIES

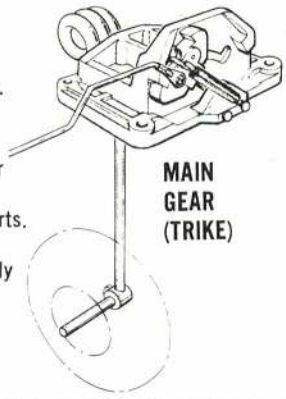
PROVEN IN PERFORMANCE – PREFERRED BY THE EXPERTS!

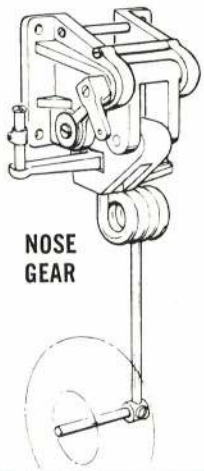
NEW! 1972 MODEL CG RETRACTS

3 Great New Features for '72 – adjustable axles, shorter nose gear steering arm and special twin-gear struts. And now CG Retracts are proving their quality everywhere – carrying 8 lbs. and up over rough grass fields with ease and reliability. When you want dependable retract performance check with the leaders – find out why most of them prefer CG Retracts!

- **LOWEST PROFILE** – Main Gears 1" high.
- **LIGHTEST** – Nose Gear, 2 Mains and 3 Struts, only 6 oz.
- **BROADEST BASED** for best stress distribution.
- **TOUGH** – Rugged vibration absorbing nylon moldings. Large bearing surfaces.
- **SHORTEST TANK COMPARTMENT** – Nose Gear needs only 5½" to 6".
- **SIMPLEST** – Main Gear has only 3 molded parts.
- **EASY** – Installation or Strut Removal. Low actuating force – one retract servo can easily actuate all three units.
- **COST??** – Unbelievable! But True!

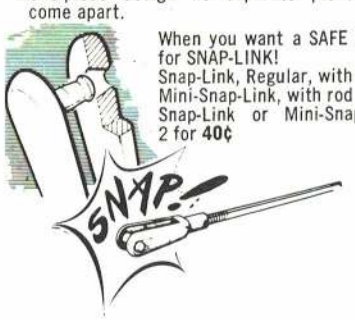
TWIN GEAR Retracts – RG2 – $9.95
TRI-GEAR Retracts – RG3 – $19.95





UNIQUE SNAP-LINK! Patent Pending. Now for the first time—you can buy a truly safe link—the SNAP-Link! Note these features:

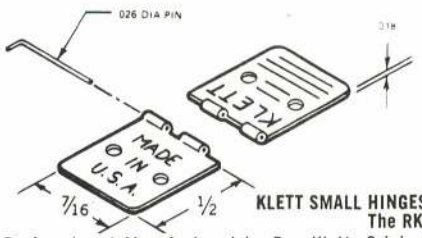
- Tiny 45° shoulder snaps through arm, prevents accidental opening. So unique it's Patent Pending!
- One-piece design—no separate pieces that might come apart.



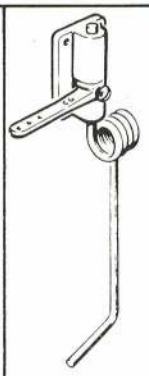
When you want a SAFE link . . . ask for SNAP-LINK!
Snap-Link, Regular, with rod } **29¢** each
Mini-Snap-Link, with rod }
Snap-Link or Mini-Snap, less rod 2 for **40¢**

NEW—MAJOR R/C FITTINGS SETS

Here's the economical way to buy the major fittings for your multi-ship. In one set, you get all the horns, links, keepers, bellcranks, or strip aileron linkage, and hinge material—and at a saving.
R/C Fittings Set No. 1 for ship with standard ailerons—**$3.50**
R/C Fittings Set No. 2 for ship with strip ailerons—**$3.50**

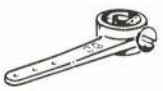


KLETT SMALL HINGES – The RK2's
Designed and Manufactured by Roy Klett, Originator of the World-Famous RK Hinges!
An exclusive with Carl Goldberg, here is an extremely strong smaller hinge constructed with exceptional care and attention to detail. So thin that all you need is a knife slit. Top quality, yet only cost **$1.95** for 15 and **$1.10** for 7.



STEERABLE NOSE GEAR
Versatile – steering arm can be to either side, or slightly up or down, or mounted on bottom with extra collar in slot. Steering arm is nylon, stiff enough for good control, yet can flex under shock to protect servo. Collar is hardened steel—won't strip like brass. Screw is hardened steel, too. You can really torque it and get good grip on music wire strut without a flat.

Complete steerable nose gear with nylon bearing, 5/32" plated music wire strut, extra collar, blind nuts, screws and washers – **$2.50.**

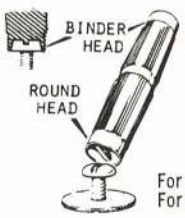


NYLON STEERING ARM
Hardened steel collar and screw—**75¢.**

NYLON BEARING
One-piece design mounts to firewall without alignment problems. Includes blind nuts, screws and washers—**75¢.**

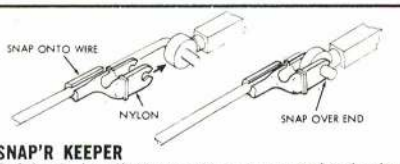
CONTROL HORNS
Our new horns have the upright part rising from the center of the base for maximum stability. Holes are right size for 1/16" wire; nut plate for simplest mounting. Long horns or short horns, with screws—**50¢** for 2.

NYLON REINFORCING TAPE
This nylon reinforcing tape is extremely tough when applied with epoxy around the center when joining wing halves. 2½" wide x 5 ft.—**50¢.** ¾" wide x 5 ft.—**25¢.**



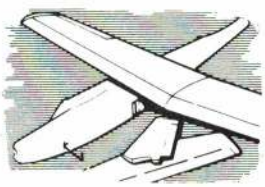
NEW KLETT SAFETY DRIVER SOCKETS DOWN ONTO SCREW HEAD – CAN'T SLIP OFF AND DAMAGE YOUR WING!
Takes Round Head Screws and Binder Head.

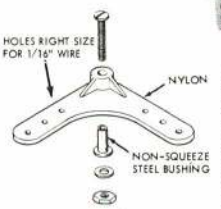
KLETT SAFETY DRIVER
For ¼" Nylon Screws } **98¢** each.
For #10 Nylon Screws }



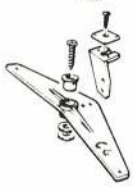
SNAP'R KEEPER
Quickest, handiest way to secure pushrod wire end to servos, horns, etc. Works on wire 3/64 to 5/64" diameter—**50¢** for 4.

REPLACEMENT FOAM WINGS, ETC.
To go with your own design fuselage. Proven efficient Ranger 42 foam wing gets you in the air quickly – **$3.95.** Stab and vertical fin, set **$1.95.** Assembled Ranger 42 fuselage. plus bearers, nosegear, etc., **$8.95.**





AILERON BELLCRANK
Bellcrank has steel bushing of proper size, so crank can be screwed firmly in place without binding. No electrical noise—all metal parts are screwed tightly together—**50¢** for 2.



½A BELLCRANK and HORN
Made of nylon, this new set provides smooth ½A control line operation. Easy on dacron lines, too –**25¢.**

SHEET METAL SCREWS
Like wood screws, but better. Sharp, clean, full-depth threads, hard and strong. Excellent for mounting servos, etc. Includes washers—#2 x 5/16—**30¢** for 10; #4 x 3/8—**30¢** for 8.

P.S. For best service, see your dealer for items you want. If not available, write direct; add 35¢ per item (75¢ outside U.S.). Minimum order $1.

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WIND FLYING

by JOHN HUNTON

Three inside loops followed by some lazy eights, a couple of wingovers, the wires are whistling now. There is a strong, steady breeze at your back. An inside loop followed by half a loop. Down elevator, the outside loop portion, up elevator. The plane rounds out six feet off the ground and is moving fast enough to begin another vertical eight, but you have been flying for half an hour now and you should be getting back home. You bring the plane down to six inches off the ground and let it kill off speed. It touches the ground once, but so what. No prop to break. The plane finally stalls and lands. You wind up the lines, pick up your stunt model and leave. There is nothing else to carry. No tool box, no oil to wipe off, no prop to break, no muffler, no noise—just plain fun.

Earlier that day you had awakened to the sound of the wind whistling. Other modelers had turned over and gone back to sleep. They wouldn't fly in this wind, but this is exactly the type of day you have been waiting for—to go wind flying. Wind flying is a ball. If you cannot fly inverted, your repertoire will be wingovers and a limited number of loops. If you can fly inverted, the world of silent flights is yours.

For years I have seen experienced stunt fliers finish a flight with a few dead-stick loops. At a contest in Frederick, Maryland, a storm hit and the high winds cancelled flying temporarily. My brother Hugh took his stunt job up with a short tank and began dead-sticking in the high wind—he stunted until the wind tapered off. Later, I got out an old fuel-soaked stunt job, filled the nose with modeling clay and found that the model would fly even in a modest wind, evidently because of reduced drag by having no motor or propeller. After trying several different models, I have the following suggestions as to the type of model you use.

A ringmaster type model will perform fairly well, but it takes a strong wind which is not always available. Refinements can make it possible to stunt in a light breeze. Select an old stunt job or build a new one. Remove the motor and add an equivalent amount of nose weight. Use a model with wing flaps—flaps make wings much more efficient in turns. Reduce drag as much as possible. Remove landing gear and add skids. Reduce rudder area to half of normal to minimize weathervaning.

Flying technique is very important. Fly smoothly. Jerky motions or overcontrolling add drag. Wait for a good windy day. If you have a u-reely, you can operate alone. You can let out an amount of line appropriate for the amount of wind. If you do not have a u-reely, have a strong friend run as fast as he can and throw as hard as he can with the point of release on the downwind side. Keep the plane down low and whip. After a couple of laps of whipping, the plane should have good speed up. Now you can relax.

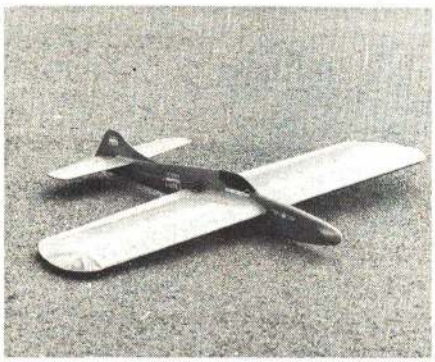
The basic speed-building maneuver is a smooth, open wingover with the high point into the wind and the low point downwind. A few wingovers will have the model zinging along and you will be ready to proceed to other stunts. Smooth, wide inside loops also build speed. Another basic speed building maneuver is the lazy eight.

From the above basic maneuvers the rest is up to you. Almost any maneuver in the AMA stunt routine can be done with a good plane in enough wind.

Although wind flying began in a storm, I do not recommend flying in an electrical storm. Static electricity can zap you good, and who wants to become a conductor for lightning!

So go ahead. Dig out that old stunt job or build a new one. Then wait for a windy day. Now that is a switch, isn't it?

WHO SAID A CONTROL LINER CAN'T BE A GLIDER? WITH MUSCLE POWER AND A BIT OF WIND, THE AMA STUNT PATTERN CAN BE DONE.



Author's modified and cleaned-up Sig "Banshee." Lead in nose compartment is smoothed in with clay.

With a Jim Walker U-Reeley handle each flight starts from hand slowly letting the lines all the way out. Model can be recovered in flight too—just reverse the launching procedure.

Spirit of St. Louis stunter is an unlikely subject for aerobatics and an even more unlikely subject for powerless flight, but it does very well. Note many patches, fuelproof dope is not necessary.

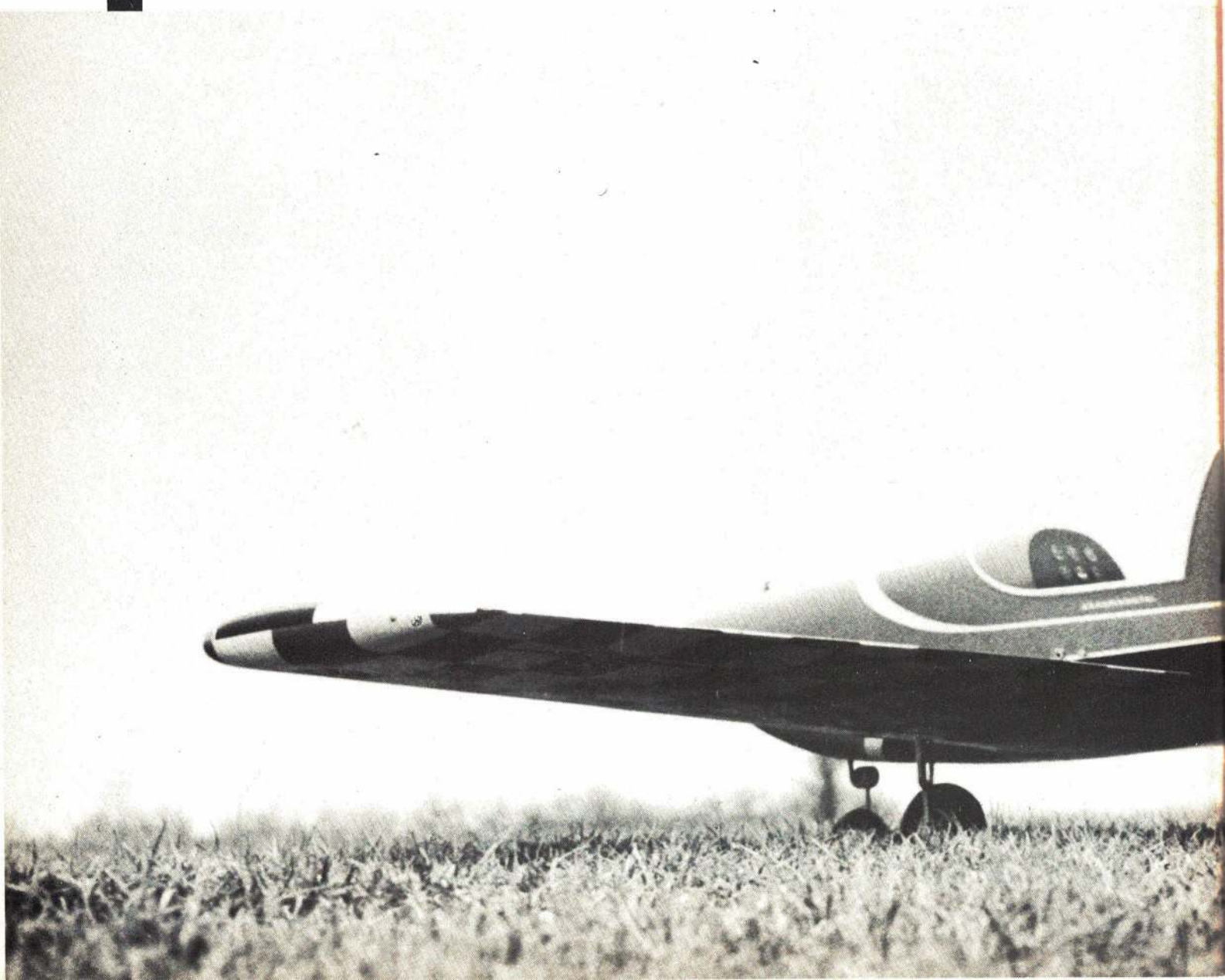
REALISTIC RC PATTERN DESIGN HAS LARGE SHAPELY FUSELAGE, ALL-FLYING STAB, BUILT-IN AILERONS, RETRACTS, AND ALL-BALSA CONSTRUCTION.

hot pants

by GERALD NELSON

The total design concept of the Hot Pants includes two major considerations: performance and realism. Almost all of today's successful competition stunt models are designed entirely for all-out competition with no thought given to realism. Sure, many ships have a canopy placed somewhere, maybe even a pilot and instrument panel. However, if a full-size aircraft were to be built with the same proportions as these models, we would normally expect to find a 100-ft. span acrobatic aircraft. Today's full-size acrobatic aircraft are, of course, much smaller.

Taking a 25-ft. span of a full-size aircraft, typical of current full-scale acrobatic aircraft, and scaling it down to a five-ft. span, we would come up with a fuselage shape and cockpit size as pre-



sented here with the Hot Pants design. The additional width and height cause such minor extra drag that it becomes negligible. The by-product of the wider fuselage is that of Dutch roll elimination, the so-called Kwik-Fli wiggle. An obvious advantage of the larger fuselage is easy placement of the RC equipment—the four-abreast servo placement is quite functional.

Perhaps the most interesting design feature of this model is the flying stabilizer or stabilator. The entire horizontal stabilizer moves as one unit. The major reason for choosing this system of pitch control is that there is less aerodynamic drag. Deflecting the entire surface produces much less drag than the conventional deflected elevator/stabilizer combination. This type of stabilizer also produces a very positive control feel about the pitch axis at all airspeeds, so necessary for today's competition flying. A practical advantage is the ease of transporting the aircraft, since both stabilizer sections are easily removable. Yet another plus is one which I have not fully explored: because the stabilizer sections are removable, it would be simple to fabricate different types of stabilizers to test for the optimum design. Perhaps the unit should be smaller, thicker, highly tapered, semisymmetrical, and so on. As there would be no other variable other than the stabilizer, one could easily evaluate the test results.

There is no reason to be concerned over the servo power required to move the full pivoting stabilizer. As only a small amount of throw is required, an excellent mechanical advantage is obtained. The mechanics of the system shown are quite simple. During tests, more than twice the amount of elevator travel was tried; the pitch control was of course very sensitive. This did provide proof of servo power required. Ample power was available to drive the stabilizer. Reducing the travel to half the amount (now normal travel) increased the mechanical advantage of the system by a factor of two. In other words, we have more than twice the power needed to drive the stabilizer.

Perhaps another unusual design feature is the use of the regular type of ailerons. Certainly full-span ailerons would be quite satisfactory with this design, but the regular ailerons do offer some out-

standing features: they have a more positive feel, especially with 1972 Kraft servos and their improved resolution; one is easily able to check the neutral setting of the ailerons prior to flight; and they look like ailerons should (certainly a minor design point, but a valid one if realism is to be considered).

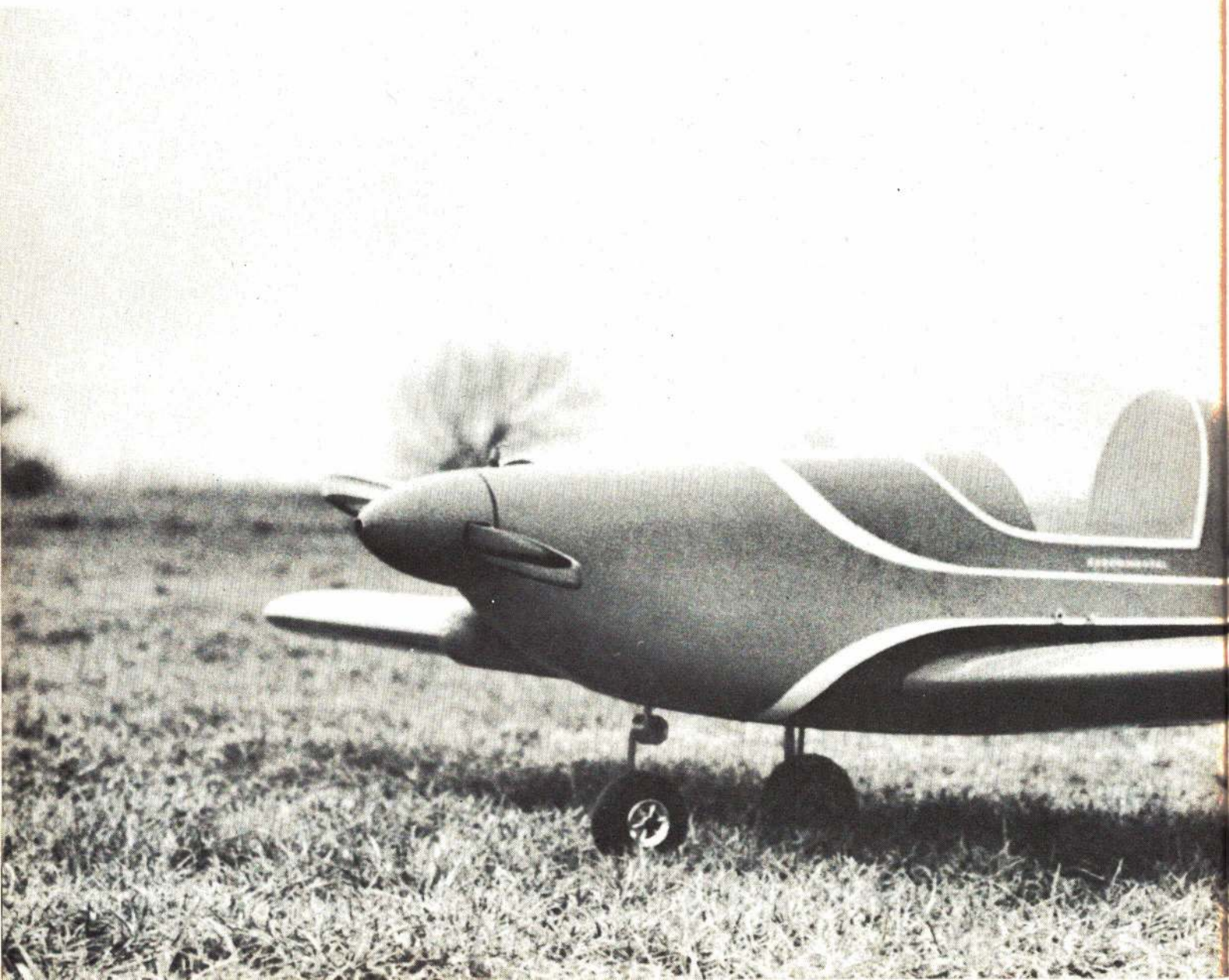
Construction

The construction of Hot Pants is straightforward. Start with the wing first, as the fuselage cannot be finished unless the wing is completed.

The wing can be built on two 3/16 dia. steel wire rods. The rod locations are shown on the ribs. The two rods are supported at each end by metal or wood brackets firmly attached to a rigid surface—a workbench top, for example. A precision level is used (placing it across the rods at each end, observing the reading) to line up the rods. By shimming one of the brackets before firmly securing it to the rigid surface, the need for an accurate building board is eliminated. The wing sheeting used on the original model was 3/32 thick (1/16 thick balsa can also be used).

Assuming the wire rod jig system is employed, proceed with the wing as follows: Glue plywood landing gear doublers to ribs 4 and 5. Locate the retractable landing gear unit mounting bearers before attaching to rib. Drawing shows proper location for Rom-Air landing gear system. Place ribs in approximate position on rods and mark rib locations on spars. Glue top and bottom spruce spars in place, as well as the two-in. wide trailing edge sheeting on bottom of rib. Glue leading edge in place and four- or six-in. wide trailing edge sheeting on top of ribs. (Note that the entire wing will eventually be sheeted, so keep the trailing edge joint straight by placing two pieces of 1/4 sq. on each side of the trailing edge, clamping them in place with clothespins.)

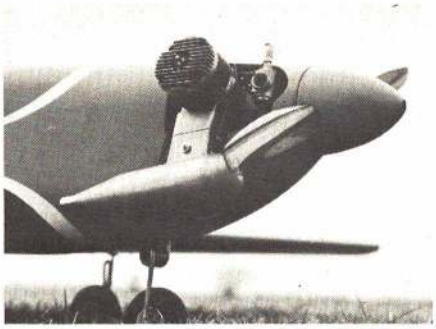
Shape upper leading edge flush with rib contour. Glue four-in. wide leading edge sheeting with rear edge of sheeting over the center of the main spar. (Leaving a portion of the spar exposed allows for easier attachment of the remaining sheeting.) Glue the remainder of the sheeting in place. Remove wire rods sufficiently to take the almost completed wing panel out of the jig, turn the panel



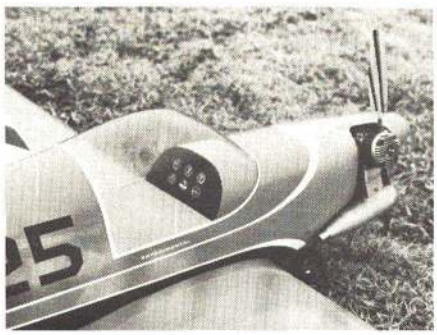
over, and reinstall wire rods into the jig brackets. Install shear webs with grain vertical. Install 1/4" wing hold-down dowel gusset (grain is vertical). Then put in one-piece 3/32" sheet aileron gusset. Cut rib 7 completely through and locate where aileron is to be cut out. Cut through the top sheeting at aileron hinge line where possible between the ribs; however, do not cut the ribs. The ailerons will now be easily located when wing sheeting is finished.

(Continued on page 82)

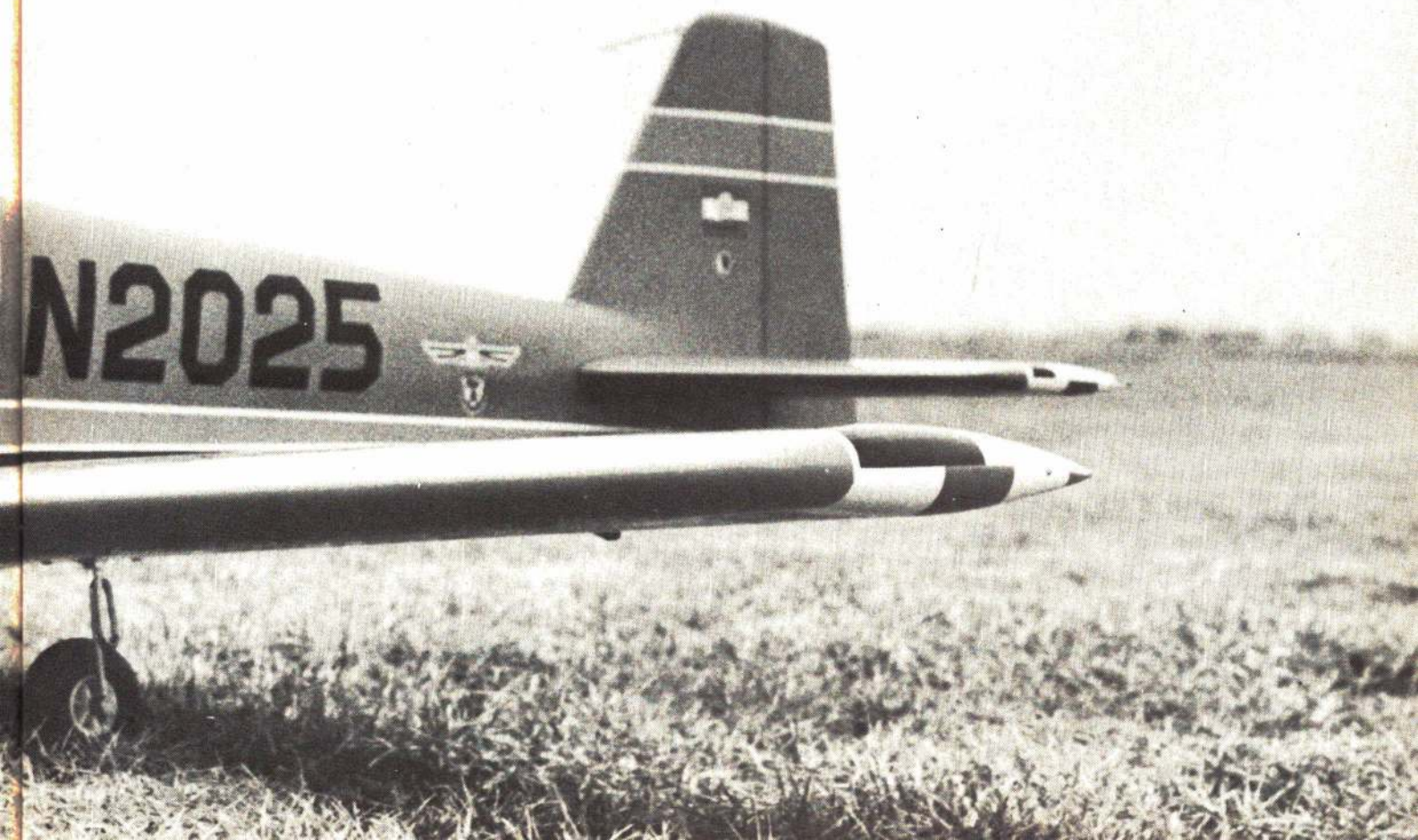
Business end has an H.P. 61 engine with muffler extension piece. Use of exhaust pressure to the tank for smooth fuel feed is recommended.

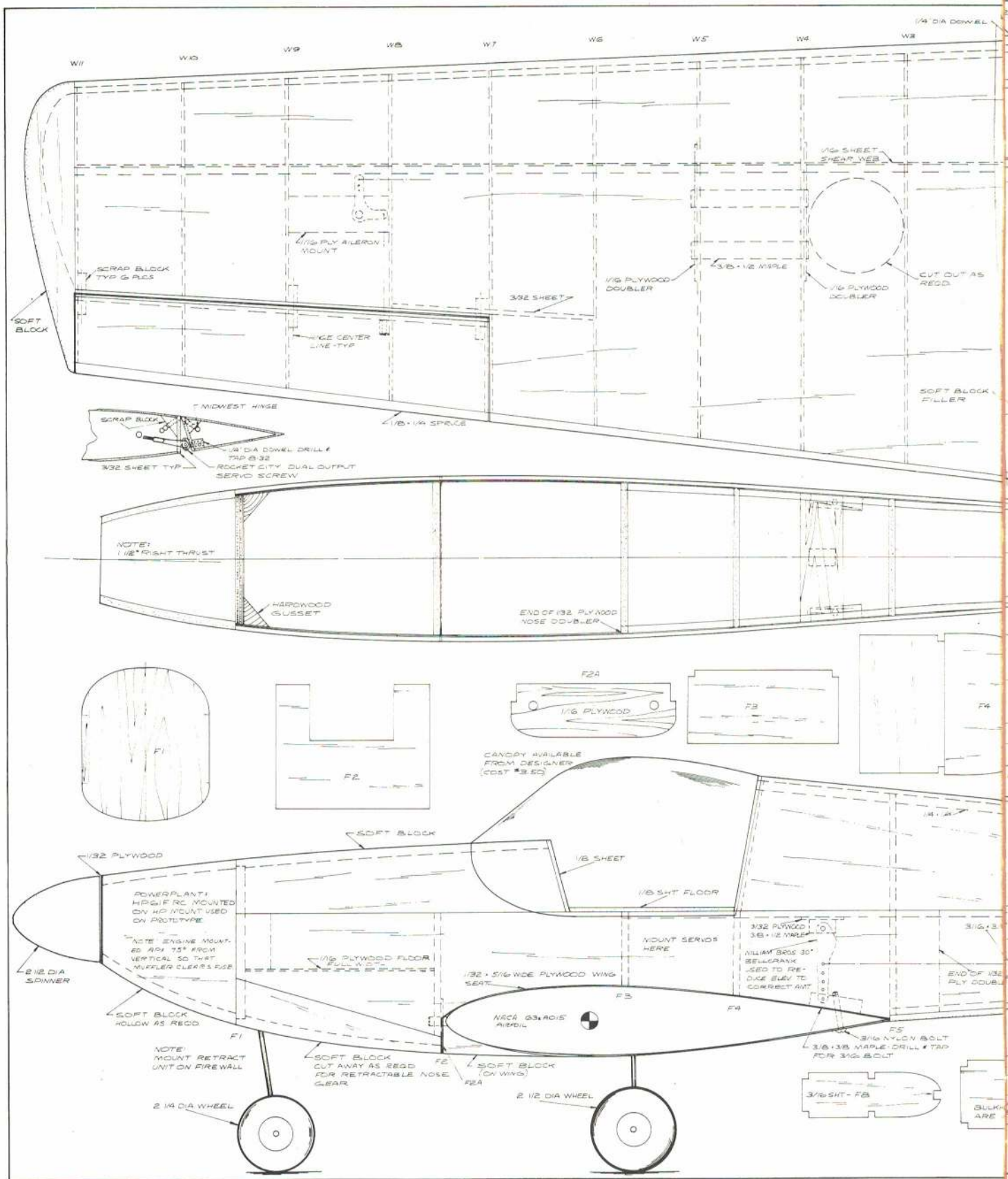


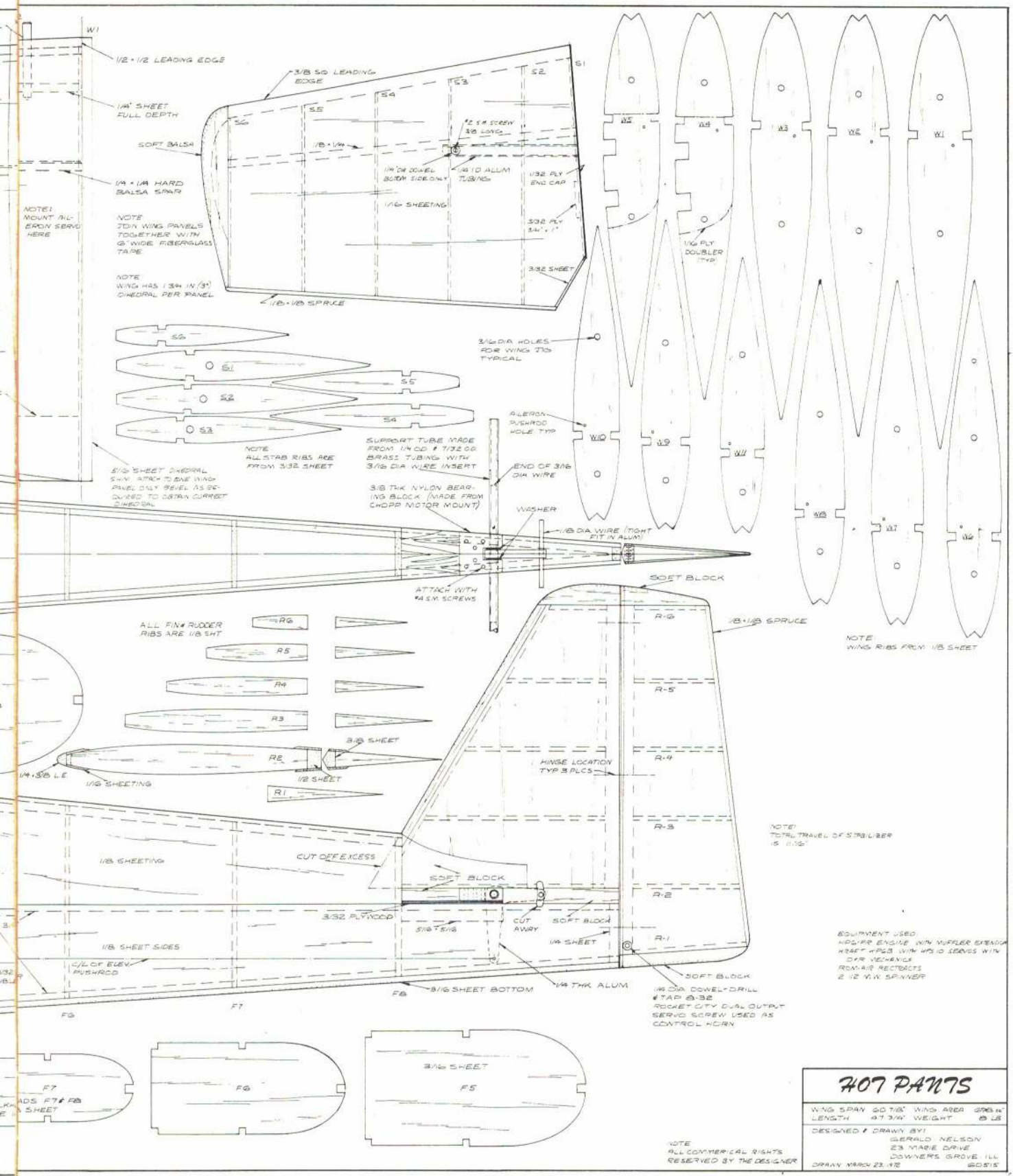
Stabilator is not a novelty—it reduces drag somewhat and can be removed for transport. Small movement requires little servo power.



The author forgot the pilot so he'll have to fly this plane from the ground. Large canopy is available from the author.

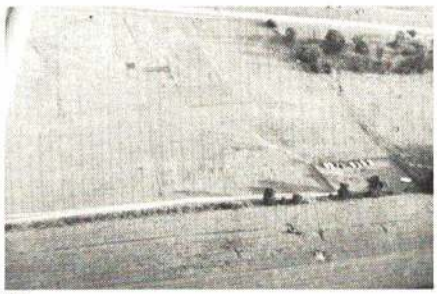



W11
W10
W9
W8
W7
W6
W5
W4
W3
1/4" DIA DOWEL
1/16 SHEET SHEAR WEB
1/16 PLY AILERON MOUNT
SCRAP BLOCK TYP 6 PLCS
SOFT BLOCK
3/32 SHEET
1/16 PLYWOOD DOUBLER
3/8 • 1/2 MAPLE
1/16 PLYWOOD DOUBLER
CUT OUT AS REQD
HINGE CENTER LINE - TYP
SOFT BLOCK FILLER
MIDWEST HINGE
SCRAP BLOCK
1/4" DIA DOWEL DRILL & TAP 8-32
3/32 SHEET TYP
ROCKET CITY DUAL OUTPUT SERVO SCREW
1/8 • 1/4 SPRUCE
NOTE: 1 1/2° RIGHT THRUST
HARDWOOD GUSSET
END OF 1/32 PLYWOOD NOSE DOUBLER
F1
F2
F2A
1/16 PLYWOOD
F3
F4
CANOPY AVAILABLE FROM DESIGNER (COST = $3.50)
SOFT BLOCK
1/32 PLYWOOD
1/8 SHEET
1/16 SHT FLOOR
POWERPLANT: HP61F RC MOUNTED ON HP MOUNT USED ON PROTOTYPE
NOTE: ENGINE MOUNTED AT 7.5° FROM VERTICAL SO THAT MUFFLER CLEARS FUSE
2 1/2 DIA SPINNER
1/16 PLYWOOD FLOOR (FULL W.O.)
1/32 • 5/16 WIDE PLYWOOD WING SEAT
MOUNT SERVOS HERE
3/32 PLYWOOD
3/8 • 1/2 MAPLE
WILLIAM BROS 30° BELLCRANK USED TO REDUCE ELEV TO CORRECT AMT
END OF 1/32 PLY DOUBL
NACA 63A015 AIRFOIL
F5
3/16 NYLON BOLT
3/8 • 3/8 MAPLE: DRILL & TAP FOR 3/16 BOLT
3/16 SHT - F8
SOFT BLOCK HOLLOW AS REQD
NOTE: MOUNT RETRACT UNIT ON FIREWALL
SOFT BLOCK CUT AWAY AS REQD FOR RETRACTABLE NOSE GEAR
SOFT BLOCK (ON WING)
F2A
2 1/4 DIA WHEEL
2 1/2 DIA WHEEL



FULL-SIZE PLANS AVAILABLE—SEE PAGE 84

ON THE SCENE



(1)

(2)

(3)

(4)

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(6)

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(8)

(1) Free-flight area at left, RC in center and CL circles to right. Picnic area among trees. (2) Learning the hard way. Flight area is well marked. Sign also advises spectators that watching is at their own risk. (3) Youngsters always welcome, Here Pat Potega explains RC to fascinated future modelers. (4) Lots of publicity, plenty of models, a variety of displays. 60,000 came to see "Miniature World of Model Aviation" as it was billed. (5) Students from local school built models during show at shopping center. (6) Owen Campen and modeler/dentist Dr. Carl Mohs talk shop. (7) Every phase of aeromodeling was displayed. RC group shows off here. (8) Space age modeling well illustrated by this rocket group.

Modeler's Miracle in Madison

by WILLIAM D. FEENY

One year ago, Madison, Wisconsin was no different than any other community as far as modelers were concerned. There was no specifically designated place for flying model airplanes; most modelers drove some 40 miles to where an approved site was available. The only modeling organizations were the MARCS (Madison Area Radio Control Society) with 26 members, and a small rocketry group.

Today things are different. A new sign erected by the Madison Parks Commission announces the Aeromodelers' Flight Center, a 25-acre field within city limits specifically reserved for flying model airplanes. MARCS has grown to 50 members; the rocketry group has doubled its membership; a new plastic modeling club has been formed with 20 members; a UC group is in the organizational stage; a recent model airplane exhibit attracted some 60,000 people.

All this did not happen by accident. It was achieved by a handful of dedicated modelers, hours of hard work, endless planning sessions, and a cooperative and positive relationship with city officials.

Having been present at all meetings and planning sessions, I offer firsthand observations in the hope that other modelers will benefit from the Madison story.

On October 14, 1970, twelve men sat down to lunch together. Six were members of the Madison Parks Commission, headed by Forrest Bradley; and the remaining six were local aeromodelers who had requested this luncheon meeting. The modelers' goals for this meeting, decided at an earlier session were: (1) to communicate to the city that there existed a sizable number of modelers who needed a place to fly; (2) to represent aeromodeling as a legitimate and mature hobby; (3) to ascertain the city's attitudes toward a municipally maintained and regulated model airport.

As the meeting progressed, it was evident that the members of the Commission took most seriously their duty to provide adequate recreational facili-

ties for the people of Madison. No one tried to belittle the hobby. Instead, they asked pertinent questions and seemed genuinely interested in learning more about model aviation. Finally, we popped the Big Question: "Would the city of Madison be interested in providing a model airport for all modelers to use?"

To our surprise, the idea wasn't shot down on the spot. The Commission's response was that they would have to know more about what such a facility would involve. They suggested that we draw up a detailed proposal to be presented at a future meeting.

Now the hard work really began. Questionnaires were placed in two local hobby shops to determine the minimum number of active modelers in Madison and their range of interests. In addition to writing the proposal, we decided to initiate a continuing series of press releases to create a public awareness of the good things about modeling.

The proposal: each modeler selected his area of interest and listed physical requirements necessary for that specialty. These ideas were then incorporated into a master plan. With regard to the actual site, several possible locations had been discussed with the Commission; it was finally agreed that the best was a portion of a 100-acre tract of gently sloping grassland locally known as "the sod farm." Its terrain was ideally suited to model airplane flying and, in fact, a small number of modelers had already used it with the Commission's knowledge. A map of this area was furnished by the Commission and adapted to the master plan. The completed 12-page plan provided such features as: paved RC runway, four paved UC circles, large FF area, rocket launching site, signs and bulletin boards, parking area, fencing, tree-shaded picnic area for modelers' families and a permanent club house (existing building)!

Press releases: We compiled a list of topics for newspaper feature articles about local modelers. The first to be released extolled the joys of model rocketry. It appeared before our second meeting with the Commission, and was also posted in hobby shops and toy stores throughout Madison.

In addition, one modeler took it upon himself to canvas the entire neighborhood surrounding the proposed site; he obtained written statements from the residents that they would not object to model aviation activities.

In December 1970, we met again with the Parks Commission and presented our proposal. They seemed impressed at its thoroughness and most of the discussion concerned costs of the various items. The economy was getting tight and they wisely anticipated a cut in their next budget. The modelers offered to provide the labor if the city supplied the materials, thereby eliminating much of the cost. We also offered to restrict any flight activities on Sunday mornings to avoid disturbing nearby church services. We suggested the importance of regulations which were enforced by the Parks Commission rather than the modelers themselves. The meeting ended on a positive, cooperative note.

Shortly afterward, a second feature article about modeling appeared in the newspaper. This one told the story of a local architectural modelmaker who used his camera-equipped RC airplane to obtain aerial photos of the University of Wisconsin. Again, a mature approach to modeling.

In January 1971, Bradley advised us that model airplane flying as proposed at the "sod farm" had been documented as a valid form of recreation in the new Madison Open Spaces Plan. Two months later, it was accepted by the City Council. The Aeromodelers' Flight Center was now a dream come true!

There was little time for rejoicing, however, because Madison's modelers were already hard at work on a new project. Jim Roche, manager of West Towne, Madison's newest, largest, most luxurious shopping mall, asked if we'd be able to stage a model airplane exhibit. As an added attraction to shoppers, Roche had been scheduling a variety of weekly exhibits: paintings, antique sleighs, sculpture, etc. They had proved successful and he was searching for new ideas.

"The public's interest varies," he explained. "I know nothing about model planes and there must be others like me. Such an exhibit should appeal to young and old alike from an educational as well as entertainment standpoint." The thought had been triggered as he drove past the new Aeromodelers' Flight Center.

We assured him we could do it. But privately we wondered how in the world we could muster enough models to fill the entire mall.

Once again, planning and communication were the keys. Our aim was to present modeling as an art and science. We chose as our theme, "The Miniature World of Model Aviation." Newspaper announcements and radio spots were handled by Mr. Roche. Owen Kampen, nationally-known RC aircraft designer, appeared on TV to talk about the hobby and plug the exhibit. A lengthy article about Owen and his philosophy of life and model design appeared in the newspaper. Once again, the public was exposed to modeling as the legitimate hobby of respectable people.

The word was out and now the models began to pour in. When the exhibit opened there were hundreds of models of all shapes and sizes: from tiny 1:72 scale plastic aircraft to Frank Baker's giant seven-ft. B-17; from sophisticated camera-carrying rockets to Carl Vogt's collection of rare antique model airplane engines. Students from Orchard Ridge Middle School actually built a model as part of their display and spectators returned again and again to keep track of their progress. The Richard I. Bong Chapter of IPMS/USA came all the way from Milwaukee to exhibit well over a hundred plastic aircraft of museum quality.

As a result of the exhibit, modeling received a good press, merchants attracted more customers, a new hobby shop has opened in the mall, MARCS and the rocketry club have doubled their membership, and a new IPMS group has been formed. Today, it's more fun to be a modeler in Madison, Wisconsin.

We hope that other modelers will benefit from our experience. There is no reason why your community cannot accomplish the same. But it's up to you to carry the ball. Here are a few tips.

Organize. Even loners should realize that a group carries more weight than an individual. Your opposition has been doing it for years!

Plan ahead. Establish definite goals and work towards them.

Take the initiative. Don't wait for national modeling organizations to fight your battles. If modeling means something to you, do something to promote it.

Communicate. Don't keep your hobby a deep, dark secret—let the whole world in on it. Send written press releases to your papers.

Know your facts. Check data before you open your mouth at a public meeting. Don't make any statements you can't support, and answer objections with facts, not opinions.

Be positive. Your attitude is important. No one wants to do business with a loser or a complainer. Learn from setbacks and plug ahead.

Importance of timing. The best publicity is worthless if it appears too late to influence a decision.

Importance of repetition. Don't expect one good news article to educate the public. They'll wrap fish in it the next day, and must be reminded again and again.

Cooperate. Your city officials have other problems besides yours. Having informed them of your needs, show them you'll do all in your power to assist them.

Compromise. Don't insist on all or nothing. You might end up with nothing.

PART I

WITH AN ANALYTICAL APPROACH TO FREE FLIGHT, JOHN GARD DEVELOPED A FIFTEEN-MINUTE DEAD-AIR UNLIMITED RUBBER JOB.

the ULTIMATE rubber ship

by JOHN GARD

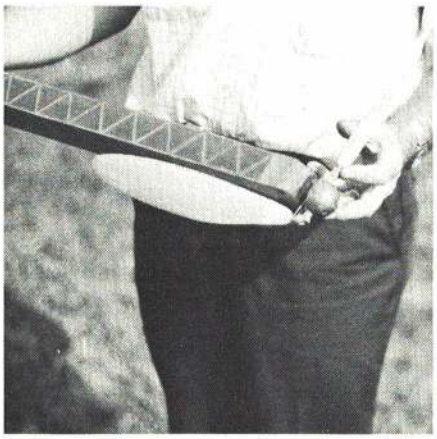
"The Supreme" can fly for more than 14 minutes. Additional testing, to establish optimum trim, should push its flight time to 15 minutes. Does this sound unbelieveable? Five years ago I might have agreed with you.

Four years ago I wrote a technical article for the *NFFS Digest* (January 1968) presenting an analytical method which predicted outdoor rubber-powered model performance. Two example solutions were given: one which predicted maximum flight time for a Wakefield model and the other which predicted maximum flight time for an unlimited rubber model. Comparison of predicted flight times showed that an unlimited rubber model could be designed and built with a flight capability of better than three times that of a Wakefield. Based upon present-day Wakefield performance, durations of 12 minutes would be possible for a comparably designed unlimited. This duration first seemed unobtainable and many modelers questioned the accuracy of the analytical solution. The values assigned for each parameter (lift coefficient "C_L", lift-drag ratio "L/D", propellant efficiency "e" and energy release per pound of rubber "U_R") were the same for both solutions. Since recorded flight times of good Wakes have equalled and exceeded predicted flight times, the assigned values or combination of values for these parameters must be considered realistic.

I therefore felt reasonably confident that an unlimited model could be designed which would have a 12-min. duration potential. I designed and built such a model in 1970 and subsequently flight tested it in 1971. Many technical considerations went into the design of this ship. The primary objective of each consideration was to improve duration. I'll enumerate the more important ones.

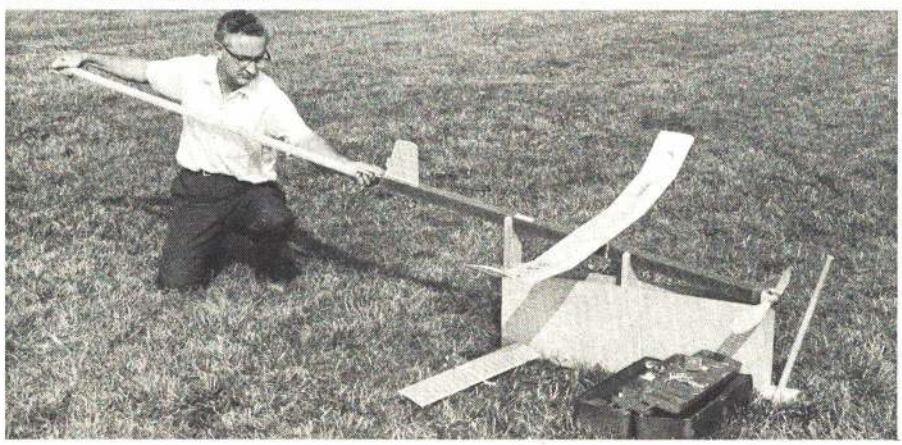
Minimum wing loading results in improved flight time. This dictates that the maximum area of 300 in^2, permitted by AMA rules, should be used. The larger size also improves visibility.

An airframe should be designed and built as light as possible. Theory shows maximum duration is obtained when rubber weight to airframe weight (W_R/W_A) is equal to 2.0. However, air-



Balsa spinner on this rubber job typifies the details which improve flight performance. Hub contains many important features.

Golf club tube used to protect the fuselage during winding. It will contain a "blown" motor without destroying the structure.

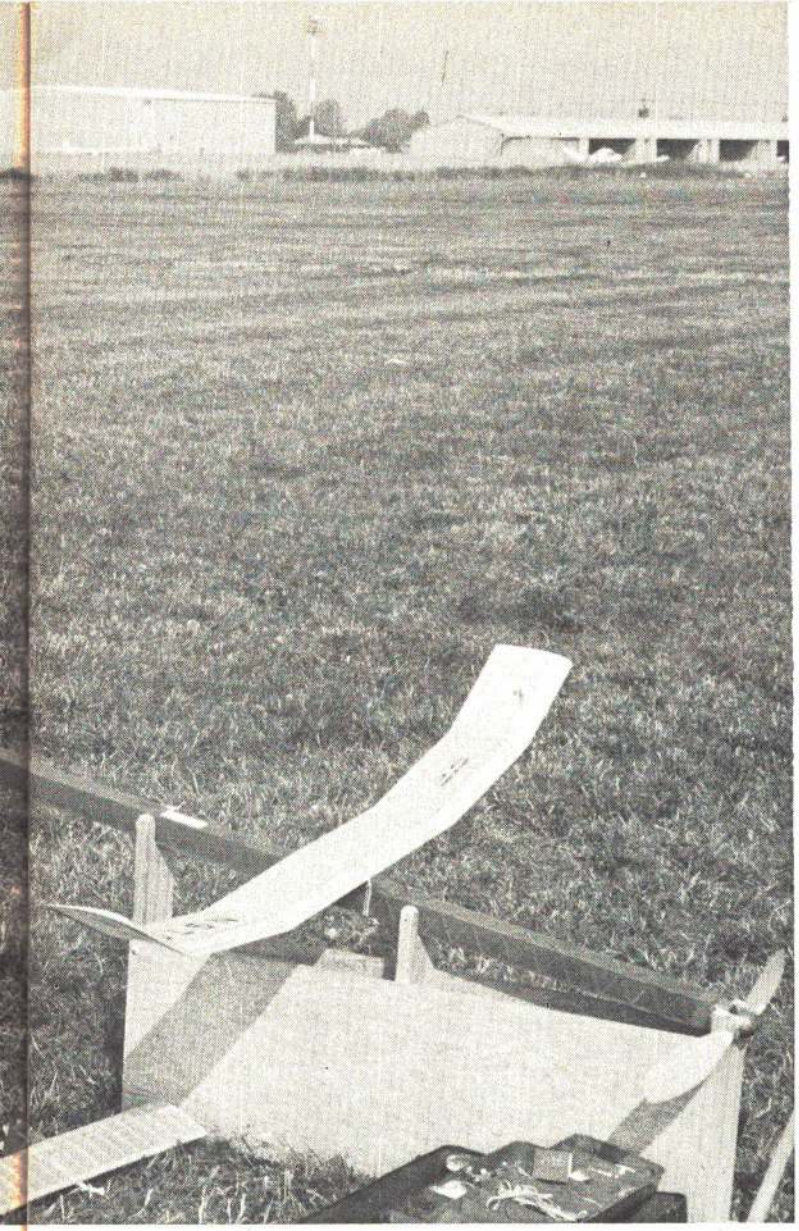


Dual-handled winder strapped to author's waist turned to precise number of turns. Note the excellent model-holding flight box. It is staked to the ground.

frame weight is influenced by the amount of rubber used. Bob Meuser accounts for this effect on maximum duration in his technical article published in 1968 in the March issue of the *NFFS Digest*. The curves shown in Figure 1 are slightly modified from those derived by Bob Meuser. My definition of "t max" is one value and it occurs when $W_R/W_A = 2.0$ and $K_1 = 0$. "K_1" is the ratio of the fuselage weight per running inch of length to rubber weight per running inch of length. When "K_1" equals .10, a realistic value for current fuselage design, peak duration occurs when W_R/W_A equals 1.53. When this ratio is 1.25, duration drops from .91 of a theoretical maximum to .90, an insignificant reduction. My design goal was to build an airframe weighing no more than 120 grams and housing 150 grams of rubber. My ship weighed out at 118 grams using Jap tissue and three thinned coats of clear dope. It is surprising how much weight goes into covering and doping—nearly twenty-five percent of total airframe weight. Table I gives component weights.

Sixteen strands of 1/4" Pirelli were chosen driving a 24" prop with a mean pitch of 31". Theory shows that prop efficiency improves with large ratios of

(Continued on page 75)



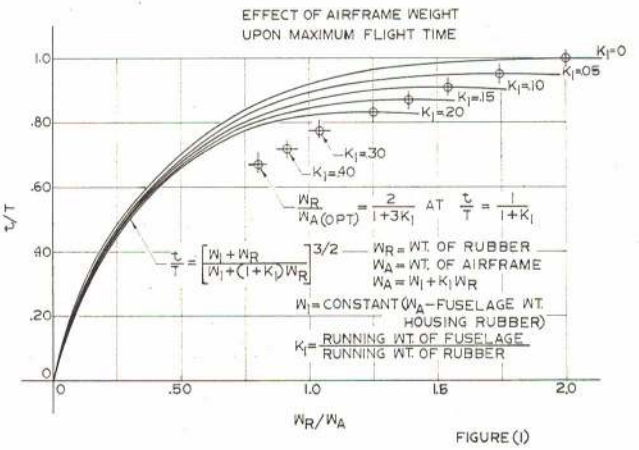


FIGURE (1)

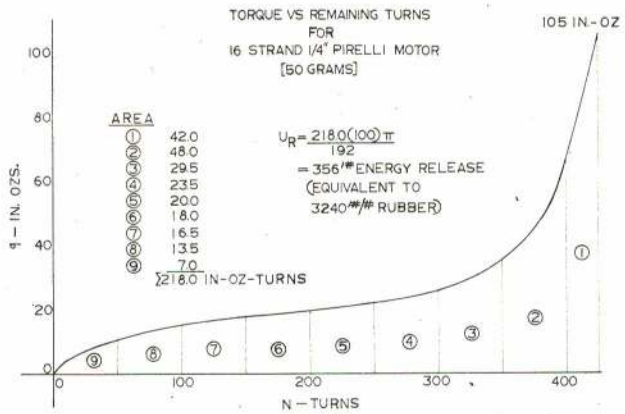


FIGURE (2)

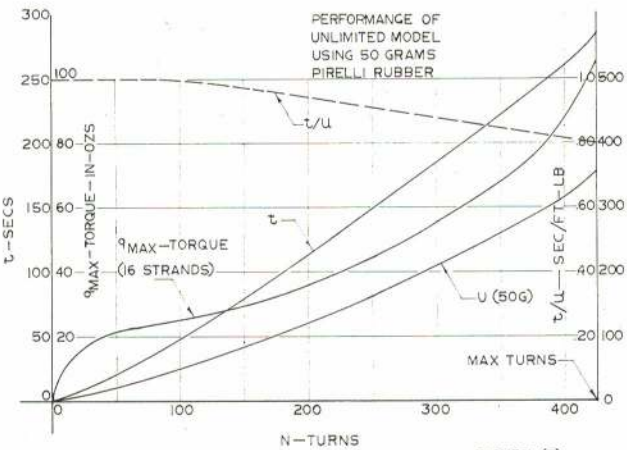


FIGURE (3)

TABLE I-COMPONENT WEIGHTS

COMPONENT	WT. BEFORE COVERING	WT. AFTER COVERING AND DOPING
PROPELLER	1.08 OZ	1.18 OZ
FUSELAGE	1.00	1.36
WING	.98	1.38
STABILIZER	.14	.23
	3.20 OZ	4.15 OZ

TABLE II-FLIGHT PERFORMANCE

TURNS	U_R	τ	τ/u	q_{MAX}
200	120 FT-LB	115 SEC	.96 SEC/FT-LB	36 IN-OZ
320	230	201	.875	60
400	315	260	.825	88
425	356	285	.800	105

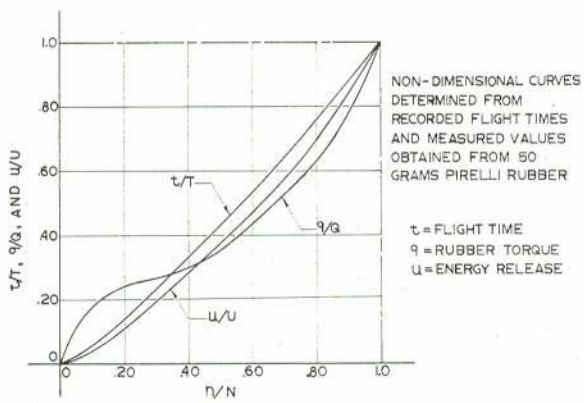


FIGURE (4)

by DON BERLINER

THE PUGNACIOUS REPUBLIC THUNDERBOLT RELIED ON OUTSTANDING DIVING ABILITY AND TERRIFIC FIREPOWER.

DON'T CALL HER 'JUG'

Please don't call her a "Jug"!

That name was coined sometime after the end of World War II, when the great beast that was the P-47 was being phased out in favor of the sleek new jets. Not even the guys who flew Mustangs called the Thunderbolt a "Jug," though they showed their contempt in a variety of other ways. In fact, you can still get a lot of those old P-51 types to lose their cool by suggesting the hefty P-47 was a pretty good airplane, too, wasn't it?

Well, somebody must have thought so, because there were more P-47s built than any other American combat airplane except the B-24 Liberator. And the P-47D was built in greater numbers than any other single version of any military airplane ever used by the U.S., and perhaps any other country, as well. Maybe those Mustang pilots weren't terribly impressed by the Thunderbolt, but vast numbers of German and Japanese pilots were. And so were thousands of tank drivers and railroad men and anti-aircraft gunners who were on the receiving end of the Thunderbolt's thunderbolts.

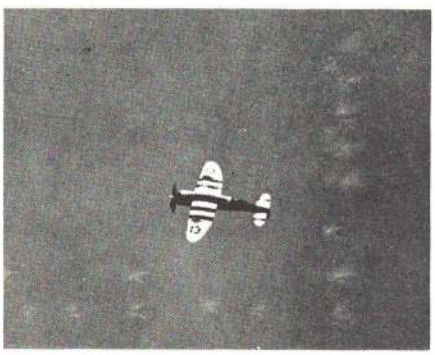
It may not have been the prettiest fighterplane ever built, but it was without a doubt the biggest single-seat, single-engine, prop-driven fighter of all time. And while it drew the sarcasm of other pilots for its sheer bulk, it also earned their respect for its amazing ability to absorb punishment while carrying out its mission, and then bring its pilot back home safely.

The story of the development of the P-47 is that of the early days of Republic Aviation Corporation, for it was the first airplane produced by that firm and the only type produced during the Second World War. Like Republic, the Thunderbolt was a direct result of the pioneering work of Maj. Alexander P. de Seversky in all-metal, retractable-gear pursuit planes.

Seversky Aircraft Corporation was formed in 1931, but didn't get around to building an airplane until 1933, when a three-seat, twin-float amphibian—the SEV-3XAR—rolled out of a rented hangar on Long Island, New York. The flamboyant de Seversky established several speed records with his floatplane, and then sold the U.S. Army Air Corps 30 BT-8s, the fixed-gear trainer version, and the company was on its way.

When the time came for the Army's classic Boeing P-26 to be replaced, Seversky entered the competition with its SEV-1XP, a quicky single-seat conversion of the two-seat experimental SEV-2XP pursuit, which flew in the summer of 1935. And though the main contract went to Curtiss for its P-36 Mohawk, Seversky got an order for 76 P-35s in June of 1936. That airplane was considerably smaller than the P-47 which was to follow, and had less than

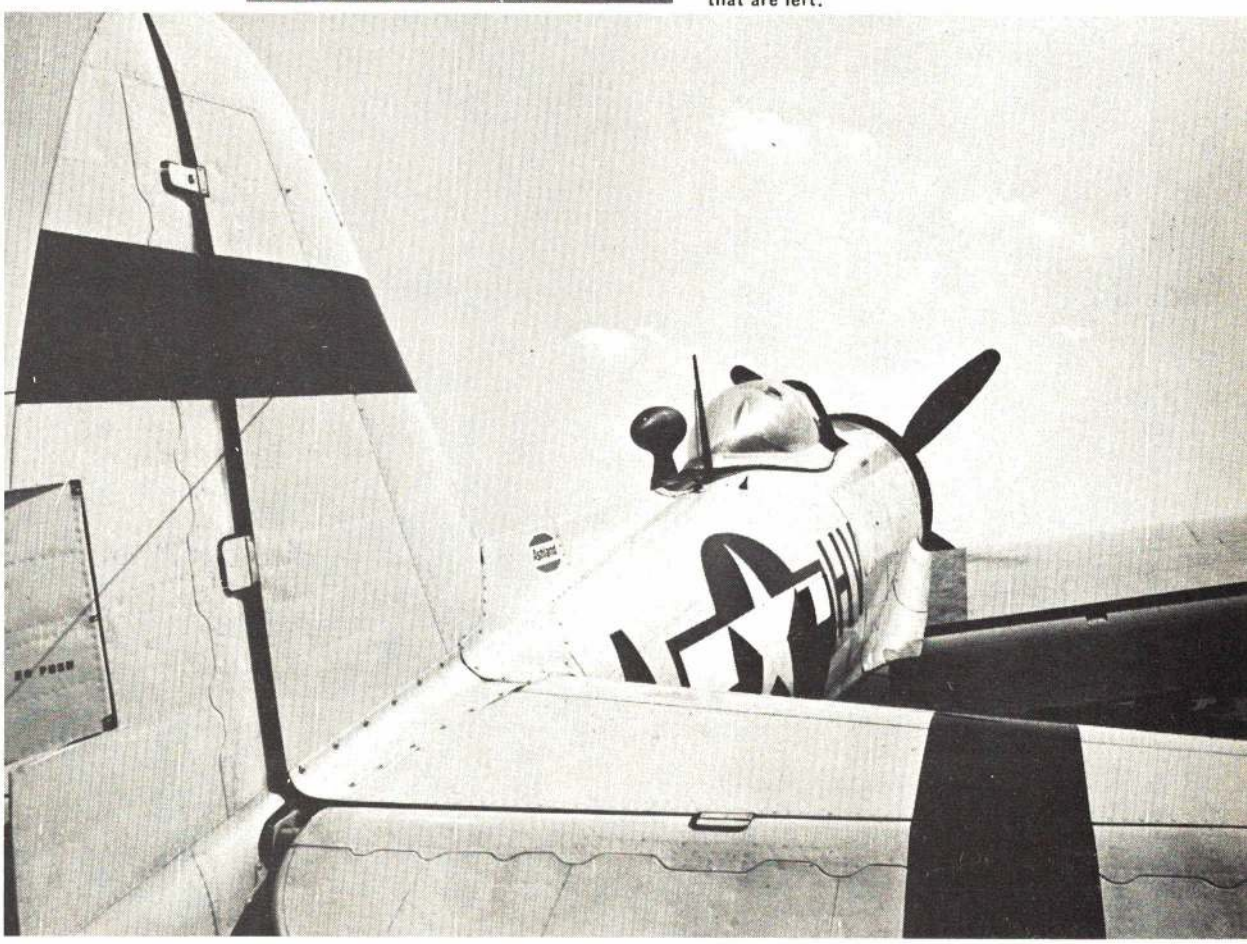
(Continued on page 88)



The bubble canopy and dorsal fin mark this picture to be of a P-47D, after the 27th of that series. Plans show the "Razorback" version of which 4000 were built. From the P-47 D-25 onwards the company switched to the bubble version, building 8500 such craft.

Rolling past the grandstand at Transpo 72 at Dulles, is a refurbished P-47D belonging to the Confederate Air Force, which has various WWII craft—B-24, -17 etc.—in flyable shape.

The biggest single-seat, single-engine prop fighter of all time was the P-47. This one, pictured at Transpo, is one of about a dozen that are left.



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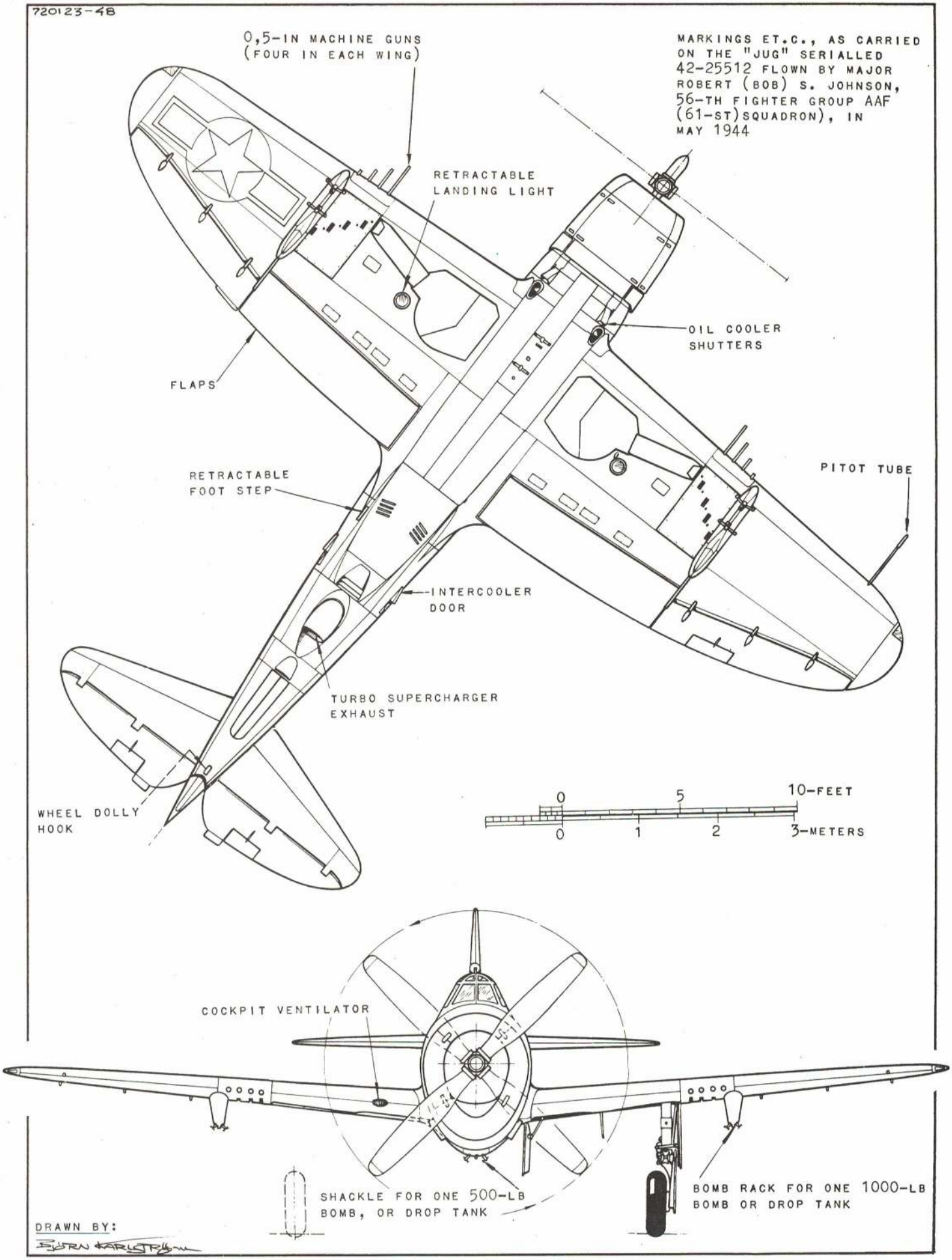
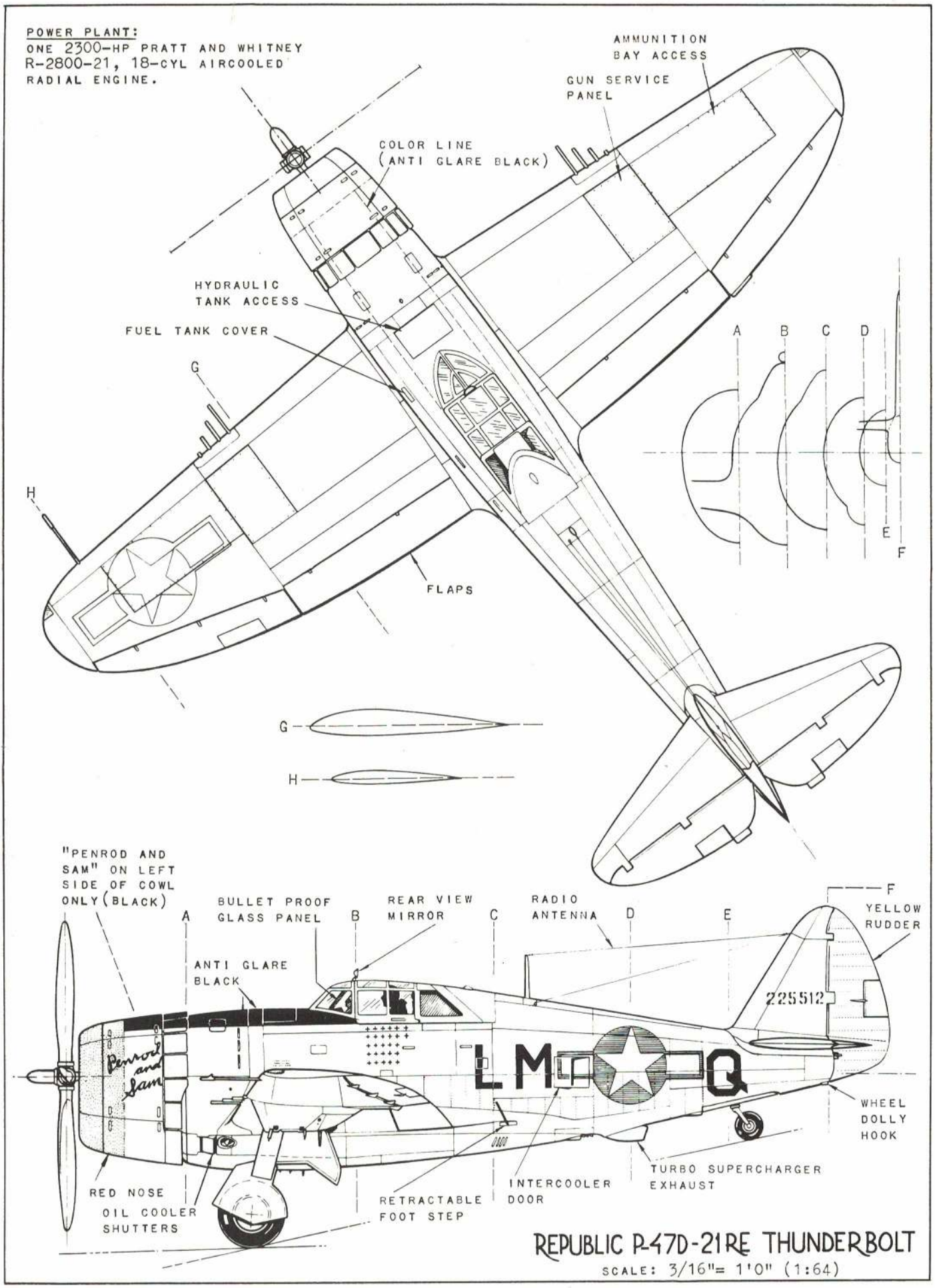


DRAWN BY:
BJÖRN KARLSTRÖM


POWER PLANT:
ONE 2300-HP PRATT AND WHITNEY R-2800-21, 18-CYL AIRCOOLED RADIAL ENGINE.
AMMUNITION BAY ACCESS
GUN SERVICE PANEL
COLOR LINE (ANTI GLARE BLACK)
HYDRAULIC TANK ACCESS
FUEL TANK COVER
FLAPS
A B C D E F G H
"PENROD AND SAM" ON LEFT SIDE OF COWL ONLY (BLACK)
BULLET PROOF GLASS PANEL
REAR VIEW MIRROR
RADIO ANTENNA
YELLOW RUDDER
ANTI GLARE BLACK
225512
LM Q
WHEEL DOLLY HOOK
RED NOSE
OIL COOLER SHUTTERS
RETRACTABLE FOOT STEP
INTERCOOLER DOOR
TURBO SUPERCHARGER EXHAUST
REPUBLIC P-47D-21RE THUNDERBOLT
SCALE: 3/16"= 1'0" (1:64)

AQUA-VENT FLOATS

by ROGER CARIGNAN

UNIQUE STEP DESIGN AND LOW AERODYNAMIC DRAG MAKE THESE FLOATS WORK WELL ON LOW-POWERED HIGH-WING SPORT MODELS.

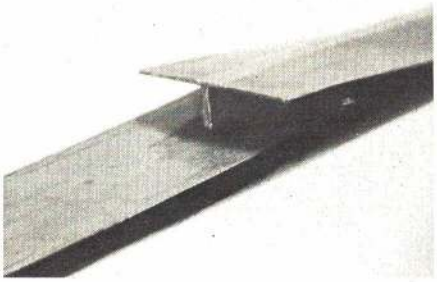
If you are looking for diversion from those routine weekend flying sessions, why not try hydro-flying? Often in areas where flying sites are scarce, or overcrowded, you will be able to find some lake, pond, or river where a model seaplane could be successfully flown.

Perhaps the easiest way to get into hydro-flying is to convert a land plane by the addition of floats. The floats presented here were designed for the sport flier who would like to try hydro-flying with the least amount of modification to his model. Due to the excellent efficiency of the Aqua-Vent floats, a larger engine size will not be required if the model is an agile flyer as a land plane.

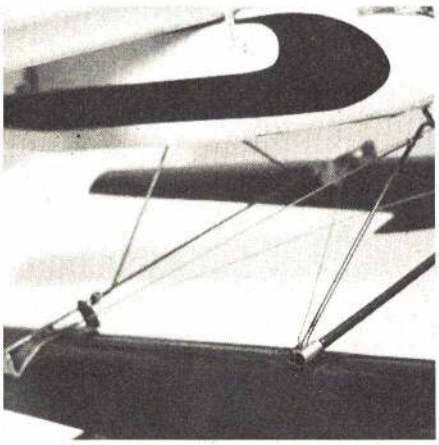
The Aqua-Vent floats were designed to float a rather heavy "H-Ray" weighing slightly over four lb. and powered with a four-year-old muffled Enya 19. Total all-up weight with floats was 4 lb. 12 oz.

A unique, lightweight, monocoque construction is used which eliminates the need for a conventional framework and maintains strength and alignment by the cylindrically shaped skin. Each float, completely covered, weighs in slightly over three oz. The mounting hardware used on the prototype added another three and a half oz., bringing the complete float assembly weight up to ten oz. Taking into account the weight of wheels to be removed, the total added weight to the model will run around eight oz. The center of gravity will be approximately at the step so the model's weight trim should not have to be changed after adding the floats.

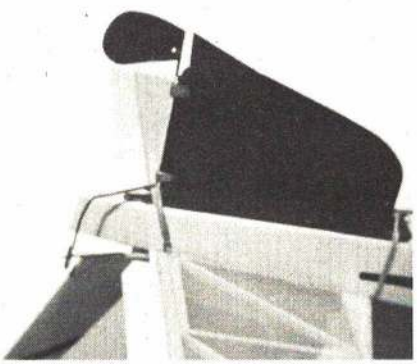
Study of the plan is required to appreciate the design features, especially in the step and forebody areas. From the step forward, the bottom changes from flat to a maximum "V" halfway to the bow; the keel in this area remains parallel with the top of the floats. This section is the same as many V-bottomed planing type boat hulls. From the point of maximum "V" to the bow, the keel line angles upward to meet the top of the floats forming a sharp bow point. Also in this area the bottom "V" angle reduces to a nearly flat section at the bow. Spray is minimized for two reasons: the almost flat bottom section at the bow keeps the spray down; there is very little displacement forward of the propeller. Displacement forward of the propeller is minimized by allowing the afterbody to float low. This keeps the tips of the floats well up during the displacement phase of the take-off run and while taxiing. There are two additional advantages obtained by allowing the afterbody to float low. A more efficient



This is the Aqua-Vent step. It makes takeoff require less power.



Rigging for nose-wheel equipped H-Ray. Those wire diagonal braces are essential. Main gear wire legs are used in float attachment.



An added sub-fin is usually necessary to balance the float area ahead of the CG. So the sub-fin here doubles as water rudder mount.

use of the afterbody displacement is made, reducing float weight and making it easier to obtain sufficient height from the step bottom to the stern which is required for proper rotation before liftoff. A water rudder attached to the tail of the model will lift clear when on the step, thereby reducing drag.

The Aqua-Vent step combines the good features of two common step designs and has the advantages of both, plus a bonus which results from the combination. The design can be described as a tapered step with the bottom surface extended back even with the taper point. This bottom extension (step plate) increases the planing area at the step and does not appreciably increase the displacement resistance over that of a typical tapered step. The major advantage results from the excellent venting of the step, which is obtained with this arrangement. The low pressure pocket, which forms behind a conventional step, can cause enough drag to require considerable additional power for liftoff. The Aqua-Vent step provides a nonobstructed flow of air around both sides of the taper over the step plate, eliminating the low pressure pocket. The effective venting area is increased by a factor of three or four over that of a conventional step. Water resistance is also lowered by the air which flows past the step and under the afterbody reducing the wetted surface area. Some of the features which help reduce hydrodynamic drag also favorably reduce aerodynamic resistance.

Construction

Construction can be completed in relatively short time with the major portion being spent on finishing and attaching hardware. No framework as such is required, and all critical parts are self-jigging. The top of the floats is a cylindrical section which eases the chore of cutting frames, since each has the same top section radius. Follow the ballooned sequence numbers on the plan. I used Marvelite for the top skin—a very thin (1/64") plywood, available at most large hobby stores. An equivalent material which is used extensively for covering foam wings is Sig Wingskins sold by Sig Manufacturing Co.

Step 1: Cut the skins to the outline shown. A pattern can be made by either cutting the outline from the plans, or by tracing if you wish to keep the plans intact. This outline should be cut accurately, especially in the step area, since this governs the final shape of the floats. Use a sharp knife for this operation instead of any type of saw—the plywood is so thin that one or two passes with a sharp blade will make a precise and clean cut. If the outline is cut accurately, little trimming will be required later.

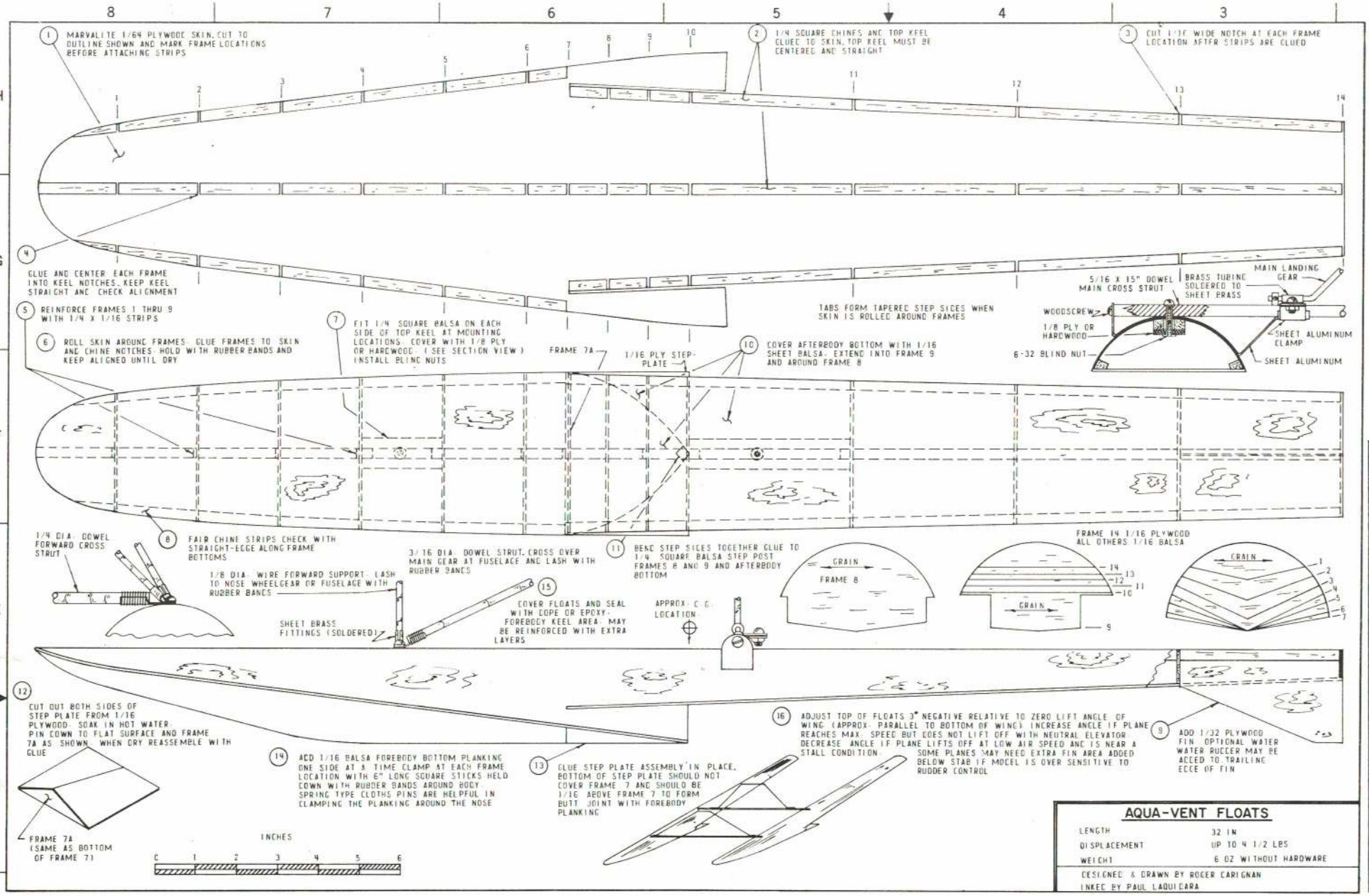
After the skins are cut, mark each frame location. Position the skins over the plan and use a straight edge between the frame marks located on each side of the pattern. Next mark the centerline and a line 1/8" on each side to provide guidelines when attaching the upper keel strip. Make sure you have a "true" straightedge for drawing these lines.

Step 2: Glue the 1/4" square balsa upper keel and chine strips in place. The chine strips should be flush with the outer edge of the skin, except at the bow where they can extend forward over the edge and be trimmed later. Leave a 1/16" space at the end of the three pieces at the stern for frame 14. These pieces can be held down with pins.

Use your own choice of adhesives for assembling the floats. As an experiment, I used Titebond for one float and Resorcinol waterproof glue for the other. Both worked well except that the Resorcinol glue swelled the skin at the glue joints, resulting in a slight bulge line on the outside of the skin. Due to an accident, the float assembled with Titebond glue picked up considerable water but, after drying out, all joints were intact and no weakness due to the soaking was evident.

All frames are made from 1/16" sheet balsa except frame 14 which is 1/16" plywood. If you make a pattern for the largest frame, it can be used for cutting the curved portion of all other frames. Use the frame outlines cut or

(Continued on page 69)



AQUA-VENT FLOATS

LENGTH	32 IN
DISPLACEMENT	UP TO 4 1/2 LBS
WEIGHT	6 OZ WITHOUT HARDWARE

DESIGNED & DRAWN BY ROGER CARIGNAN
INKED BY PAUL LAQUICARA

FULL-SIZE PLANS AVAILABLE—SEE PAGE 84.

WHERE THE ACTION IS

Special Interest

FRED MARKS
AERODYNAMICS, ELECTRONICS

Diode Steering for Retract Gear: The Blue Ribbon Review for the Lanier Colt and the Hobby Lobby Four system in the March issue of **AAM** included the Carl Goldberg retract gear operated by the Jetline Products retract servo. We stated that the necessary battery complement could be reduced by using diode steering for servo switching.

Carl Goldberg wrote to ask us how "diode steering" worked. This is best illustrated by a series of four drawings of the switching and mechanical hookup. Figure 1 shows the normal arrangement which uses a center-tapped battery supply and is the one we used. The bellcrank is shown to indicate how servo throw to the switches may be increased or decreased. The center tap goes to one side of the motor. The outputs from the switches go to the limit switches. When the throttle is moved to, say, full low, the servo will automatically extend the gear until the "down" limit switch opens and vice versa. The separation of voltage and switching is achieved by virtue of using separate limit switches but requires a center tap.

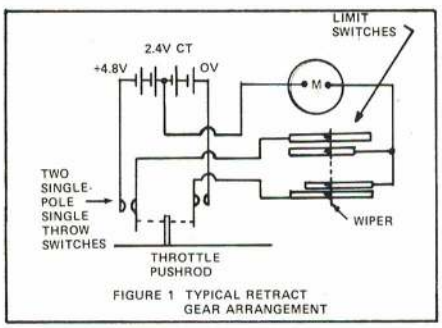


FIGURE 1 TYPICAL RETRACT GEAR ARRANGEMENT

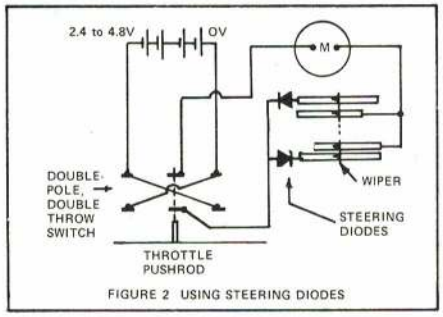


FIGURE 2 USING STEERING DIODES

Figure 2 schematically shows how the arrangement would work using steering diodes. A double-pole, double-throw switch is needed to provide reversed polarity going to the motor. Now, the voltage is reversed across the motor by the switch output. If, say, full low throttle were commanded, the polarity out of the switch might be positive to the diodes and negative to the other motor terminal. The servo would move until contact for the positive diode was broken, and vice versa. If the diodes were not used, there would be no limiting and this would not work.

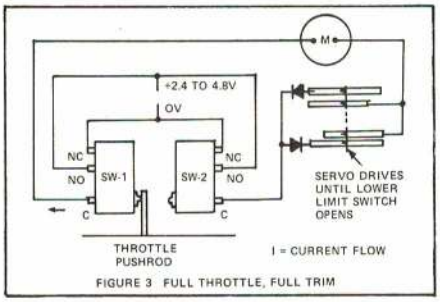


FIGURE 3 FULL THROTTLE, FULL TRIM

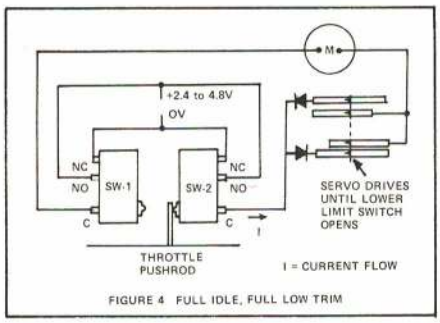


FIGURE 4 FULL IDLE, FULL LOW TRIM

Figures 3 and 4 show the mechanical arrangement required. While a DPDT slide switch can be modified to perform the switching, two single-pole, double-throw (SPDT) micro switches are far better. Study Figures 3 and 4 and you will see that, with the two extremes of throttle servo travel, the output is reversed as shown. With the lever anywhere between the extremes, both switches will be at the normal closed (NC) position so that the output is zero volt.

I can assure the reader that the whole thing is easier to do than to describe!

CLIFF PETERS
RC BOATING

S.F.M.Y.C. Leads in Noise Pollution Action: The San Francisco Model Yacht Club has taken specific action in the national move to reduce noise. Because of the occurrences which lead to positive steps in the handling of this problem, it will be best that we chronologically take the actual happenings from their excellent newsletter, which moved the club from no muffler conditions to most stringent rules in the right direction for the benefit of all concerned.

Because other groups throughout the country (and this includes flying clubs as well) are perhaps passive about the noise problem, the San Francisco boys' experiences may prove useful, or at least serve as guidelines for preventative steps which will eventually effect most of us who use IC engines.

Early this year San Francisco residents of homes across the lake from where sailing took place, presented an anti-noise petition to the mayor. He turned it over to the Park Committee for action. Naturally, it ended up at the club.

A meeting was called immediately which brought a club decision that mufflers would be mandatory. However, this was not sufficient. Stronger action was necessary and to quote one of the subsequent newsletters, "It was either this or put your boats on the mantle."

A subsequent meeting brought a committee report which was passed and had teeth in it. Here are the rules which are now enforced in the S.F.M.Y.C., and should be read with more than mild interest by other groups and club members before they find their city fathers banning their favorite ponds or lakes for model boating:

"1. The highest noise level by a boat engine shall not exceed 84 DBs at 50 feet.
"2. Boats may be checked at any time and whenever the boat is challenged by anyone.
"3. If a boat does not meet with the regulations, it is not to be operated until it is rechecked and approved by the officials.
"4. If a club member refuses to comply with the regulations, the club member shall be expelled from the club, and the police shall be called and a complaint lodged.
"5. A noise control officer shall be appointed annually by the club.
"6. A DB noise level meter shall be purchased by the club. (The club has already done so)."

It couldn't be hoped that every member would agree to abide by rules which would guarantee the continued use of the lake by all members with the approval of the Park Commission. A subsequent newsletter announced the resignation of seven members, with the statement: "These seven members refused to use mufflers of any type or to cooperate in noise abatement."

Photo of the new Dumas kitted Shelley Foss tug, suitable for either electric or IC engines. It is 36" long and 13" beam.

Tom Protheroe works on plug for a fiberglass molding job of the "Soling." It fits the 50-800 Class of the AMYA and might become a kit from Vortex.

Glen Staubitz enjoys company of Linda Falkenberg when winning Toledo's Best in RC Boat Scale.

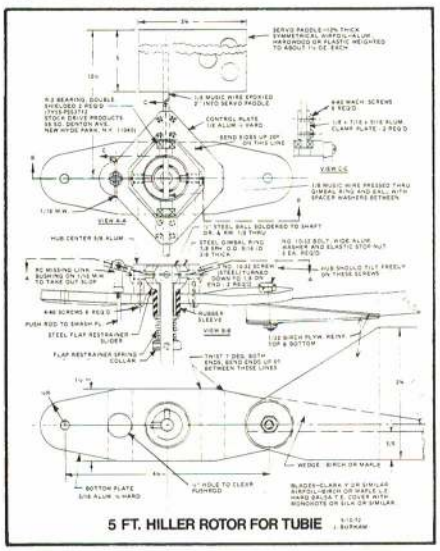
We will drop the S.F.M.Y.C. problems and pass out some of the information we have been able to obtain from legislature personnel in Connecticut. Anti-noise bills are in the works, and we have been informed that they are expected to be passed. Also, similar bills are in legislative committees in many other states.

There is every reason to believe that noise abatement laws will be popular. It is difficult to believe that they could possibly be generally unpopular, which in effect would be getting John Q. to say, "I like noise and even though I have been up late Saturday night, there is nothing I find more pleasant than being awakened early Sunday morning by the sound of unmuffled IC engines, particularly if it continues all day."

Let's make our move now before we find that we are moved from our favorite sailing or flying location. It will be much easier to take action ourselves before action is taken against us, and then attempt to undo the damage when it may be too late.

JOHN BURKAM
HELICOPTERS

Hiller Rotor: This sketch (an update of the rotor shown in November '71 column) is the rotor now performing so well on DSE-1 and may be used nicely on Tubie. Note the improved flap restrainer which steadies the fuselage and makes flying so much easier.



5 FT. HILLER ROTOR FOR TUBIE

Rigid (Hingeless) Rotor: Forgot to mention last month that rigid rotors should have three or more blades to avoid severe vibrations in any rapid pitch or roll motions. The quarter chord line or center of pressure should be in line with the pitch bearing axis of each blade for minimum control forces.

Articulated, Teetering or Gimballed Rotor: All three are unstable as heck by themselves, but may be stabilized by a Bell or Hiller type gyro.

Bell Rotor: As invented by Arthur M. Young in the early 1940s, this was a two-bladed teetering rotor with its hub connected to the shaft by a universal joint. The hub was hung below the universal joint (underslung) just enough to bring the rotor CG in line with the U-joint. This was to prevent strong two-per-rev inertia forces on the shaft which would occur when the rotor disk was not perpendicular to the shaft. It is important that the inner axis (gimbal ring to shaft) be perpendicular to the blades and act as the teetering axis. The outer axis (gimbal to hub) is then in line with the blades and acts as the feathering axis. If it were the other way, when the rotor disk is not perpendicular to the shaft, part of the driving torque would be exerted on the blades in the feathering direction and would be fed back into the bar. As it is, this component of driving torque is felt only in the flapping direction where it is insignificant compared with the powerful C.F. and aerodynamic forces. With this gimbal arrangement, there are no C.F. loads in the feathering axis, considerably reducing the friction and consequently the control forces.

Pivoted to the shaft, either above or below the hub, is a stabilizer bar with a weight on each end. (On models, the inertia of this bar should be two or three times the scaled inertia from full size.) Inside the bar are mixing levers; the middle of each lever is connected by pitch link to the pitch horn of each blade. On Bell 47s, the inner end of the mixing lever connects to the swashplate and the outer end is connected to the stabilizer bar. On HU-1's and Kavan's Jetranger, it is just the opposite. Dr. G.J. Sissingh at Kellett Aircraft Corp. determined that the optimum ratio of blade pitch change to gyro bar tilt was about 1/10 for best stability. The HU-1 hookup gives approximately this ratio. On full scale, Bell's viscous damper acting about the stabilizer bar pivot shortens the time required for the bar to follow a tilt of the shaft. This is to increase maneuverability of the helicopter, but it also decreases stability. There is usually enough friction present on models that a damper is not needed. The following rate of a model should be about one to two seconds. That is, with rotor turning full speed, if the shaft is suddenly tilted 10^{0}, for example, it should take one to two seconds for the rotor to follow and again become perpendicular to the shaft.

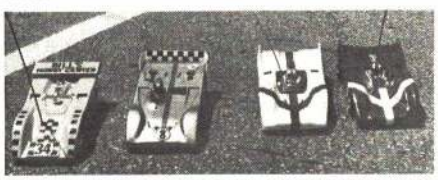
In controlling the Bell rotor, the swashplate pushrod moves one end of each mixing lever. Hopefully the other end of the lever does not move because of the bar inertia. The middle of the lever does move, and puts the control into the blades. For collective pitch, each blade has a pitch change bearing where it is connected to the hub. This bearing takes C.F., but it has to move only when changing collective pitch. A linkage from blade to hub to other blade forces the hub to stay halfway between the two blades, insuring that only the gimbal feathering bearing moves for cyclic pitch, and keeping the two blades aligned exactly opposite each other. To change collective pitch, the whole swashplate is raised or lowered, which raises or lowers both mixing levers and the pitch on both blades simultaneously. This equalizing linkage plus the collective pitch bearings are what complicate the Bell hub if controllable collective pitch is desired.

A simpler hub was suggested by Bartram Kelley of Bell in the mid 1950s. This one eliminated the feathering bearing of the gimbal and had only the flapping or teetering bearing and the two underslung individual blade pitch bearings. The Kavan Jetranger uses this type hub. Since the feathering bearings now take C.F. of the blades, careful design of these bearings is necessary to minimize friction in them and keep down the size of the stabilizer bar required.

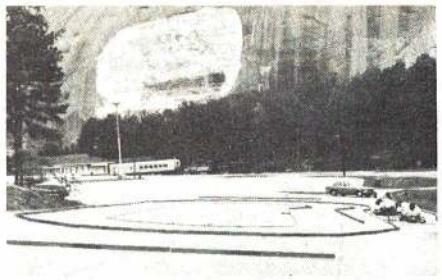
Books: *The Helicopter Design and Data Book*, by Stanley Dzik (Aviation Publications, P.O. Box 123, Milwaukee, WI 53201 $4.95), suggested by Ed Gray of Cincinnati, explains helicopter terms and mechanisms and has lots of useful information in it; some inaccuracies. Another Bible of helicopter engineers is *Principles of Helicopter Engineering*, by Jacob Shapiro (McGraw-Hill Book Co., Inc., New York, NY); more advanced.

BOB BECKMAN
RC CARS

Jerobee 1/12 Regional Races: The first of several Jerobee Regional Races was held April 16th at Stone Mountain, Georgia. The race was co-sponsored by Champion of Chamblee, and Ed Lewis, Champion's General Manager, was Race Director. About 20 entrants, some from as far away as St. Louis, competed on the 250 ft. per lap road course. Stock Jerobee cars got five to seven laps on a tank of fuel, so fast pit stops were a must. The Stock class was won by Charles L. D'Englere (Decatur, Georgia), and Jim Newman (Forest Park, Georgia) came out on top in the Modified class.

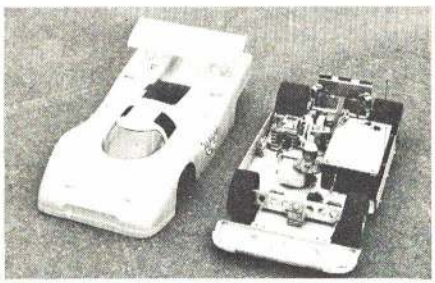


Concours winners at first Jerobee Regionals. Ferrari by Bill Prehen took first place.



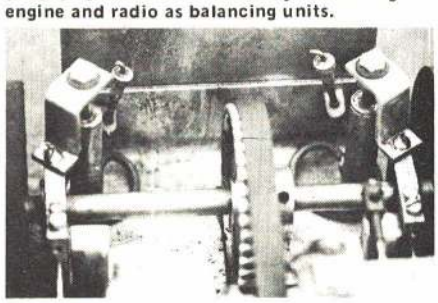
Stone Mountain, Georgia. Great racing site.

Series 72 East: The 1972 East Coast series got started with races at Elmsford, New York on April 8th and 9th, and at Tyson's Corner, Virginia (D.C. area) on May 7th. About 35 entrants showed up at Elmsford, which is geographically in the center of the circuit; 16 raced at Tyson's Corner, the southern end. My main impression of the two meets: Elmsford—lots of organization and not much racing; Tyson's Corner—not much organization and lots of racing. At Elmsford you ran one 30-lap race, and that was it. At Tyson's they didn't start until 12:30, but by 4:10 they had run off 12 ten-lap heats, two 30-lap races, and a 35-lap race. Everyone got to run at least three heats and the top qualifiers on the basis of heat points moved on to the finals.



At Elmsford, Novice winner was Lou Pascucci with all-suspended live-axle car.

Rearend of Pascucci car is sprung and has air shocks. Drive line centered by off-setting the engine and radio as balancing units.



At Elmsford the top Novice was Big Lou Pascucci driving a very interesting car designed by Ernie Huber. Young Dan Bracciale took Expert honors and Gary Swiman was first in Concours and first overall. Gary Walker was number one Expert at Tyson's Corner, with Fred Berlenbach earning a well-deserved Novice win.

Competition: A lot of RC model airplane fliers can't understand what we see in running RC cars. They equate "running a car" with "flying a plane" and take the attitude that there can't be much to running a car since you've only got two dimensions to play with. There are a lot of RC fliers who have tried RC cars. They put a car together, take it out someplace with no one else around, and run it back and forth for a while. Predictably, they get bored in a hurry and go back to doing fancy things in the sky.

What they are overlooking is the thing that RC cars are all about: *Competition.* I used to go out to "fly" my planes, but now I go out to "race" my cars. Anyone who is just running an RC car literally hasn't found out where the action is. Not that there isn't competition in flying, but, except for pylon racing, it's a different kind of competition. You can go out by yourself and practice for a

(Continued on page 89)

Free Flight

BOB MEUSER
SPORT

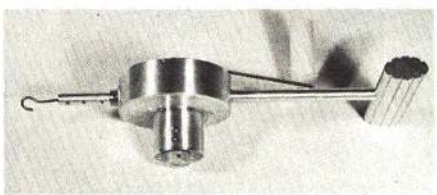
Driftwould (sic): Designed by Steve Geraghty in 1964, and refined through years of competition, the Driftwould is easy to build, and is light enough to pick up early morning "dew-thermals." In only one year, in the hands of Steve and Gerry Geraghty, it racked up the impressive list of accomplishments shown on the three-view. In the 10-in. size it has won five Western Associated Modelers (W.A.M.) championships, and more trophies than any other 10-in.-class glider.

The Geraghtys build them quickly and without non-essential features like airfoil sections sanded into the tail surfaces, or any finish whatsoever except one quick coat of filler on the wing. Occasionally M&P-type drop-weight dethermalizers are used, but most often they are omitted—easier to build another glider if one is lost. The triangular airfoil thins to 1/16-in. at the tips with slight wash-in sanded in. Fuselage is very hard balsa—spruce of the same weight whips too much. All surfaces are aligned straight, and turn is added by rudder warp. Given a side-arm launch slightly to the right of the wind, with a steep bank, the glider makes about 3/8 of a turn before settling into the thermal that just passed.

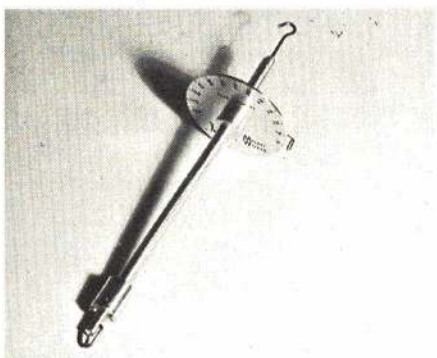
Driftwould kits are being sold for $2, postpaid, by Gerry Geraghty, 2858 Pinecrest Court, San Jose, Calif. 95121.

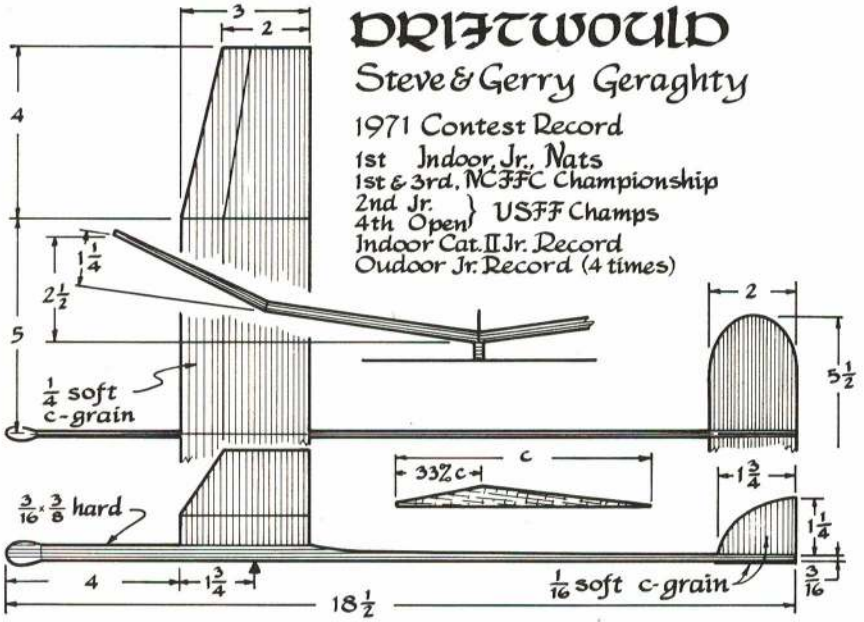
The Geraghty boys and their Driftwoulds. West of Fast Richard, they do most HLG winning.

Wilder's Wild Winder: Back at the Albuquerque Affair in 1970 we were favorably impressed with the pre-production prototype of Bob Wilder's rubber motor winder, and it is now in production. It works silky smooth, is light, has enclosed 4-to-1 gears and ball bearings galore, and has a crank-turns counter with add-subtract and reset-to-zero features. The price tag of $30

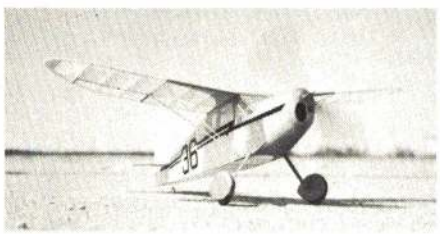


Bob Wilder's winder has many valuable features. Note a counter on the winder and an attachable torque meter.





seems like a lot until you consider the features. His well known torque meter is seen in increasing numbers on the contest scene, and aids in winding a motor closer to the breaking point consistently. His improved models come in two ranges: 120 in. oz. for Wakefields and Unlimited Rubber models; 30 in. oz. for Coupe d'Hiver and other smaller models; $12.50 each plus postage; 2010 Boston, Irving, TX 75061. The winder and torque meter may be simply hooked together, or the torque meter may be firmly attached with a machine screw.

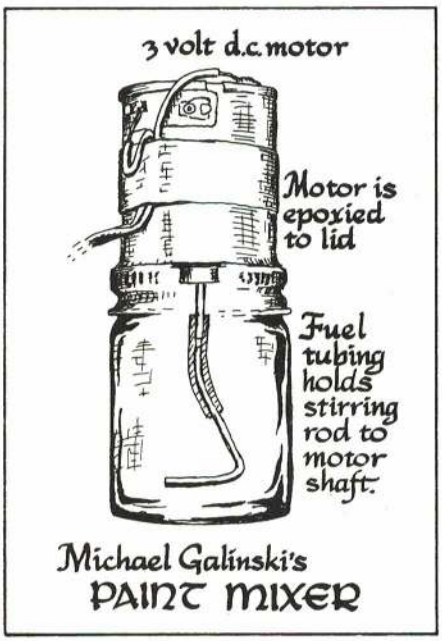


Sig's nifty version of Paul McIlrath's sort-of-scale Cabinaire.

Cabinaire: Appearing to combine the best classic design features of a clipped-wing Monocoupe and a Fairchild 24, Paul McIlrath's Cabinaire, a 22-in. rubber-powered sport model kitted by Sig, combines good looks with flyability. Rounded wingtips and wheelpants look complicated, but accurately die-cut parts reduce it to a simple matter of gluing the pieces together. Any manufacturer that claims he can't furnish soft wood in his kits because it will not die-cut well should sign up for lessons from Sig.

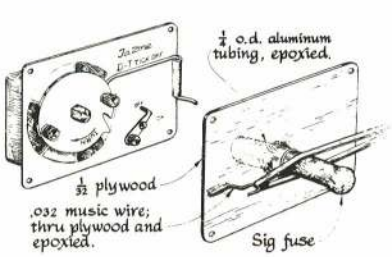
An eight-page booklet augments the well-detailed plans to help the modeler through the construction and those critical first flights. It is a far cry from some of the kits we have seen where the top and side views don't even agree with each other, let alone with the die-crunched parts furnished, and which won't fly anyway. However, if an eight-year-old who had never cut balsa before were expected to build one without adult assistance, the results would probably be disappointing. It is best to start him with a 39 cent AMA Cub first.

Mike's Mini-Mix-Master: At first blush, Mike Galinski's battery-powered electric paint mixer seemed frivolous—until I needed one. Then, in twenty minutes I had one built and mixing away. Now that a dime bottle of scale-model enamel costs between 39 cents and a dollar, it doesn't pay to chuck one when the pigment and flatting compound settle out. Mixing by hand is a chore, and not entirely satisfactory. Small 3-volt motors are available in the hobby shops, especially those selling model railroad supplies, for around 50 cents.



Mine were $3 a dozen from Edmond Scientific. Poke a hole in a lid, epoxy the motor to it, attach a wire stirring rod, and it is done. A pair of D-cells in a battery box with clip leads attached will serve as a power supply, or use your glow-plug battery. Mike's original version had a balsa spacer between the lid and the motor, to keep the paint from gooking up the lower motor bearing.

Fuse/Timer Exchange: Compared to fuses, mechanical DT timers are accurate, expensive, unreliable, convenient, heavy, and have never been known to start a fire. In short, each has its place, and to be able to change from one to the other at the flip of a screwdriver is often a great convenience. This is possible if the model is made to accept a mechanical



DT FUSE - TIMER EXCHANGE

timer, and the fuse adapter shown in the sketch is built.

If the timer is located at the CG of the model, then replacing it with the lighter fuse assembly will not noticeably change the trim. If the timer is not at the CG, the fuse adapter will have to be ballasted up to the timer weight to prevent a shift of the CG when the switch is made. On a light model, the fuse should be at the CG anyway, to prevent a CG shift as the fuse burns down.

BUD TENNY
INDOOR

New Indoor Activity: Canada, usually lacking indoor sites, has had a breakthrough. In British Columbia, a 90-ft. domed site called the Agrodome was the location of an indoor contest on July 1, 1972. Florida has been another "indoor wasteland," but Miami will be the scene for a series of spring and summer indoor contests. Contact Tom Cooney, 4245 Braganza, Miami, Fla. 32202.

At Philadelphia Convention Hall, Charles Danila launches a Bandersnap (Jan., Feb., and Mar. AAM 1971).

More On Bracing: Previous issues have explained wing bracing techniques for indoor models. Indoor models often have fuselage and tail bracing as well. Fuselage bracing will be covered in a future column, but let's now examine tail bracing methods.

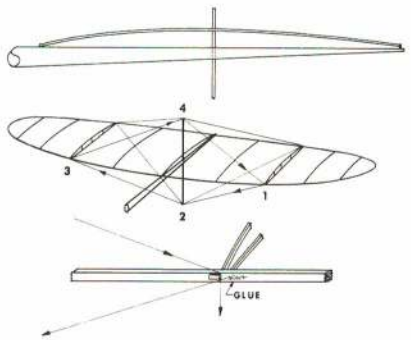


Fig. 1

Bracing The Stab: Fig. 1 shows a view of the most common tail bracing scheme; it is almost the only really practical bracing arrangement for models using rolled, tapered tail booms. After the stabilizer has been mounted, a small reinforcement patch is placed on the film over the center of the stab. A small hole is then cut through the film and the tail boom to allow a vertical post to be glued to the tail boom as shown in the upper part of Fig. 1. Note also in Fig. 1 that a compression rib (see August '72 **AAM**) is used where the bracing is attached to the leading and trailing edges. The lower part of Fig. 1 shows how a small balsa block is glued to four places on the stab to provide an anchor for the bracing. In addition, there should be a small "v" notch in each end of the vertical post to help locate the bracing.

Stringing The Bracing: Begin bracing by gluing one end of the bracing to the leading edge of the stab as shown in the lower part of Fig. 1. Follow the arrows around from "1" through "4" and back to "1," then remove the slack from the bracing. This is done by supporting the stab leading edge on a thumbnail and pulling slowly down on the bracing. Stop when all the slack is removed—no special tension is used. Glue the second end of the bracing at "1," then repeat this bracing technique on the rear side of the stab.

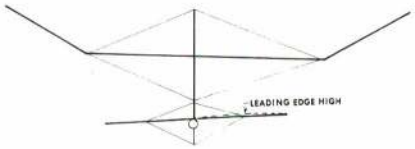


Fig. 2

Stab Alignment: View the model from the front as shown in Fig. 2. Carefully align the stab with tilt, and with the leading edge of the stab high as shown. The stab will slide on the bracing and hold the new position, so work until the alignment is correct and glue the bracing wherever it touches wood.

Why a Twisted Stab?: With the stab leading edge slightly elevated, the forward motion of the model will make the stab tend to "fly" into more tilt, which will help the model hold its turn in the climb.

BOB STALICK
GLIDER, RUBBER AND POWER

The Care and Feeding of Jetex: Rocket (Jetex), the event in which you don't see too much activity at contests, can be one of the more pleasureable events on the AMA schedule, if the model performs correctly, or one of the more frustrating, if it doesn't. The diversity of model design isn't in a rut as are some more popular classes. However, all successful ones have two things in common: they are light and they have well-cared-for motors. The model designs seem to zero in on a Coupe-size planform, about 120 to 170 sq. in. in the wing and around 35 to 45 sq. in. in the stabs. Weight in the neighborhood of two oz. for the hot competitors seems about the maximum.

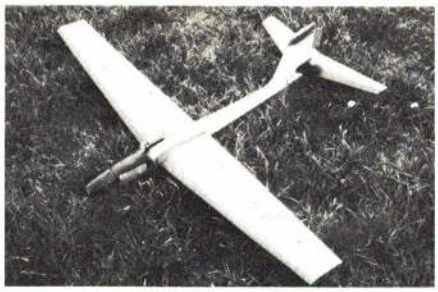
The care of engines and particularly the fuel and wick is the single difference between successful and indifferent performance. Moisture robs power from the fuel pellets, so a good procedure is to buy a large amount of fuel, remove it from the packages, and dry it in a cheesecloth bag put into a furnace vent for several days, then moving it into an airtight container for storage. Another is to obtain moisture-absorbent capsules from a local camera shop or jeweler—the type that is used when packing jewelry or watches—and store them in an airtight container along with the pellets.

Dry pellets should have their ends sanded lightly to induce ignition. Wicks should be coiled, leaving a long tail, with the coil glued to every third pellet with cellulose cement. Regular checking of the screen and motor barrel must be made with detergent brushing to clean out residue. The gasket should be replaced regularly—every two or three flights to prevent blowby.

Competition Jetex lighted by Jack Redlingshafer and held for launch by Harold Harden.

Converting the Eldon Foam Glider to Jetex 150: Jerry Farr sends along some suggestions for getting into the air quickly with Jetex by modifying the Eldon Foam Glider as follows:

Sand all the flash off the wing and blocksand the tips to a 45 degree angle (when viewed from the front). Use colored tape for trim and for stiffening the flying surfaces. Mount the Jetex 150 on a strip of 1/8 basswood or other hardwood. Decorate with spray enamel or with some "Magic Marker" felt tip pens, cut a slot in the TE of the rudder to glue in a sheet aluminum trim tab for turn. Mount the engine just forward of the CG, use a hand-launch glider type swinging weight dethermalizer. Finished weight is around four oz., complete with enamel spray job. Even so, don't fly without a DT.



Farr's Jetex-driven Eldon foam glider.

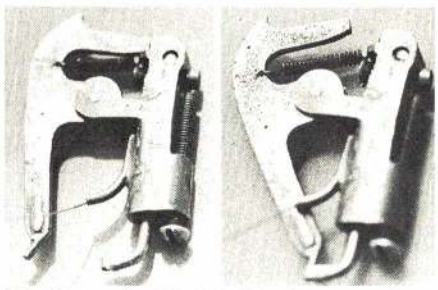
The final product is a more of a sport flyer than a competition machine, but it certainly allows an easy entry into the wonderful world of rockets.

FAI Super-Pans: Having flown FAI Power for a number of years, I have found engine mounting critical. Streamlining is now the latest fashion, with variable surfaces, remote floodoffs and all of that type of in-fashion equipment. Many good pans are available for power, all of which have strong and sturdy construction. There is one exception, and that is the Supertigre cast aluminum pan, which to this jaundiced eye is the most attractive pan available. Some minor rework needs to be done to make this pan fit the new Rossi rear-exhaust engines, but the major complaint with this pan is its annoying habit of breaking apart at the rear section. A second version of this pan from the factory had a built-in radius at this weak point. The result was a stronger model, but one which still suffered from structural fatigue. I have had very good luck in using this pan by roughing up the internal area between the engine mount lugs and the rear mounting ring using a Dremel tool, then filling this entire area with Formula 1 Hobbypoxy glue. This has the effect of absorbing vibration and providing some more support in this weak area. So far no pan failures. Try it, you'll like it!

BOB HATSCHEK
GADGETS AND EQUIPMENT

The Nordic Revolution, II: A zooming launch provided the margin of difference in the Nordic glider event for 1971 World Champion Pavel Dvorak of Czechoslovakia. Finland's Niilo Munnukka had stayed with the Czech through seven rounds of perfect maxes, but now it was after 8 p.m. and the northern sun was low to the horizon. The air was calm, the thermals were gone. The world's two best towline glider fliers towed simultaneously. Munnukka eased his glider smoothly off the line into its glide. Dvorak galloped into the launch—giving him a rolling zoom on release that put his glider some 10 to 15 ft. above the Finn's. The winning margin was 12 sec. in this flyoff flight.

This is the meaning of the Nordic revolution. It is an even more significant development than the introduction a couple of decades ago of the now universally used autorudder. Last month we looked at a variety of tow hooks and tow techniques. This month we'll look at some even more sophisticated glider gadgetry.



The Markov hook latched for towing and unlatched for release.

The Markov Hook: The Russians are generally credited with the invention of the "swinging" tow hook. This particular version pictured was built by G. Markov, a member of the 1971 Soviet team. It isn't known whether Markov originated the basic concept, which was used by all the Russians and a number of

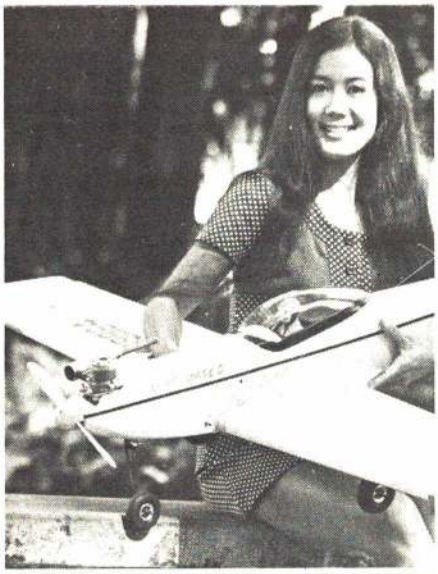
other Eastern Europeans at the World Championships, but the Markov hook has had a profound effect among non-Communist Nordic fliers for the simple reason that, following the competition, he presented it to Israeli flier Giora Herzberg. And Herzberg, in turn, showed it to Britisher Ian Kaynes, who published a drawing of it in *Free Flight News*.

Photographed in both the latched and unlatched positions, the Markov hook not only "safeties" the towline, it also provides (1) a straight-tow autorudder action, (2) a rudder setting beyond normal glide turn for circle towing, (3) a partial rudder offset for the zoom launch, and (4) a normal glide-turn setting. All of these positions are established by the hook itself. The model has no stops on the rudder.

Mounted in the glider, the hook pivots the hole at the upper end of its main body. In normal tow (straight), the hook pivots forward to a stop, and the stranded steel line to the rudder horn holds the rudder centered. For circling tow, the line is slacked and the hook swings back to a screw stop that contacts the point at the upper edge of the latchplate (when the hook is latched). For the zoom launch, a steady, hard pull (about 6½ lb. on the Russian mechanisms) extends the hook proper out of the bottom of the main body—against an internal compression spring. Since the rudder line is attached at the top end of this extending member, it allows the rudder to come over slightly toward the glide turn, and it also allows the latch to disengage. When the model is totally released, the whole mechanism again swings back, as it did in circle-tow, but now the upper latch point is in a new position where it contacts a second adjusting screw for the glide setting.

In addition to the two adjusting screws mentioned above for circle-tow and glide settings, two more hook adjustments are provided. One is the vertical screw on the front of the hook body, which determines the vertical travel of the hook component, and hence the amount of travel of the rudder cable for zoom launch. The other adjustment is a threaded collar through which the hook member passes and on which the bottom end of the compression spring bears. The setting of this determines the unlatching tension. Markov's hook, incidentally, is a soldered (or perhaps silver-soldered) assembly of brass and steel.

(Continued on page 89)



Kathy Horio poses with James Miuras' Lanier Jester in Hawaii. It uses O.S. 60 and Proline gear.

Fifteen-year-old Kevin Mehok displays partially completed Sterling P-63.

Radio Control

DON LOWE
SPORT AND PATTERN

Feedback: Gosh, somebody does actually read this column! Sometimes it requires a goof to find out. A couple of gents took me to task for a goof in the equations shown in the June issue on CG computation. You're right. The equation which was printed:

$$\bar{C} = \frac{2Cr}{3} 1 + \frac{\lambda^2}{1+\lambda}, \text{ should have read}$$

$$\bar{C} = \frac{2Cr}{3} \left(1 + \frac{\lambda^2}{1+\lambda}\right).$$

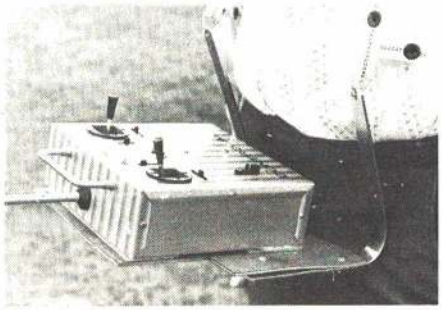
Now that makes sense doesn't it? Well, I'm sure it makes sense only to those who read the June column. So, for those who haven't, the recommendation is obvious.

A Warning Note: How long can I safely fly on a full battery charge? That's a question often heard and it can rarely be answered with preciseness. Usually the weak link is the airborne system since the average battery drain is considerably higher than that of the transmitter. Also, the transmitter drain is easily defined since the load varies very little during operation. The battery drain of the airborne system varies widely as a function of the make of the system, how you fly (i.e., how much you move the controls) and stickiness or drag in the controls. In regard to the latter, sticky controls or a setup that may stall the servo such as throttle or retract landing gear is an absolute No-No! System drain as high as 500 mils has been measured where a single servo was stalled. Now assume that you stall the landing gear servo and throttle servo (which is often observed) and "crashville" here we come in a hurry! Quiescent drains on systems with no servos operating have been measured, ranging from 40 mils to 150 mis for a four servo installation. Normal running current will vary as a function of the number of servos in operation. For two servos this could be 250 to 400 mils. Additionally, if you have a servo that constantly buzzes, look out—its drain will also be abnormally high. It should also be noted that some of the newer systems using integrated circuits have higher current drain than the old discrete component circuits of yesteryear. Now, don't condemn ICs because they buy a lot in terms of smaller package size, lighter weight, higher reliability and better system performance. It's like the saying goes, however, you hardly ever get something for nothing and, if you're like me, never! One must also realize that a 500 mah battery pack won't put out 500 mah when drained at 400 to 500 mils. The 500 mah rating refers to a 10-hour drain or 50 mils for 10 hours.

So what do we do, you ask? The best suggestion that I can offer is to (1) install your gear *without* arrangements that can stall a servo, (2) plug an ammeter into the battery circuit to observe full system drain and operate the controls in a fashion simulating your flying style. Some guys hardly ever move the controls once airborne and trimmed, while others are continually horsing around, running two or three servos almost constantly. You now have observed the average system drain which probably is on the optimistic side since no airloads are imposed. Now hook up your battery pack with a load resistor and meter to duplicate the system drain previously determined (say, 350 mils or whatever you observed) and observe the length of time required for the pack to drop below useful voltage. A lot of bother, you may say. Well, it's better than rebuilding! I've heard reports of ships crashing after five flights when using fully-charged good batteries. Conversely, I've flown some equipment a dozen times without recharging.

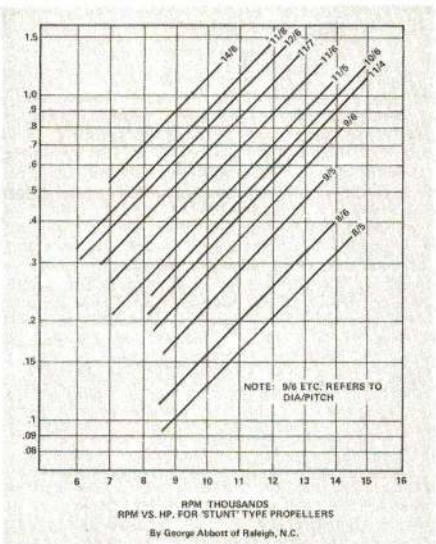
CD of Old-Timers RC meet at Lakehurst N.A.S. was Woody Woodman, here surrounded by Playboy, Sr. framework and a Jr. Mercury.

John Kiker of NASA, Houston uses European style transmitter tray. Claimed flying to be smoother.



Do you want to be completely safe? Limit your flying to four or five full-duration flights of ten minutes each until you've made a drain check, or take along a spare fully-charged pack and change after four or five flights.

Horsepower?: Did you ever wonder about the horsepower produced by that jewel in the nose of your ship? Do you also have any idea of the increased horsepower required to get that extra 1000 rpm needed to make your docile bird a winner? George Abbott of the Raleigh, North Carolina R/C Club did some research using Peter Chinn's engine data and plotted the results shown in the graph. He claims accuracy no better than 15% but the trends are interesting. For example, you guys swinging a 11/7 prop at 10,000 rpm will need a horsepower increase of about 30% to get 11,000 rpm! And, if your jewel is swinging at 13,000 rpm it's a bomb and is producing about 1.5 hp!



More Feedback: In my column of May, 1972 we discussed model noise and how it doesn't seem to bother wildlife. The reason for the bit was the arguments given by some conservationists or wildlife fanciers about not obtaining flying sites near wildlife preserves.

Harold Brown of Westfield, New Jersey writes that the Cape Kennedy area is an animal preserve and that NASA has run various tests with animals, some of which have been to place them within a few hundred feet of a rocket when launched. They found no ill effects on these animals. Harold states that he has been to Cape Kennedy for two launches and at three and a half miles a Saturn 5 puts any model engine to shame when it comes to noise. He concludes that only the *Homo sapiens* animal (you and me) is annoyed by noise. I agree with Harold in regard to rocket noise since rockets were my business for many years. The noise created by these beasts can be terrifying and completely overwhelming if you are close. I'm sure that our model engine noise is no more than a psychological irritant to some. Let's face it, however, we must be socially acceptable or the populace will arise! So use those mufflers to sooth the peasants—the animals could care less!

What Price Honesty?: Frank Schwartz has for the past fifteen years been the genial editor of the Middle Tennessee R/C Society Newsletter "Glow-Plug." Those who are fortunate enough to read his stuff know that Frank is a heck of a writer, very humorous, witty and honest. He sometimes does a tongue in cheek bit about products good or bad and sometimes the bad backfires. How far can a writer go in expressing his opinion of products? How can the modeler get an honest appraisal of a product? You certainly don't find it in a magazine unless it's good. Word of mouth seems the only safe way. I see some pretty frosty stuff in various club newsletters. Is this also to be stifled? Most of our model products are good, but believe me there are some baddies. Sooner or later the junk fades away because the word gets around, but how about the poor unfortunates that didn't get the word? What do you think?

BOB STOCKWELL
PYLON

K & B Schnuerle: We've heard a good deal of griping about not being one of those lucky enough to get a new K & B Schnuerle, and since Whit and I are among those who did not get one, I thought it might be useful to explain the bind that K & B was in. It is an experimental engine; before they produce it in quantity, so it can be sold for about forty-five dollars or even less, they need to test it in the only reliable way, namely in wide-open pylon competition. The manufacturer cannot risk producing them in quantity until he is sure of the quality of his product.

As for its quality, on the basis of the first race in which it was used by a substantial number of competitors—the Valley Flyers' Formula I Race at Mile Square in Fountain Valley, Southern California, May 6 and 7, 1972—you have to conclude that if it holds up it is quite an engine, and nothing but another engine comparable to the Schnuerle is going to compete with it successfully. It does not appear that even the best existing Tigres will do more than run even with it. Bob Smith won the Valley Flyers' race with his Miss DARA powered by a K & B Schnuerle. Larry Leonard and Dan McCan took second and third places respectively with their similarly powered Miss DARAs. But the results alone do not tell the story. There were 58 entries, including some of the fastest Supertigre fliers in the country: Jack Hertenstein, Lee Frey, Roger Owens, Joe Vartanian, Bror Faber, to name just a few besides Terry Prather. With the Tigres turning at their very best, they could stay with the Schnuerles, but they had no edge. Both Bob Smith and Larry Leonard were *consistently* under 1:40, usually under 1:35.

Chuck Smith responsible for important procedural innovations in the race. See text for details.

This was an important race in other respects. CD Chuck Smith broke his back to be sure it was run properly—run perfectly in accordance with his recommendations in the new RC Pylon *Contest Procedures Guide* in which he played such a large role in developing. In particular, he developed a way of displaying cuts at the scatter pylon which is so good it is bound to catch on and become standard operating procedure all over the country. He set up the protective panels for the scatter pylon flagmen so that if there was a cut, all they had to do was flip part of the protective panel down and there was a large black-and-white striped panel on display for the rest of the race. Everybody within a thousand yards could see there had been a cut on the airplane which had taken off in that position.

Do you have Scouts in your area? They are great helpers and they enjoy doing it, too.

Working behind the colorful flagging box, Boy Scouts did the manual labor for the race and also earned money for their troup.

Another innovation, this one credited to Jack Fabbri, the foam wing expert of Stafford Models, was the use of a troop of Boy Scouts as workers—at the scatter pylon and as counters. They were great, and they solved (once and for all, we hope) the labor problem in Formula I. They get money for the troop, they have an exciting new experience, they're willing and eager to work, and there are enough of them to rotate the job so they don't get all worn out.

More Race Results: The other early-season race in Southern California was not so one-sided as the Valley Flyers, even though the two best-known K & B fliers came out on top: they were pursued closely by a string of Supertigres. This was the April 22 and 23 Formula I race sponsored by the San Gabriel Valley Radio Control League, at Whittier Narrows in South El Monte. Bob Smith was first, and Larry Leonard second, both flying their beautiful new PB Products Miss DARAs with Lee Custom '71 K & B engines. Larry's best time was 1:39.7, which put him about 14th

How would you like to judge these for handicap? All are PB Product's Miss DARA.

Dwight McCan cleans up this FAI plane called the "Great Tomato." Well you see, it's the color. . . .

down on the list of fastest times, but he was consistent enough to make up what he lacked in speed. Bob Smith had a 1:33.4, which is only 1.4 seconds slower than his best time two weeks later with the Schnuerle, but the fastest times went to Joe Vartanian, 1:32.7 with a Supertigre in a Miss Dallas, and Terry Prather, 1:33 flat with a Tigre in a Minnow. Bror Faber, with a fastest time only 3/10ths of a second better than Larry's put on a consistent performance to get 3rd, and Joe Vartanian, 4th with Lee Frey, 5th.

In Florida they completed their racing until after the 12 week summer break on June 11, but I don't have the results yet. Prior to that Ed Weitock picked up his first first-place win ever (he has about a jillion seconds) at the Orlando races on April 30. Jim DeMeritte, who got off to a brilliant start in the Southeastern District by winning his first three races, took second in this one.

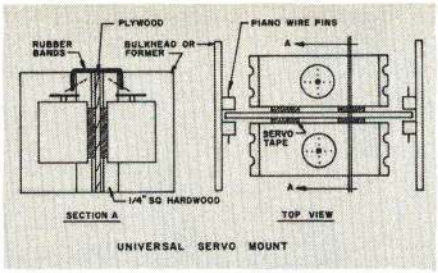
In the Northwest, Bob Root with his Loving's Love got off to a fine start on April 9 with a win at the Mount Rainier Radio Control Society annual pylon races. Pylon racing was not active in that area in 1971, and Bob has taken the leadership to build things up again for 1972.

FAI Pylon is looking very fast indeed this year. Would you believe these times at the Birds' FAI race at Los Alamitos on April 29 and 30: Joe Foster, 1:44.0, Garry Korpi, 1:42.2, Bob Smith, 1:45.0. I was there, and I can guarantee they were carefully clocked, properly flagged, and the course was correctly measured.

CARL MARONEY
GLIDERS AND FAI

Universal Servo Mount: Chris Adams from the Los Angeles area sends an idea for a universal mount to permit switching of servos from one glider to another. The advantage of this system allows a contestant who has only one radio system to initially set up his primary glider and, if weather conditions have changed by meet time, a changeover to a different performing ship can be accomplished expediently. Although the diagram does not depict any dimensions, the basic design can be tailored to each specific type servo available. The mount holding the servos slides up and out and is simply secured in place with rubber bands. The designer claims this system has survived a 200-ft. straight down dive and crashed without any servo damage.

VANCE "V" Tail Gear: This system will give proportional control to pushrods for any controls that require opposed or simultaneous control action at the same time using only two servos. This system can be used for a combination rudder/elevator "V" tail section or an aileron/flaps combination such as used to control flying wings. It may also be used to change the chamber on a wing section via strip ailerons.

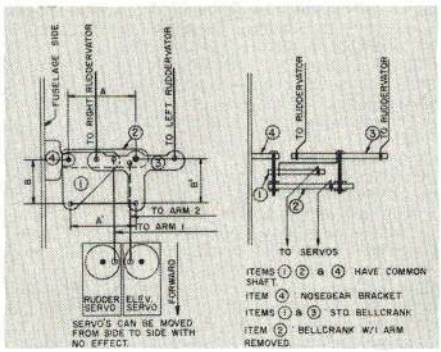


The Vance "V" tail gear is very accurate and friction-free to the point that it can be used with Galloping Ghost.

The only critical dimensions are A- and A^1 (which must be identical) and B- and B^1 which must also be identical. They may be much smaller or even larger than shown on the accompanying drawing.

Rudder action passes from rudder servo by a rod attached to (1) which is translated into a lateral motion on (3). If rudder motion is to be reduced, the point at which the rod connects to the servo can be moved in closer.

The elevator action passes from the elevator servo to the arm (2) on which the final action crank (3) is mounted. Again the elevator action may be increased or decreased by lengthening or shortening the distance from the pivot point on the servo output connection.



A third point of adjustment of the combined action of both elevator and rudder in (B) may be the distance from the pivot of (3) at which the control rods to the rudder/vators are attached.

Naturally, the fourth point is the length of the horns on the rudder/vators.

Leave enough space between the fuselage side and the forward tip of (1) to permit adequate rudder swing.

The bearing surfaces of the pivots at which (2) and (1) are pivoted on (4) and of the pivot of (3) on (2) should be broad and strong and have little or no slop in them. Want something different to tinker with? Give this system a try. (By Stew Vance, reprint from the ECSS Journal, "Sailplane.")

CLAUDE McCULLOUGH
SCALE

The Factory Drawing Myth: It used to be that the ultimate source for a scale model was considered a three-view from the company that made the aircraft. After all, who else would have better information? In recent years, as scale modelers have become more interested in getting every dimension and shape exactly right, it has become painfully obvious that the factory drawing, in many cases, is a long way from being accurate. It is evident why the term "general arrangement" is sometimes used, for the arrangement is often very *general*. Some examples make one wonder how they ever get the full-scale airplane built. Of course the three-view is not used at all in construction, but still it is hard to understand why, with all the necessary data right at hand when they are going to the trouble of making a drawing, it is not done a little more carefully. Doug McHard, the English scale expert, once remarked that the junior draftsman of the company must be given the job as his first assignment. Actually it is not an easy thing to do properly and requires a lot of motivation and effort.

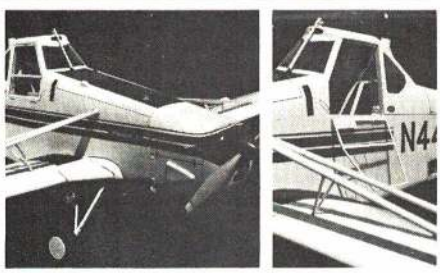
Some of the best three-views are those produced by dedicated scale nuts who are obsessed with getting it right. Every draftsman is a prisoner of his material, however, so look at all plans with a questioning eye. A choice of three-view for your masterpiece should always be backed up by a study of every photo possible. You may find out things you'd rather not know, like the same airplane from the same factory with different component shapes from photo to photo and all of them varying from available three-views. In this case about all you can do is put the discrepancies in your scale presentation and explain your final choice to the judges. It must be recognized, finally, that complete perfection will always elude the scale builder and that at some point research must stop and building begin, or the model will forever be a paper project lacking just one more bit of "gen."

Read Twice Before Test Flying: If, due to loss of power, running through grass, etc., it is necessary to force a takeoff at slow speed, it is far better, once in the air, to put the nose down (no matter how close to the weeds) and gain speed as soon as possible, rather than claw for altitude and fall out of the sky from twenty or thirty feet up. Most taildragger aircraft cannot accelerate sufficiently to take off without raising their tails first. The best way to stretch a glide is to put the nose down and maintain a uniform flying speed well in excess of the so-called stalling speed. (From "School Daze" by Fred Komlosy in the Palm Beach Aeronauts News.)

Yes, It Says Spikes: For airplanes of about 2½" to 3" to the foot scale, the round head model railroad track spikes—actually tiny 1/4" long brads—in Perfect No. 430 hardware packages make good round head rivets for detailing. The slightly flattened shape of the heads looks very realistic. The spikes stay in reasonably well just by pushing into the wood and doping over them, but for safety's sake, a tiny drop of epoxy in each hole is recommended.

The Easy Way: Bend up a pattern for complicated scale landing gears and struts from soft iron or copper wire and check fit on the model before attempting to make a permanent part from spring steel wire. Don't attempt 90 degree bend over a sharp edge, like a vise jaw. Make a metal edge with a radius, particularly with heavy wire sizes like 5/32 and 3/16".

Scale Data Sources: One of the best private photo sources is Leo Kohn's collection of over 30,000 pictures of antique, classic, military, racing and other interesting aircraft. At least four views are available of every type he has listed and some have a large variety. For example: 57 different shots of Bell P-63 1946-49 National Air Racers. Catalog available from Collect-Air Photos, Box 2453, Milwaukee, Wisc. 53214 for a stamp.



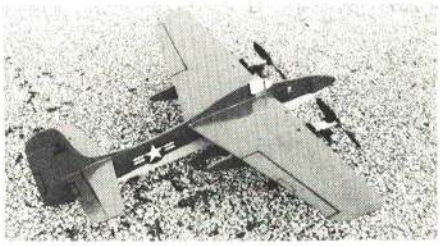
Piper Pawnee PA-25: Les Stephenson went to the Pawnee assembly station at Visalia, California to get photos of the details for reproduction on his model of this popular airplane. Ship has operating flaps, duster bin and beacon light. Doors for the cabin and hopper open and the cabin ventilator control is operable. Seat covering material in the cockpit is Naugahyde from the actual Pawnee. Powered by an Enya 60, the beauty has 56" wingspan and weighs 7¼ lb. ready to fly with fuel.

Control Line

BILL BOSS
SPORT AND SCALE

Getting Started in Scale: One of the many deterrents to the youngster or older beginner from participating in Scale modeling is his first impressions of the planes he sees scale builders enter at local contests. In many cases he stands in awe of all the detail work—what appears to him to be something beyond his talents.

It doesn't have to be that way. Almost anybody can get into the Scale game by starting small (with a profile or semi-scale kit), working hard and exercising a certain amount of patience. While profile and semi-scale planes do not qualify for the scale events, they do, however, provide the vehicle for the modeler to try his hand at scale detailing without having to match his talents with what he feels are the pro's. Adding some scale detail to a profile can have the opposite effect, that is, getting raves from his fellow modelers for the great job done, thus building up his confidence to go on to better things.



Grumman F-7F Tigercat profile model by Mike Blum illustrates how simple dressing of paint and lines make a profile model realistic.

The first step is to choose a profile kit of a military plane such as the P-51, P-40, Yak-9 or one of the many others available at most local hobby shops. Next, secure three-view drawings of the plane selected. The drawings should include scale detailing such as rivet patterns, paint schemes and possibly some structural detail. If you already have the three-views, you might want to pick the plane to match the drawings. If you don't have three-views, there are many ready sources of information for this starting venture. AAM and other modeling magazines feature three-view drawings which are more than adequate for this type project. The Profile Series of publications are also a great source of scale info. If all else fails, ask your local scale builders for help.

Let's now assume you have chosen a kit and have the information for this first attempt.

Build your plane, do all the basic filling and sanding and then stop. Study the scale data that you have accumulated and decide just what scale detail can be added to your plane: Dress up the landing gear? Add radio antennas? Mount guns in the wings? After studying the drawings, you may decide that all you want to do on this first try is paint the plane in a particular color scheme. If so, carefully study the color scheme data, and when satisfied that you know where all the markings and insignia belong, proceed with the painting.

Apply general or overall colors first, and then the insignia, numbering or lettering, making a masking tape stencil of the letter or insignia to be applied. For example, let's assume you are going to make the letter "U" as would be used in "U.S. Air Force." Take masking tape two or three in. wide and apply a strip a few inches long to a sheet of soft aluminum, and draw the letter "U" to proper size on the tape. Now, with a very sharp X-acto knife or single-edge razor blade, cut along the drawn lines. When all lines are cut remove the letter. The tape remaining on the aluminum sheet will serve as your stencil. Carefully remove the tape from the aluminum sheet so as not to rip it, and apply the masking tape stencil to the plane at the proper location. Make sure all edges are down tight. Paint in the letter with appropriate color and, when dry, remove stencil. With a little thought and planning, almost any insignia can be made in this manner.

After all the letters and insignia have been completed, finish off the plane by adding painted outlines of the flaps, ailerons, hatches, etc. If you do all this to your profile you will have taken one giant step toward scale modeling. Good luck on your first try.

Sticky Joints: Control rod pivot points and wheels sometimes become rather stiff after keepers are soldered in place. This usually happens when an excess of resin or soldering paste is used. Stiff joints can be loosened by washing them with a small amount of lighter fluid. Work the pivot point or wheel back and forth while applying the lighter fluid with a small paint brush.

The Castelli boys show off their latest semi-scale stunters. Both are powered by 29s.

Flight Box: John Park solved the flight box problem for those quick evening or spot flying sessions by using a plastic eight-bottle soda carton. By cutting out some of the bottle partitions, room can be made for a quart of fuel, handle and lines, fuel squeeze bulb, battery leads, a couple of props and a small cigar box for miscellaneous small parts, and finally the ever-present cleaning rag.

JOHN SMITH

SPEED AND RACING

The "Baby Rats" Are Flying: Contest notices from all over the country indicate that the 15-sized rat racers are more popular than ever this year. While not replacing the 40 jobs, they are making their mark with the younger fliers. Some clubs are even flying sport type models and Flite Streaks in traffic events. Engine sizes are limited to 35s and everybody must use the same sized prop. While this event may not sound too exciting to some of you fast ratters, it is getting more and more people interested in competition traffic events. I'm sure we'll be seeing many of these guys move up to the faster stuff real soon. Credit must go to those clubs which are looking at the Junior problem, and more important are doing something about it.

C Speed winner by team of Arpino and Garzon at 184.73 mph with an S.T.65 and mini-pipe. Clean design and good work.

Keep In Balance: Ever have a model that could use just a touch of nose weight to make it "groove" just a little bit better? Prather Products (1660 Ravena Ave., Wilmington, Calif. 90744) has the answer with their new Nose Weights. Four different sizes from 1/2 oz. to 2 oz., drilled for 1/4" shafts, fasten with the prop to give that bit of nose trim that sometimes adds mph to your model. This is just one of the many RC items that can find another home in CL. With all the adjustable links, horns, and associated control linkages available, anyone can put a good control system into a Rat Racer, TR, or Speed model.

Tips, Photos Needed: Everybody likes to see what the other fellow is doing. Let them know through this column.

Youngest Jet Pilot?: How about John "Johnnie Lightning" Wentz, seven-year-old son of Marvin Wentz, Santa Clara, California? Flying a Hoyt "TAMIGO" model he turned 130 mph. He's been flying since he was four and a half years old. While I have heard of many young fliers, this is the youngest Jet flier so far. Anybody top this "jet setter"?

Support the AMA Safety Code. FLY SAFELY.

HOWARD RUSH

COMBAT

Pen Bladder Substitutes: A good substitute for the scarce pen bladder is a 3-in. length of surgical tubing plugged on one end by an empty .22 cal. cartridge and bound at the end by copper wire. Tubing of ¼ in. OD and 1/16 in. wall thickness gives about the same pressure and reliability as a double pen bladder.

The Captain's Bladder, sold by C.M.I., is a new tubing-type bladder that works fine for Combat and can be found in the hobby shop.

Not all fuel tubing works well with bladders. Try Veco FL-2 or Sig silicone hose.

Easier Scoring: AMA rules call for a match to end when a mid-air collision or line entanglement results in one or both planes being unflyable. A scoring problem occurs when the judge is checking the airworthiness of a damaged plane after a tangle or collision while the other plane is still flying. The plane in the air gets credit for his air time, if the one on the ground is still able to fly; he doesn't if the grounded one is unflyable.

What happens while the judge is investigating? Richard Ryon suggests that one judge start a third stopwatch when a plane crashes from a line tangle or collision. This watch would run while the other plane is still flying during the five-min. flight period. Meanwhile, the two air-time scorers continue timing as if the match is still on. If the downed plane is judged flyable, the third watch is reset and the match goes on. If it is unflyable, extra air time for the plane still flying is recorded on the third watch and can be subtracted from his total time to indicate his air time up to the incident which ended the match. This simplifies the job of the two flight-time keepers because they continue regardless of collisions. It also relieves the judge of having to make an immediate decision on a plane's airworthiness. Sounds hard, but it's easy to practice. It worked for us the first contest we tried using it.

Something That Didn't Work: We held a Slow Combat contest with the only airplane restriction being the use of a 10-6 propeller, thinking that this restriction would tend to equalize Ringmaster types with honkin' stabilator rigs. There was still a big difference.

With a Top Flite wood 11-4 prop, a 110 mph Combat machine slows down to about 70, a fine speed for slow and easy dawg-fighting, but I'd sure recommend that folks competing in a contest requiring only 11-4s use standard Combat planes and engines—the heavy profile jobs won't be competitive. Keep us informed on what luck you're having with your Slow Combat rules system.

Health Tip: If a plane crashes because of a line tangle, don't try to retrieve it while the lines are still tangled with a plane that's still flying. This seems pretty obvious, but some people have been hit by planes while being too hasty about pit stops.

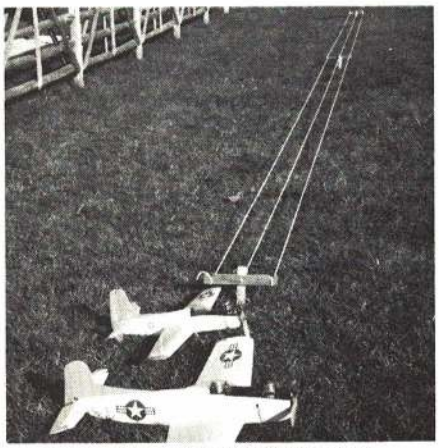
Brothers Joe and Tony Mickel fought it out again in the Purdue Cosmic Combat Champs. Last year Tony won.

Joe Mickel makes good use of silver champagne cooler he won at this year's Purdue Combat meet.

JOHN BLUM

CARRIER AND STUNT

Protecting Throttle Lines: Henry Telfair (St. Louis, Missouri) became tired of the usual stumbling in the lines and did something about it. Note the photo. The gadget is made from clothesline strung on wooden supports. The horizontal support is approximately 10" long, and is bolted to a vertical support of about 10" in length. The three pieces of line are a few inches longer than the control lines. Thus, when the outfit is strung about six in. above the ground, the throttle lines can be placed under them when in the pit area. Prompted by the loss of three sets of lines in one season, Henry relates that it is well worth the effort.



Carrier line protection described in text.

Skyshark Debate: Since the printing of the three-view in this column of the XA2D-1 Skyshark (Feb. 1972 **AAM**), many modelers have responded. General consensus is that the model is an excellent subject, but is most difficult to comply with rule 20.10 in the AMA rule book which reads, in part, "the prototype of which has performed carrier-type takeoff and arrested landing on either an actual or simulated carrier deck."

It is not the intention of this column to take the rule book to task, nor to prove or disprove any model, however, a summary of info is pertinent. Much is contingent on the interpretation of the rules. A strict analysis might require a photo of the arresting hook of the subject prototype actually hooked to an arresting cable, or an immense amount of legal looking wordage to describe same. This is difficult to obtain and may well eliminate most carrier model entries. Another interpretation might allow satisfactory conformity to the rules when same is obtained from a recognized publication. In the 1951 issue of "The Aircraft Year Book" (page 282), the caption under the photo of a Skyshark reads "Skyshark for Carrier Operation." The text reads, in part, "carrier based aircraft," photos and drawings show the tailhook. Now, at what point does the subject aircraft meet, or not meet the rules? Any ideas?

Looking for Club: Kansas City area control-line modelers looking for a club should contact Dave Trible at 7201 E. 104th St., Kansas City, Mo., 64134. The K.C. Super Tigers M.A.C., as many others throughout the country, are promoting a Novice Stunt event in their contests, with the hope that this philosophy will bring more into AMA Stunt. This perhaps parallels a proposal by Jim Silhavy to form a nationwide Stunt training program coordinated by present UC clubs.

Research Department: *Guardian* in 1965 **American Modeler Annual**; *Sky Raider*, 1965 **American Modeler Annual**; On-Off pressure, February 1967 **AAM**; K & B 40 with two carbs, May 1968 **AAM**; Tigre Cat, July 1961 **AAM**.

Participation In Column: Send info to John Blum, 2417 Glen Pl., Granite City, Ill. 62040.

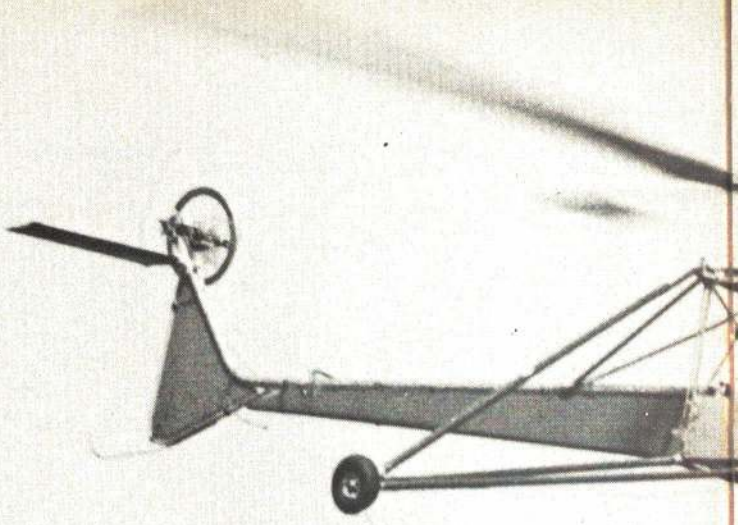
Underside view of Rabe's big, magnificent Sea Fury. It is flown with a 60 turning a 14-5 propeller.

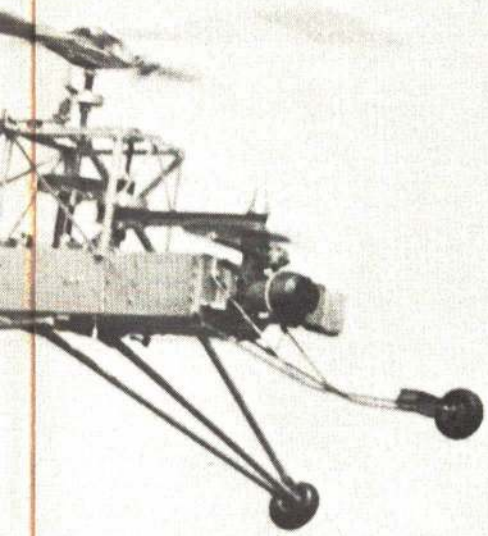
PART II

learning to fly the S.S.P.

FLYING A HELICOPTER IS LIKE BALANCING ON TOP OF A HARD SPHERE ON A HARD, SMOOTH SURFACE. STAYING ON TOP TAKES CONSTANT CONTROL INPUTS, BUT IT CAN BE DONE WITH ENOUGH PRACTICE.

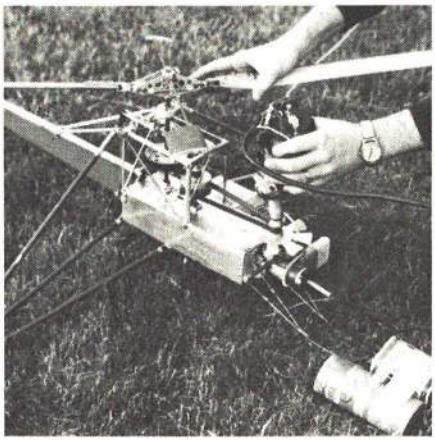
by GENE ROCK



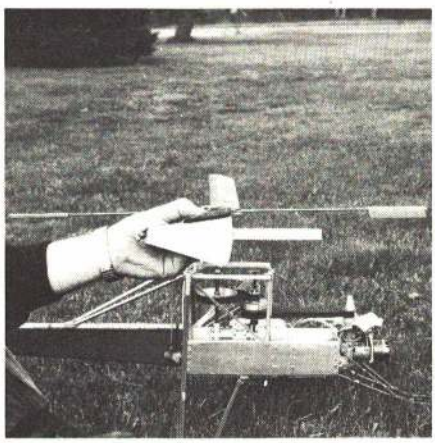


Trimming: Fill the fuel tank and start the engine with an electric starter, making sure the engine throttle is on idle. Use a starter with an rpm range of 2000 to 3000—a higher speed starter would engage the clutch causing unnecessary wear even though it would start the engine. I like to hold the model above my head when adjusting high throttle; others like to adjust the model by lying on the ground. After high speed is set, adjust low speed so that the clutch does not engage. Again hold the model above your head and tilt the model fairly rapidly in one direction, then stop suddenly. If the main rotor gyro is functioning properly, it should take 1½ to 2 seconds to become perpendicular to the main rotor shaft. If the interval is less, add weight to the gyro. Yaw the model physically (rotating about the vertical axis). The model should resist your force if the tail rotor gyro is working. Next check your controls. Make sure you have a good grip, as the force can surprise you, especially the yaw control. Have your helper move the stick slowly. If the swashplate is hooked up improperly, or the tail rotor is backwards, don't feel bad—I still make that mistake.

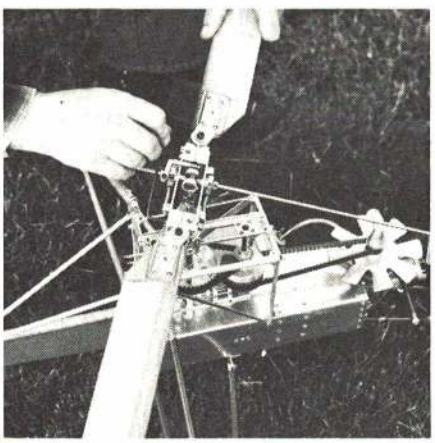
Tracking the main rotor blades can be quite simple if the tips are painted contrasting colors. Use an adjustable protractor or the equivalent to set the collective of the main rotor blades. An 8° setting can be used with the Enya 45 and the Murphy muffler. Start the engine and slowly advance the throttle. Observe the blade tips and adjust until they describe the same plane by rotating -20. When the blades are tracking, lock their setting by tightening the No. 6-32 x 1¼" bolts in the hub.



Using an electric starter. Note long needle valve extension.



Setting main rotor pitch at 8 degrees.



Securing main rotors after adjusting.

The next step is to tether your model. Put two stakes into the ground about 50 to 60 ft. apart if possible. (Weights can also be used.) Place the model in the center facing one of the stakes. Tie a cord from one side of the main landing gear to one stake and the opposite side to the other stake. Do not allow any slack. This tethering allows the model to yaw 90° on the ground but keeps the cord away from the tail rotor. The model can move fore or aft ± 10 ft. and sideways ± 2 ft. approximately. The model can also rise 8 to 10 ft. off the ground.

Now you are ready to briefly raise your model off the ground. Again advance the throttle slowly. Play with the cyclic stick and watch the main rotor. If there is a wind, try to keep the rotor horizontal or slightly high downwind. Let the model rise off the ground and immediately settle back; if the model yaws, adjust the tail rotor collective by either the pitch arm or the servo linkage. If the tail rotor rate gyro is used, adjust the collective so the gyro remains vertical at operating speed. Remember, make your adjustments for tail rotor collective when the engine is running at a constant speed.

Next, observe the pitch. Add weight just behind the nose-wheel until the model hovers with the swashplate horizontal. The model may hover slightly nose down. It should balance about ¼ to ½" forward of the rotor shaft. (I have never had a nose-heavy helicopter.) The swashplate probably will be tilted slightly left to offset the tail rotor thrust. Again observe the rotor when applying cyclic. Does it move purely fore and aft when longitudinal cyclic is applied? If not, rotate the swashplate. My pitch link on the swashplate leads the blades by about 10°.

This entire procedure may seem long and tedious, but in time will become instinctive and will not require more than a half hour if you are already familiar with fixed-wing RC flying.

Flying: This is where the fun starts. It can also be an extremely trying time if you have a ship of your own design, for it can take up to two months to de-bug it. But then, nothing is more satisfying than flying one's own creation. The S.S.P. in the configuration shown has been de-bugged and should present few problems.

With your model tethered, play with the controls to familiarize yourself with them while the model is on the ground. Try to taxi it. I found it difficult at first to work all four controls simultaneously. Raise the model off the ground occasionally. The easiest way to take off is to taxi to the extreme forward position and apply power—the tail will rise. Slowly pull back on the stick. As soon as the model is horizontal, neutralize the stick, or the tail will drop and it will start flying backwards. Using this procedure, you should be able to fly the model to the top of the tether. This is an exercise to familiarize yourself with longitudinal (fore and aft) cyclic. Since the tether lines are taut, lateral (sideways) cyclic and yaw are stabilized. Another exercise is to keep one tether

line taut by applying a small amount of lateral cyclic. Raise the model off the ground to about a three- or four-ft. altitude. This is a throttle, longitudinal cyclic and yaw exercise. A pure lateral cyclic, yaw or throttle control cannot be obtained with this tether. Although limited, this tethering system should prove satisfactory for most people.

Another more sophisticated method, proposed by John Burkam, is to attach pulleys to the stakes so the cord is a closed loop. Attach a five-ft. cord somewhere along the return cord. Secure this cord to a third stake. This method of tether allows the model to move sideways as much as it does fore and aft. As you become more familiar with your model, and keep it in the air for longer periods of time, it will jerk when the tethering limits are reached. A screen door spring cut to four in. long and attached to the landing gear will soften this blow.

Because the tether does not pick up the model at the center of gravity, a strong moment is applied when the model is in the extreme aft position. Forward cyclic will not right the model. Chop the throttle and taxi back to the center.

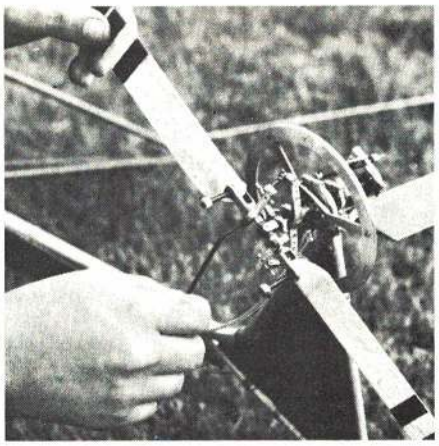
After three to five hours of tethered flight, you should be familiar enough with the controls to fly free. When the model is released from tethering, flying it is a whole new ballgame. Be very cautious as you were when starting tethered flight. Start by putting the model into the air and try to keep it from translating (i.e., into forward flight). Keep practicing until you can keep the model in the air for about 30 seconds in a confined space, 50' x 50' x 50' for example.

I find the best way to control the model is to give the cyclic stick a large displacement for a second and then to back off to about ¼ to ½ of its travel. The model is very slow to respond to a small input because of the large main rotor gyro. If the gyro is made smaller, the model will respond faster but will be less stable and therefore harder to fly. The opposite is also true, provided more cyclic can be fed into the paddles on the gyro. At first your stick motions on the transmitter will be very erratic; in time, you will learn to anticipate the model because of this time lag and the stick motions will become smoother. It took about 15 hours before I could hold the model in one spot. Don't be surprised if it takes you just as long!

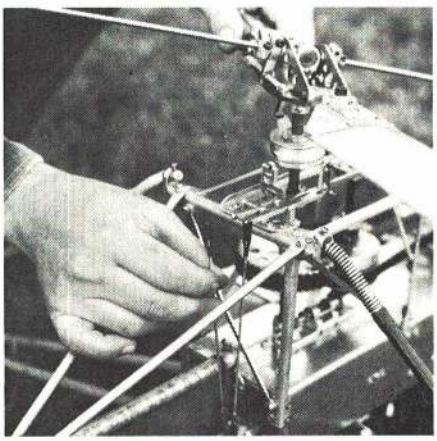
When learning to hover, a slight breeze is helpful. The wind keeps the model pointed into it, therefore less tail rotor correction is needed.

It takes less power to fly the model just off the ground up to a distance of 1½ times the main rotor diameter. The model is riding on a cushion of air—this is called ground effect. The helicopter can be very skittish in this region, like a ping-pong ball rolling off a table. (This effect is less noticeable over grass.)

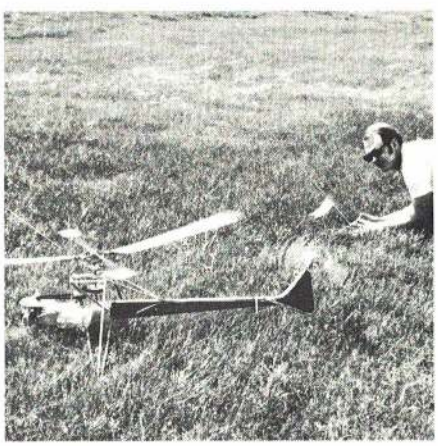
The fuel tank level plays an important part on the trim of the model. A full tank makes the nose heavy, and a low tank, the opposite. The trim pot on the transmitter should be able to correct this, but in time you will not notice this



Adjusting tail rotor collective by setting both blades individually. Note horizontal stabilizer for trimming forward flight.



Setting up the links for the swashplate for lateral and longitudinal control.



Observing main rotor for proper tracking. It helps to have different color tips on the blades.

Tether system allows learning forward and aft cyclic control only. Taut lines prevent a turnover. Tail rotor control can also be practiced.

change as much. A central tank draining into a small tank at the engine using the chicken feeder system could correct this, but I don't recommend it as this system is troublesome and does not allow stunting. The fuel pick-up in my tank is in the front because the model usually flies nose down.

Now you are ready for forward flight. Select a calm day and take the model to a large field. Practice flying forward for about 50 feet, then set the model down. You will notice that, as the model picks up speed, it will climb as long as the rotor remains close to horizontal. In hovering, tail rotor collective is used to yaw the model. To yaw in forward flight, lateral cyclic is used and made smoother if tail rotor collective is also used. This is just like coupled rudder and aileron on a fixed wing. When making a turn, longitudinal cyclic is neutralized or slightly aft to keep the model's nose from dropping just like up elevator. When coming out of a turn, forward cyclic is fed back in. If not, the helicopter will climb like a rudder-only model. Fixed wing experience is very helpful in forward flight especially when the model is coming toward you. Learning to fly a helicopter in forward flight can be a slow process without this knowledge.

Try flying the model in 50-ft. diameter circles around you. Keep the forward speed down to about 10 to 20 mph. Once you are proficient at circling, try figure-eights. When you can come out of one turn and proceed into the opposite without pitching up, you have achieved your rotary wings.

The tail rotor in forward flight becomes more efficient, causing the model to turn to the left. This is very noticeable when flying in a wind of 10 to 20 mph. If the trim pot is full left when hovering, there should be enough right trim for forward flight. Unlike fixed wing, there is no "neutral" cyclic stick on a helicopter, so you may not notice this effect. The main rotor also becomes more efficient in forward flight as long as it remains close to horizontal; therefore it takes less power to fly at about 20 mph. The maximum power required is when the model is traveling at its maximum speed. This is because the rotor is about 20° to 30° off of horizontal and the model requires power to drag it through the air. A good way to illustrate this effect is to taxi down a paved surface. Gradually build up speed with throttle and forward stick. When the model is traveling anywhere between 20 to 40 mph, neutralize the cyclic stick. The model will jump into the air and continue to climb. This is a good way to lift a heavy payload. You may find your engine four cycling in forward flight to maintain a given altitude. This makes for long engine life.

To adjust the horizontal stab, select a day with winds of 20 to 30 mph. Fly the model forward as fast as it will go with full throttle. If the model dives, shim the leading edge down. If it climbs, shim the trailing edge down. Once trimmed, the model should have good penetration. The horizontal stab also acts as a pitch damper when hovering.

If the model is built without the tail rotor rate gyro, a vertical fin is a must. The vertical fin would act as a yaw damper and make controlling with tail rotor collective much easier. A vertical fin painted a bright color also makes the model easier to see at a distance. The fin should have about 1/3 to ½ the area of the tail rotor disc. This will require more power to the tail rotor but will not be noticed.

After flying this model for awhile you will find large landing gear can create an optical illusion interrupting your orientation. For this reason, keep the model upwind. Scale-like skids and a fuselage can correct this. As you get better, shed the large landing gear. I would like to remind you that this model was designed as a trainer and as such is limited.

I don't expect anyone to follow the plans completely and if a fuselage is decided upon, make it integral. An integral fuselage would require extensive redesign but would not add the extra weight that a fuselage shell, only for looks, would. Try to keep the fuel tank visible.

Hovering in a crosswind can be very difficult requiring almost total tail rotor collective. Increase tail rotor collective travel to +20° -5° if required.

Chopping the throttle back to idle when the model is hovering can be disasterous. The model drops into its own downwash and continues to drop; applying power will only make this condition worse. Push the cyclic stick forward. This will pull the model out of the downwash. The only time that this can happen is when the model has no velocity with respect to the surrounding air. This sometimes can be the case when dropping in for a flaired landing. Always keep the model moving forward during this maneuver.

The flaired landing is performed from forward flight by pulling back on the stick to slow the model and chopping the throttle to keep it from climbing. Give a short engine burst just before touchdown.

To spin the model, just hold full tail rotor collective. A slight amount of opposite lateral and forward longitudinal cyclic may be required. Don't do this maneuver until you have complete confidence in yourself and the model, for it is easy to loose orientation.

As you improve you will find that this helicopter can be banked almost 90°. This requires hard lateral cyclic, then ease off. The 90° bank should only be continued for about 30° of the turn, for the model will drop drastically. You might even roll it if full lateral cyclic is held.

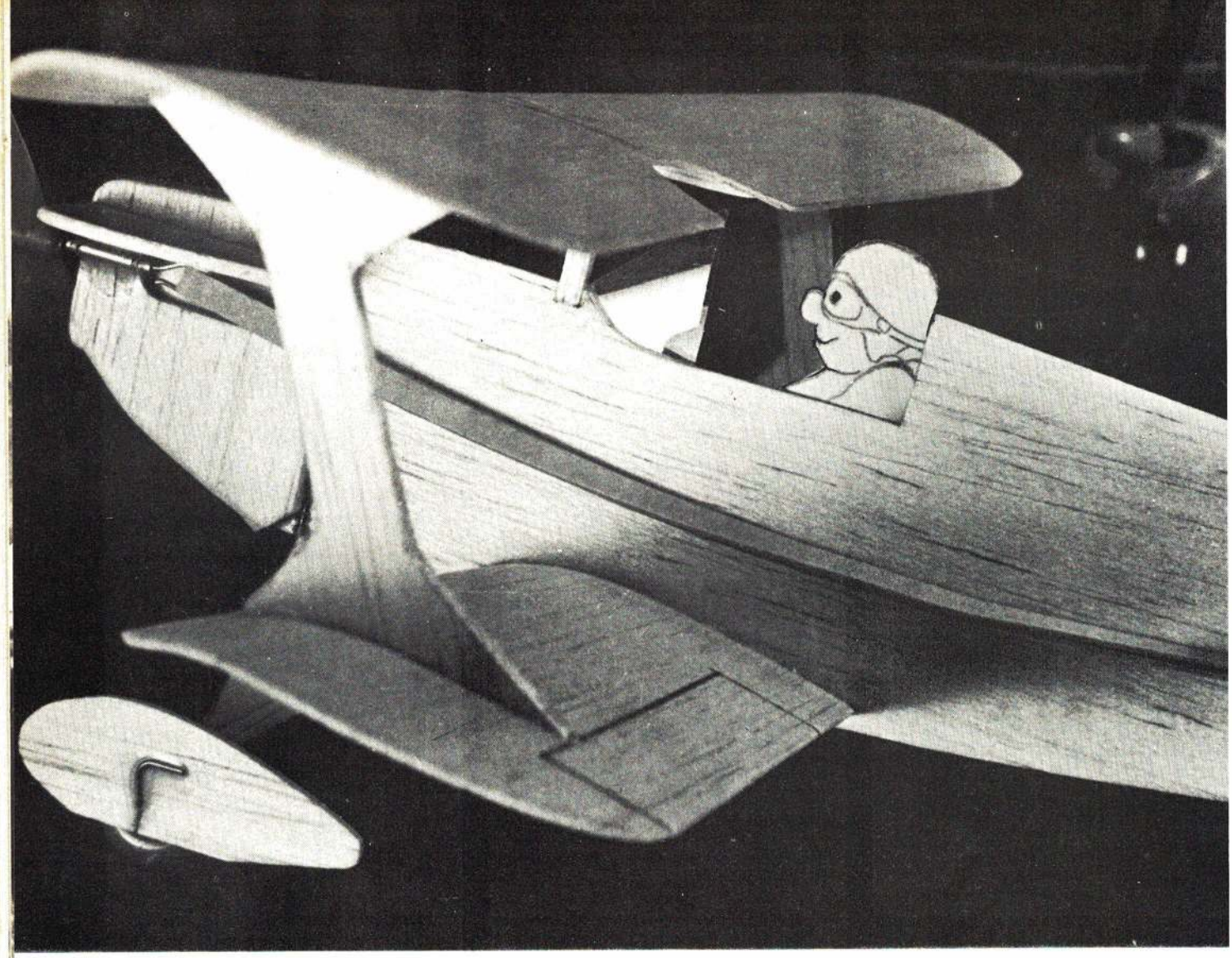
The stall turn is performed at close to maximum speed. Pull back the longitudinal stick until the model climbs at about a 45° angle. When the model slows down and stops, give it hard left tail rotor. When the model has spun 90°, let up on tail rotor while still holding some aft cyclic. The model will come right back down the same path. Learn this maneuver well for it just may save your model some day. Using lateral cyclic when downwind to turn the model takes time and allows the model to drift further downwind.

The same procedure that is used for stall turns can end up in a loop if just longitudinal cyclic is used. The S.S.P., with the large landing gear, will not coast through a loop because of the low center of drag. The loop has been accidentally performed by the Dieter Schluter Hueycobra when making a stall turn.

The S.S.P. weighs about 7 lb. and has been flown at 9-5/8 lb. This represents a lot of fuel when going for an endurance record. Do not load the model up over 10 lb. for it will suffer a control loss. The main rotor thrust is about 11 lb.

I am very interested in hearing about your progress in this field. Please do not hesitate to ask questions. Write to me in care of AAM.

In flight with the tethers very loose. Happy landings.



Profile Peanut Pitts Special

MOST POPULAR HOMEBUILT AEROBATIC BIPE MAKES NIFTY LOOKING AND EASY FLYING SCALE MODEL. ALL CONSTRUCTION DETAILS ARE ON THE PLANS.

by DAVID W. JONES

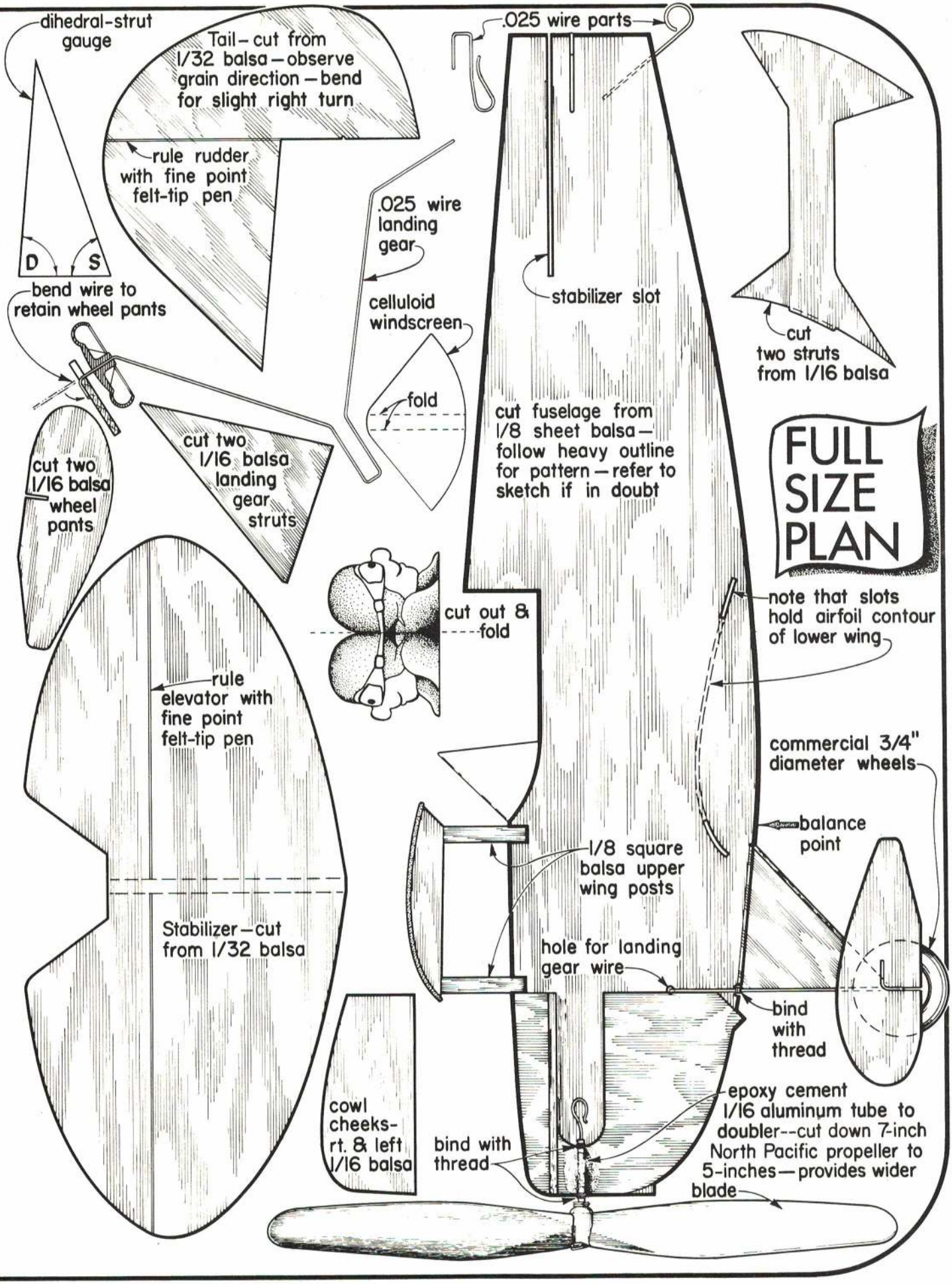
During the past year the problem of flying scale model builders became evident when indoor flying scale models constructed with the super-skill of microfilm specialists won—simply because they flew with the greatest endurance times. They might as well have been flying stick models! On the other hand, models which were constructed with scale fidelity in mind never made significant flight times.

This situation has made it quite clear the basic challenge of both *building* flying scale models, where the two disciplines of flyability and scale fidelity clash on a high technological plane, and *judging* competitions, where weighing the merits of a true miniature replica of a full-scale craft is precariously balanced against the stopwatch. In short, what looked like a fun-type extension of the "dime-model" concept of years ago, which should attract many thousands of enthusiastic modelers, has (as in other types of highly-specialized competition) become a battle of the experts, leaving behind the average model builder who enjoys his hobby for its own merits and not necessarily for the high-powered thrills that competition brings.

I usually feel that if I can get a rubber-powered scale model to climb in a gentle and stable manner and glide to a smooth landing, I have succeeded royally. Citing more specifically from my recent experience, I decided to build a Peanut Scale model (13-in. maximum span) of a Pitts Special simply because the shape of the craft is appealing and I knew I'd enjoy flying it for my own amusement. I used a drawing by Bjorn Karlstrom distributed by Bill Hannan's "Graphics" which was in 3/8-in. to the foot scale. By doubling the drawing size to 3/4-in. scale, the span was just a little over a foot and just right for a Peanut model.

It took quite an enjoyable period of time to build the model which flies well enough to satisfy me, but while constructing it, I had the thought that a profile version of the Pitts using 1/8 balsa for the fuselage and 1/32 balsa for the flying surfaces would take only about 1/100 the time to make and would be more durable and probably a bit more flyable. It was easy to trace the outlines and glue the parts together.

(Continued on page 94)


dihedral-strut gauge
D
S
Tail – cut from 1/32 balsa – observe grain direction – bend for slight right turn
rule rudder with fine point felt-tip pen
.025 wire parts
.025 wire landing gear
celluloid windscreen
fold
bend wire to retain wheel pants
cut two 1/16 balsa wheel pants
cut two 1/16 balsa landing gear struts
stabilizer slot
cut two struts from 1/16 balsa
cut fuselage from 1/8 sheet balsa – follow heavy outline for pattern – refer to sketch if in doubt
FULL SIZE PLAN
cut out & fold
note that slots hold airfoil contour of lower wing
rule elevator with fine point felt-tip pen
commercial 3/4" diameter wheels
balance point
1/8 square balsa upper wing posts
Stabilizer – cut from 1/32 balsa
hole for landing gear wire
bind with thread
cowl cheeks- rt. & left 1/16 balsa
bind with thread
epoxy cement 1/16 aluminum tube to doubler--cut down 7-inch North Pacific propeller to 5-inches – provides wider blade

FLY SPORT SCALE WITH ONE OF THESE PR

CITABRIA

J-3 CUB

CLIPPED WING CUB

YOU D
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THESE CLASSIC DESIG
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ALISTIC PERFORMANC

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THE CHOICE
THAN AL

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1/16 x 1/4	.07
1/16 x 3/8	.09
1/16 x 1/2	.11
1/16 x 3/4	.14
1/16 x 1	.18
3/32 x 3/32	.06
3/32 x 3/16	.08
3/32 x 1/4	.09
3/32 x 3/8	.10
3/32 x 1/2	.13
3/32 x 3/4	.18
3/32 x 1	.20
1/8 x 1/8	.07
1/8 x 3/16	.08
1/8 x 1/4	.09
1/8 x 3/8	.13
1/8 x 1/2	.16
1/8 x 3/4	.20
1/8 x 1	.22
3/16 x 3/16	.10
3/16 x 1/4	.12
3/16 x 3/8	.14
3/16 x 1/2	.20
3/16 x 3/4	.23
3/16 x 1	.28
1/4 x 1/4	.16
1/4 x 3/8	.19
1/4 x 1/2	.21
1/4 x 3/4	.28
1/4 x 1	.35
5/16 x 5/16	.19
5/16 x 3/8	.25
5/16 x 1/2	.30
5/16 x 5/8	.36
5/16 x 1	.42
3/8 x 3/8	.22
3/8 x 1/2	.29
3/8 x 3/4	.38
3/8 x 1	.48
1/2 x 1/2	.33
1/2 x 3/4	.44
1/2 x 1	.55
5/8 x 5/8	.39
5/8 x 1	.61
3/4 x 3/4	.53
3/4 x 1	.68

48" Lengths	
1/8 x 1/8	.09
1/8 x 1/4	.12
1/8 x 1/2	.20
3/16 x 3/16	.13
3/16 x 1/2	.28
3/16 x 3/4	.32
1/4 x 1/4	.22
1/4 x 1/2	.30
1/4 x 3/4	.39
5/16 x 5/16	.25
3/8 x 3/8	.30
3/8 x 1/2	.38
3/8 x 3/4	.51
1/2 x 1/2	.44
1/2 x 3/4	.59

ROUNDED EDGE AILERON & ELEVATOR STOCK	
1/4 x 1	.48
3/8 x 1	.54
1/4 x 2	.65
3/8 x 2	.75

SHEETS -
1/32 x 2
1/16 x 2
3/32 x 2
1/8 x 2
3/16 x 2
1/4 x 2
3/8 x 2
1/32 x 3
1/20 x 3
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3/8 x 8

48" AA
1/32 x 3
1/16 x 3
3/32 x 3
1/8 x 3
3/16 x 3
1/4 x 3
3/8 x 3
1/16 x 4
3/32 x 4
1/8 x 4
3/16 x 4
1/4 x 4
3/8 x 4
1/16 x 6
3/32 x 6
1/8 x 6
3/16 x 6
1/4 x 6
3/8 x 6

36" WIN
1/16 x 12
3/32 x 12

36" TA TRAILIN
1/8 x 1/2
3/16 x 3/
1/4 x 1
5/16 x 1
3/8 x 1½

BAGS O
Bags of

ROVEN WINNERS

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ESIGNS ARE EASY TO BUILD AND EASY TO FLY. ALL HAVE VICTORIES IN THE NEW AMA EVENT. THEIR AUTHENTIC AP- VES TOP SCALE STATIC POINT AWARDS. THE STABLE AND RE- HANCE RATES HIGH WITH FLIGHT JUDGES.

AAA AIRCRAFT BALSA

CE OF MORE NATIONALS WINNERS ALL OTHER BRANDS COMBINED

TS - 36" Lengths

x 2	.26
x 2	.28
x 2	.34
x 2	.39
x 2	.46
x 2	.60
x 2	.69
x 3	.37
x 3	.39
x 3	.39
x 3	.49
x 3	.55
x 3	.61
x 3	.66
x 3	.87
x 3	.95
x 3	1.04
x 4	.55
x 4	.55
x 4	.61
x 4	.77
x 4	.88
x 4	.98
x 4	1.30
x 6	1.08
x 6	1.08
x 6	1.24
x 6	1.29
x 6	1.50
x 6	2.00
x 6	2.30
x 8	1.38
x 8	1.38
x 8	1.48
x 8	1.80
x 8	2.05
x 8	2.25
x 8	2.85

" AAA Sheets

x 3	.55
x 3	.55
x 3	.65
x 3	.73
x 3	.87
x 3	1.19
x 3	1.49
x 4	.75
x 4	.83
x 4	.94
x 4	1.05
x 4	1.32
x 4	1.60
x 6	1.44
x 6	1.60
x 6	1.72
x 6	2.00
x 6	2.70
x 6	3.05

WING SKINS

x 12	2.25
x 12	2.55

6" TAPERED RAILING EDGE

x 1/2	.21
x 3/4	.24
x 1	.32
x 1¼	.38
x 1½	.44

GS OF BALSA

s of Balsa	.98

BLOCKS - 3" Lengths

1 x 1	.08
1 x 2	.14
2 x 2	.20
1 x 3	.20
2 x 3	.27
3 x 3	.44

BLOCKS - 6" Lengths

1 x 1	.14
1/2 x 2	.18
3/4 x 2	.22
1 x 2	.27
1½ x 2	.33
2 x 2	.37
1/2 x 3	.24
3/4 x 3	.34
1 x 3	.39
1½ x 3	.46
2 x 3	.51
3 x 3	.85
1/2 x 4	.36
3/4 x 4	.43
1 x 4	.49
1½ x 4	.63
2 x 4	.74
3 x 4	1.09
1/2 x 6	.55
3/4 x 6	.68
1 x 6	.80
1½ x 6	.96
2 x 6	1.05
3 x 6	1.75

BLOCKS - 12" Lengths

1 x 1	.27
1/2 x 2	.34
3/4 x 2	.42
1 x 2	.51
1½ x 2	.61
2 x 2	.72
1/2 x 3	.46
3/4 x 3	.65
1 x 3	.71
1½ x 3	.88
2 x 3	1.08
3 x 3	1.63
1/2 x 4	.72
3/4 x 4	.82
1 x 4	.96
1½ x 4	1.19
2 x 4	1.45
3 x 4	2.17
1/2 x 6	1.05
3/4 x 6	1.35
1 x 6	1.45
1½ x 6	1.94
2 x 6	2.26
3 x 6	3.35
1/2 x 8	1.45
3/4 x 8	1.70
1 x 8	1.90
1½ x 8	2.45
2 x 8	3.00
3 x 8	4.45

AIRFOIL SHAPED SHEETS

3/16 x 3 x 36	.74
1/4 x 3 x 36	.93
1/4 x 4 x 36	1.05

TAPER CUT SHEETS 36"

1/16" Tapered Edge	
1/4 x 3 x 36	.90
1/4 x 4 x 36	1.05

BLOCKS - 18" Lengths

1 x 1	.39
1 x 2	.77
2 x 2	1.08
1 x 3	1.10
2 x 3	1.65
3 x 3	2.42
1 x 4	1.38
2 x 4	2.20
3 x 4	3.30
1 x 6	2.25
2 x 6	3.40
3 x 6	4.90
1 x 8	2.80
2 x 8	4.50
3 x 8	6.70

BLOCKS -24" Lengths

1 x 1	.53
1 x 2	1.02
2 x 2	1.45
1 x 3	1.45
2 x 3	2.16
3 x 3	3.28
1 x 4	1.93
2 x 4	2.92
3 x 4	4.35
1 x 6	2.95
2 x 6	4.40
3 x 6	6.67
1 x 8	3.90
2 x 8	5.90
3 x 8	8.80

BULK BALSA
3" x 36"
Not Stamped or Sorted
Sold Only
in Standard Packs
Standard Pack in ( )

1/32 x 3 (50)	.29
1/16 x 3 (50)	.30
3/32 x 3 (35)	.35
1/8 x 3 (25)	.42
3/16 x 3 (20)	.49
1/4 x 3 (20)	.64
3/8 x 3 (15)	.79

ODDS & ENDS
PKG. BALSA WOOD
Packages ..... .69

36" ROUNDED EDGE PLANKING

5/32 x 1/4	.09

36" BALSA TRIANGULAR CUT

1/4 x 1/4	.20
3/8 x 3/8	.25
1/2 x 1/2	.30
3/4 x 3/4	.40
1 x 1	.55

PLANKS - 36" Lengths

1 x 1	.72
1/2 x 2	1.04
3/4 x 2	1.29
1 x 2	1.53
1½ x 2	1.82
2 x 2	2.12
1/2 x 3	1.27
3/4 x 3	1.71
1 x 3	2.10
1½ x 3	2.64
2 x 3	3.10
3 x 3	4.75
1/2 x 4	2.10
3/4 x 4	2.35
1 x 4	2.60
1½ x 4	3.45
2 x 4	4.25
3 x 4	6.25
1/2 x 6	2.85
3/4 x 6	3.45
1 x 6	4.25
1½ x 6	5.35
2 x 6	6.25
3 x 6	9.50
1/2 x 8	4.25
3/4 x 8	4.75
1 x 8	5.25
1½ x 8	7.00
2 x 8	8.60
3 x 8	12.50

CONTEST BALSA
Very Light
4-6 Lb. Stock

1/32 x 3	.44
1/16 x 3	.44
3/32 x 3	.54
1/8 x 3	.61
3/16 x 3	.72
1/4 x 3	.93
3/8 x 3	1.10

C-GRAIN AAA
8-12 Lbs.

1/32 x 2	.32
1/16 x 2	.35
3/32 x 2	.41
1/8 x2	.45
3/16x 2	.52
1/4 x 2	.65
3/8 x 2	.75
1/32 x 3	.43
1/16 x 3	.43
3/32 x 3	.54
1/8 x 3	.60
3/16 x 3	.72
1/4 x 3	.92
3/8 x 3	1.09

VH - VERY HARD

1/16 x 3	.44
3/32 x 3	.54
1/8 x 3	.58
3/16 x 3	.68
1/4 x 3	.88
3/8 x 3	1.02

LEADING EDGE
36" Lengths

3/8 x 1/2	.33
1/2 x 1/2	.39
3/4 x 3/4	.60
1 x 1	.85

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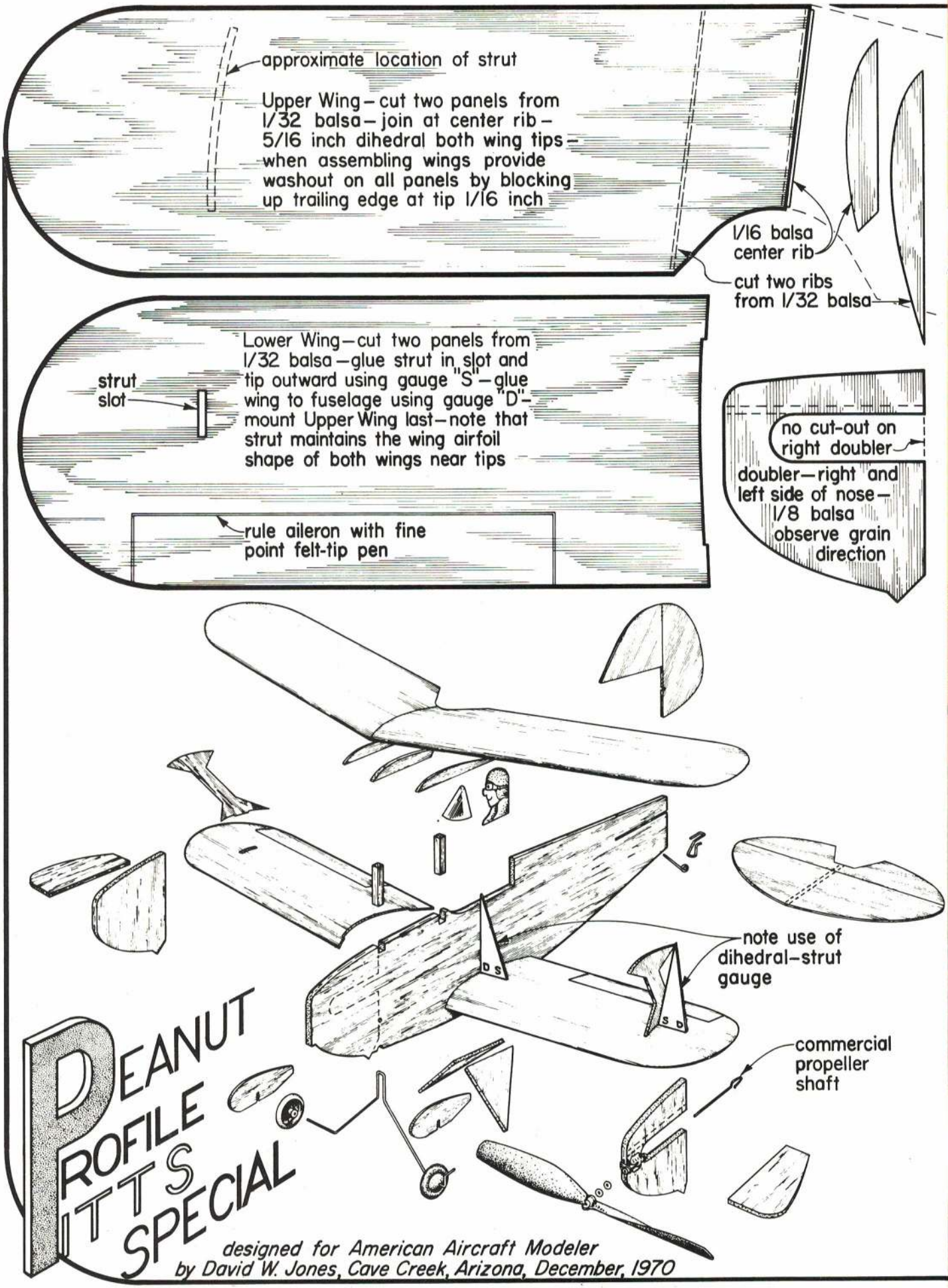
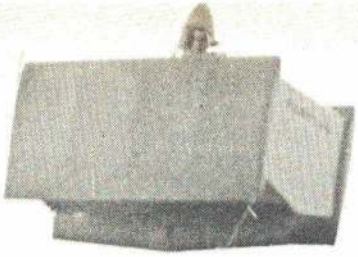

approximate location of strut
Upper Wing – cut two panels from 1/32 balsa – join at center rib – 5/16 inch dihedral both wing tips – when assembling wings provide washout on all panels by blocking up trailing edge at tip 1/16 inch
1/16 balsa center rib
cut two ribs from 1/32 balsa
Lower Wing – cut two panels from 1/32 balsa – glue strut in slot and tip outward using gauge "S" – glue wing to fuselage using gauge "D" – mount Upper Wing last – note that strut maintains the wing airfoil shape of both wings near tips
strut slot
rule aileron with fine point felt-tip pen
no cut-out on right doubler
doubler – right and left side of nose – 1/8 balsa observe grain direction
note use of dihedral-strut gauge
D S
S D
commercial propeller shaft
PEANUT PROFILE ITTS SPECIAL
designed for American Aircraft Modeler
by David W. Jones, Cave Creek, Arizona, December, 1970



VERTICAL TAKEOFF AND LANDING MODEL ADDS ANOTHER DIMENSION TO CONTROL-LINE FLYING.

VERTIGO

by IAN BARRETT

Of the many branches of the model aircraft world, most have their counterparts in full-size aviation. One major omission, however, is that of controlled vertical takeoff and landing. (The free-flight power fraternity might say they have been employing vertical takeoff for some time!) Some experiments by the writer with normal control-line models on very short lines showed that, providing the engine thrust exceeded the weight of the model, hovering flight could be achieved with reasonable control. It became obvious that a powerful elevator was required, as the only airflow over it was that provided by the slipstream from the propeller.

After sketching out various possible configurations, the first model was designed. This was a squat, box-like biplane, symmetrical about the centerline, with the controlling elevator set directly between the trailing edges of the wings. The wings were supported by the center section "fins" and wing endplates, the latter also providing support for the tailplane tips. Offset was only applied to the bottom fin to give a rolling moment in an opposite sense to that applied by the engine torque. A three-point support at the rear and a single wheel under the nose comprised the undercarriage. Although small wheels were fitted to the rear supports, they were subsequently removed to reduce weight. (There was no ground roll with the model pointing up anyway!)

The motor used was an old .15 cu. in. diesel, for which a throttle unit was obtained. Although diesels are not as satisfactory as glow motors for low-speed throttled running, this engine proved to be completely satisfactory—the control and pickup were adequate for the model. The fuel system required some thought as the tank would have to provide fuel with the model both vertical and horizontal, while stationary and at full flying speed. The tank needed to be as close to the engine as possible to reduce suction head effects, and the space available was restricted by the control mechanism. A 15 cc team race tank just fitted, and the vents had neoprene tubing raked forward to prevent spillage and to give a slight pressure feed from the slipstream.

Third-line throttle control could have been operated in one of two senses: either opening or closing the throttle when the line was pulled. As it was not certain how much line tension would be available at the hover, it was thought wiser to allow the throttle to open, should the lines go slack. As it turned out, this had some unfortunate side effects to be described later. Because of the long stroke of the throttle arm, a straight tension or compression spring in the system would have given too great a load change, so an eight-turn torsion spring was wound from .036" piano wire, then fitted to the fuselage-mounted operating crank to return it to the "throttle open" position.

The model was covered in heavy-weight tissue, the all-up weight coming out at 22 oz. The propeller was a nylon 10 x 4, which, although on the large side for the engine, was expected to supply sufficient thrust.

The handle was a simple plywood design, fitted with a sliding center rod operated by the middle finger to control the throttle. The top (up) line went to the forward position on the elevator bellcrank to prevent crossing the lines during transitional flight. Short (30 ft.) thread lines were used for the initial flights as they are light and inexpensive. The major drawback was the high line drag at maximum speed, which applied a load to the throttle mechanism, closing it slightly and thus reducing the airspeed. This was not serious, however, and was overcome by fitting a weight to the operating crank, so that as the speed increased, centrifugal force on the weight increased, thus balancing the inward pull on the line caused by air drag.

A fairly substantial amount of tip weight was added to the leading edge of the outboard endplate to give a safe amount of line tension at all times. The drawback was that the model wanted to fly with its nose pointing out of the circle, and tail first landings could not be achieved on all three points simultaneously. This was rather untidy to say the least, and usually resulted in the model turning over.

The approach to vertical flight was made cautiously. First flights were made as a normal control-line model from hand launches. The fine pitch propeller, together with the high drag of the design, gave a low airspeed. The model had indications of being tail heavy, so the rear wheels were removed. This, combined with the increased confidence of the pilot, resulted in steadier circuits. The next step was obviously a vertical takeoff. Here it was found that the thrust from the engine was insufficiently in excess of the weight to give a reasonable acceleration upwards. An upward push was needed from the launcher, and unless the launch was close to the vertical, the model would topple. Inadequate elevator control was available to right the model, so flying was suspended while modifications took place.

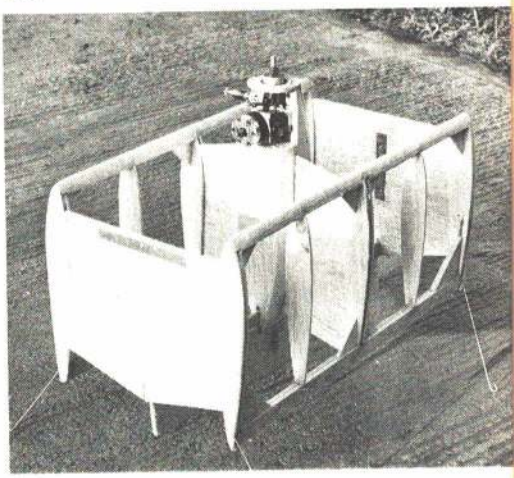
The elevator area was doubled and some balancing area forward of the hinge line, in the slipstream, was added. With a selection of propeller sizes, we were ready to continue.

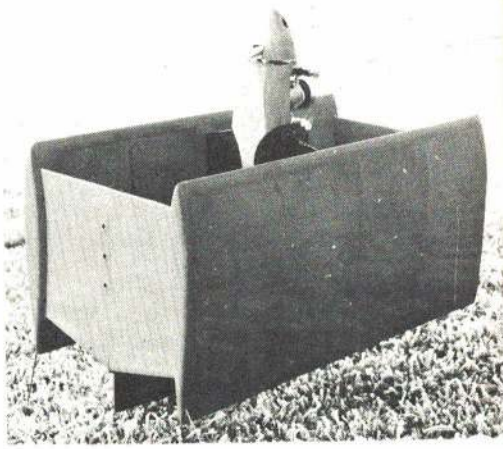
Experiments showed that the engine had to be operated at peak revs, and a nylon 8 x 4 propeller gave sufficient thrust to allow a slow climb. This was the best we could do, and the full size practice of having thrust in excess of weight by about 20 per cent would also seem to be necessary for models.

Elevator control was considerably improved. Control-line flying techniques had to be "un-learned," as the model was flying in conditions quite different than normal practice. The normal reaction, with a model apparently about to stall, was to get the nose down. Here the model was hanging on the propeller, and a rapid turn to the horizontal would deprive it of lift. A gradual transition

(Continued on page 96)

In not-quite-finished state, the model's lightweight construction is evident. O.S. 19 does fine.



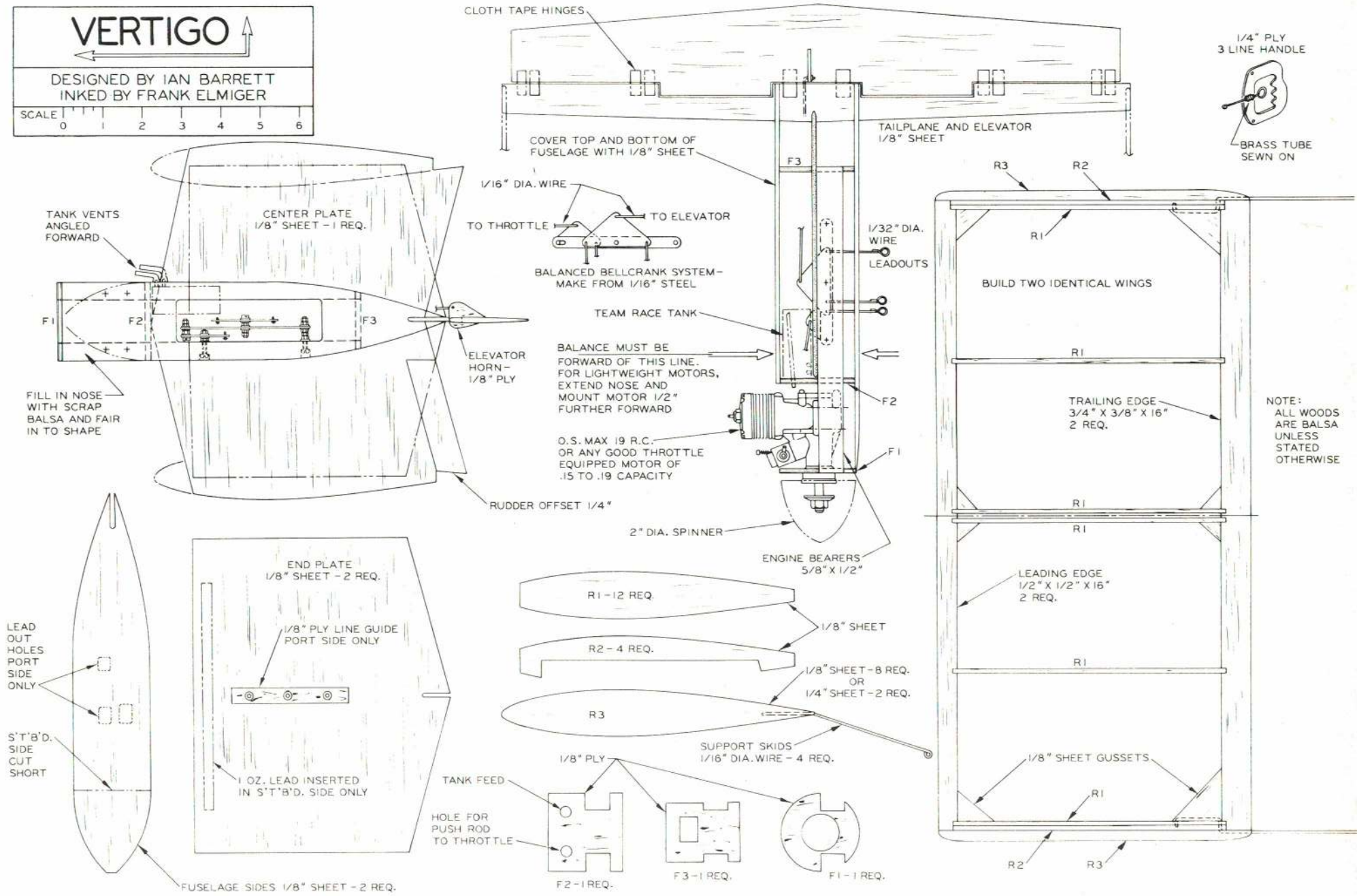


We wonder if the design has any Combat event possibilities. How about that, a Combat biplane!

VERTIGO

DESIGNED BY IAN BARRETT
INKED BY FRANK ELMIGER

SCALE 0 1 2 3 4 5 6



FULL-SIZE PLANS AVAILABLE—SEE PAGE 84

AMA Contest Calender

(continued from page 112)

AUG. 19-20—KNOXVILLE, TENN. (AA) East Tennessee RC Society RC Meet. Site: Knoxville. R. Rhyne CD, Rt. 4, Clinton Tenn. 37716. Sponsor: East Tennessee RC Society.

AUG. 19-20—SUMMERVILLE, S.C. Charleston RC Society Fun-Fly. Site: Summerville. D. Martin CD, 4361 Helene Dr., Chas Hgts., S.C. 29405. Sponsor: Charleston RC Society.

AUG. 19-20—LAKEHURST, N.J. World War II Scramble. Site: Lakehurst N.A.S. C. Gill CD, 835 Gilbride Rd., Martinsville, N.J. 08836. Sponsor: West Jersey Radio Flyers.

AUG. 19-20—CLEVELAND, OHIO (AAA) & FAI World Record Trials. 37th Annual Cleveland Junior CL Air Races. Site: Cleveland Hopkins CL Model Flying Field. R. Sargent CD, 1694 Wright Ave., Rocky River, Ohio 44116. Sponsor: Skylarks.

AUG. 19-20—CLARKSTON, MICH. (AA) 3rd Annual P.M.A.C. RC Championships. Site: Club Field. J. Frazer CD, 1980 Beverly, Pontiac, Mich. 48053. Sponsor: Pontiac M.A.C.

AUG. 19-20—CORPUS CHRISTI, TEX. (AAA) Corpus Christi International CL & RC Championships. Site: Waldron Field. J. Daubenspeck CD, Box 281, Bishop, Tex. 78343.

AUG. 19-20—RATON, N. MEX. (A) Albuquerque-Denver Annual FAI FF Challenge. Site: Municipal Airport. B. Averill CD, 9117 LaBarranca, N.E., Albuquerque, N. Mex. 87111. Sponsor: South West Aero Team.

AUG. 19-20—MORGAN HILL, CALIF. (A) West Coast RC Scale Championships. Site: Hill Country Air Museum. M. Groves CD, 791 Nisqually Dr., Sunnyvale, Calif. 94087. Sponsor: Pioneer RC Club.

AUG. 20—AURORA, COLO. (A) MMM August FF (Cat. II) Meet. Site: E. Colfax Air Park. W. Baldridge CD, 1464 S. Lafayette St., Denver, Colo. 80210. Sponsor: Magnificent Mountain Men.

AUG. 20—OHIO CITY, OHIO (A) SHOO Flyers RC Club Contest. Site: Club Field. J. Acheson CD, P.O. Box 181, Willshire, Ohio 45898. Sponsor: SHOO Flyers M.A.C., Inc.

AUG. 20—CHARDON, OHIO First C.R.C. RC Glider Event. Site: Chardon. F. Vidmar CD, 26500 Zeman Ave., Euclid, Ohio 44132. Sponsor: Cleveland Radio Controlaires, Inc.

AUG. 20—ST. LOUIS, MO. (AAA) 14th Annual Midwestern CL Championships. Site: Buder Park Flying Field. A. Schaefer CD, 4206 Virginia Ave., St. Louis, Mo. 63111. Sponsor: St. Louis Yellow Jackets, Inc.

AUG. 20—ALBANY, ORE. (AA) 1972 All Northwest FF (Cat. II) Championships. Site: Parker's Field. B. Stalick CD, 1120 Shady Ln., Albany, Ore. 97321. Sponsor: Willamette Modelers Club, Inc.

AUG. 20—DENVER, COLO. Old Timers Fun-Fly. Site: E. Colfax Airpark. A. White CD, 1373 Bellaire, Denver, Colo. 80220. Sponsor: Model Museum Flying Club.

AUG. 20—MOUNDSVILLE, W. VA. Valley I.F.O.'s Annual RC Contest-Fun Fly. Site: Club Field. S. Sturm CD, Box 5234, Vienna, W. Va. 26101. Sponsor: Valley I.F.O. Model Airplane Club.

AUG. 20—WARSAW, IND. (A) 1st Annual Sailplane Sunday RC Meet. Site: Warsaw. J. Kay CD, 903 E. Canal, Winona Lake, Ind. 46590. Sponsor: Warsaw Aero Modelers.

AUG. 20—PULASKI, WISC. Annual Summer Fun-Fly. Site: Pulaski Airport. R. Cowles, Jr. CD, 2424 Ducharme Ln., Green Bay, Wisc. 54301. Sponsor: Green Bay R.U.F. Club.

AUG. 20—JOHNSVILLE, PENNA. (AAA) 25th Anniversary Eastern States FF, CL & RC Championships. Site: Warminster N.A.F. R. Leishman CD, 167 Goldenridge Dr., Levittown, Penna. 19057. Sponsor: Levittown Flying Bucks.

AUG. 20—ORWELL, OHIO (AA) 1st Annual Champion FF Rally for Cat. II. Site: Champion Field. J. Grega CD, 355 Grand Blvd. Bedford, Ohio 44146.

AUG. 20—MANSFIELD, OHIO (A) RC Pylon Races. Site: Mt. Zion Road. M. Kalish CD, 235 Cline Ave., Mansfield, Ohio 44907. Sponsor: Electronic Flyers.

AUG. 20—ELSINORE, CALIF. (A) N.A.R. Flightmasters "Picnic" R.O.W. FF Scale Meet. Site: Lake Elsinore. J. Bailey CD, 11161 Mansel Ave., Inglewood, Calif. 90304. Sponsor: N.A.R. Flightmasters.

AUG. 20—DETROIT, MICH. (A) Detroit Balsa Bugs Annual FF Coupe D'Hiver Meet. Site: 11 Mile & Franklin Rd. J. Macay CD, 22278 Prosper, Southfield, Mich. 48075. Sponsor: The Detroit Balsa Bugs, Inc.

AUG. 26-27—SAN DIEGO, CALIF. (AAA) 4th Annual West Coast CL Championships. Site: Robb Field. C. Johnson CD, 2384 Ivy Rd., Oceanside, Calif. 92054. Sponsor: Mission Bay Prop Twisters.

AUG. 26-27—FALCONER, N.Y. Flying Rebels Fly-for-Fun. Site: Levant. E. Ecklund CD, 75 Benson St., Jamestown, N.Y. 14701. Sponsor: Flying Rebels.

AUG. 26-27—CEDAR RAPIDS, IOWA (AA) Sig Midwest RC Meet. Site: Seminole Valley Park. J. Finn, Jr. CD, 268 Hampden Dr., N.E., Cedar Rapids, Iowa 52402.

AUG. 26-27—ST. CHARLES, MO. (AA) McDonnell 15th Annual RC Meet. Site: McDonnell Douglas Electronic Co. W. Feldmeier CD, 2955 Clearview Dr., Normandy, Mo. 63121. Sponsor: McDonnell RC Model Airplane Club.

AUG. 26-27—MUNCIE, IND. (AA) Mid-States CL Model Plane Championships. Site: Westside Park. J. McDonald CD, Box 384, Daleville, Ind. 47334. Sponsor: Muncie Controliners.

AUG. 26-27—RICHMOND, VA. (AA) R.A.R.C. 12th Annual RC Meet. Site: RARC Field. C. Foreman, Jr. CD, RFD No. 4, Box 683, Mechanicsville, Va. 23111. Sponsor: Richmond Area RC Club, Inc.

AUG. 26-27—COURTLAND, ALA. (AA) Sixth Annual Decatur RC Model Airplane Contest. Site: Courtland Air Base. J. Ray CD, 1304 Fletcher Ave., S.W., Decatur, Ala. 35601. Sponsor: Decatur Model Airplane Club.

AUG. 26-27—ENUMCLAW, WASH. (AA) RAMS Annual RC Pattern Pylon & Scale Meet. Site: RAMS Field. R. Brooke CD, 3431 S. 194th, Seattle, Wash. 98188. Sponsor: Radio Aero Modelers of Seattle.

AUG. 26-27—FOUNTAIN VALLEY, CALIF. (AA) LSF 1972 RC Soaring Tournament. Site: Fountain Valley. L. Gray CD, Box 723, Chatsworth, Calif. 91311. Sponsor: San Fernando Valley Silent Flyers.

AUG. 26-27—ORANGE, MASS. (AA) New England RC Championships. Site: Orange Airport. H. Thomasian CD, 497 Central Ave., Seekonk, Mass. Sponsor: New England RC Modelers.

AUG. 27—FRESNO, CALIF. (A) Fresno Monthly FF (Cat. II) Meet. Site: Near Kerman. F. Ginder, Jr. CD, 5740 E. Ashlan Ave., Fresno, Calif. 93727. Sponsor: Fresno Gas Model Club.

AUG. 27—DAVENPORT, IOWA (AA) 15th Annual CL Model Airplane Contest. Site: Davenport Airport. J. Kroeger CD, 1218 S. Zenith Ave., Davenport, Iowa 52800. Sponsor: Davenport Model Airplane Club.

AUG. 27—SOUTHFIELD, MICH. (AA) Cloudbusters 12th Annual FF (Cat. II) Meet. Site: 11 Mile and Franklin Road. G. Lewis CD, 29536 Bonnie Dr., Warren, Mich. 48093.

AUG. 27—MILLERSPORT, N.Y. (AA) United RC Pylon Racing Circuit Meet. Site: Millersport. H. deBolt CD, 49 Colden Ct., Buffalo, N.Y. 14225.

AUG. 27—BLAINE, MINN. (AA) Minneapolis Model Aero Club Annual FF (Cat. II) August Contest. Site: Hentges Sod Farm. H. Langevin CD, 4854 Aldrich Ave. So., Minneapolis, Minn. 55409. Sponsor: Minneapolis Model Aero Club.

AUG. 27—LAKEHURST, N.J. (A) 4th Annual RC Soaring Meet. Site: Lakehurst N.A.S. R. Sarpolus CD, 32 Alameda Ct., Shrewsbury, N.J. 07701. Sponsor: Monmouth Model Airplane Club.

AUG. 27—CINCINNATI, OHIO (A) Junior CL Fun-Fly. Site: Lunken Airport. C. Snyder CD, 7051 Memory Ln., Apt. 1, Cincinnati, Ohio 45239. Sponsor: Queen City U-Control.

AUG. 27—NEW YORK CITY, N.Y. (AA) Assn. M.A.C. of Greater N.Y. 12th Annual CL Meet. Site: Flushing Meadow Park. J. Condon CD, 89-09 247th St., Bellrose, N.Y. 11426.

AUG. 27—COLLEGE PARK, MD. (A) Summer CL Combat and Goodyear Meet. Site: Paint Branch Flying Field. J. Greene CD, 5902 Cherrywood Terr., No. 101, Greenbelt,

(continued on page 100)

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COMBO!

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The new Taipan 15R/C is ideal for this new trainer with a 50" span. Same high quality found in other Bridi kits.

Total Retail $52.45

$34.40

TOWHOOK

Just a great accessory item for R/C sailplanes, this towhook is machined from an aluminum bar and mounts with two #2-56 screws that are contersunk flush with the top of the bar for a pro-looking hook. The bar has six tapped holes to mount hook and is complete with two .080 dia. towhooks and mounting hardware.

ONLY $3.50

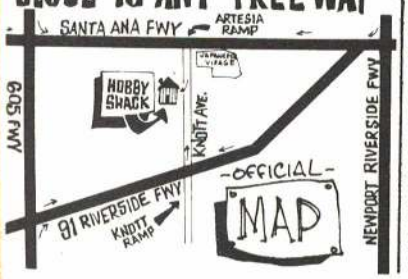
CANYON SCHWEIZER 1-26 AND EK LRB

6 foot 6 inch wing span, quick and easy to build (two hour assembly time) molded of solid expandable polystrene. Retail $29.95 Radio comes with a 2 channel brick. Add 3rd servo later.

SAILPLANE AND 3 CHANNEL RADIO

$116.97

VISIT OUR NEW SHOWROOM CLOSE TO ANY FREEWAY



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orders under $5.00	add 50¢
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$20.01 to $30.00	add $2.00
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A ☐ I enclose 50¢ for Hobby Shacks' Catalog

You get our temporary price list sent to at once, your name placed on our mailing list, plus our giant fully illustrated model catalog when complete.

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.For Your R/C Flying Fun!.

commander '72

NEW CONCEPT IN PULSE RUDDER-ONLY

For 1972 the improved Commander has a Drain Brain switching arrangement in the receiver to reduce total battery drain and increase flying time from 50-80% per battery charge! Plugs are wired into the airborne unit which allows you to switch receiver from plane to plane with a minimum of effort. COMPLETE Flite Pak weights, including nicads, run from 2.5 to 4.8 oz. Transmitter has increased output to overcome interference.

Fully Proportional—Rudder follows directly movement of your stick.

Versatile—The same receiver and transmitter can be used with airplanes from 18-72" span.

Interchangeable—Plug-in wiring allows switching of receiver from plane to plane.

Lightest—Weights 2.5 to 4.8 oz. include Nicad batteries and are TOTAL weights.

Simple—Easy installation; actuator has only one moving part. Minimum maintenance.

Inexpensive—Initial cost of system, airplane and engine is low; nickel cadmium airborne pak and charger are included; transmitter and receiver can be used for many different planes.

COMMANDER '72 R-O SYSTEMS

Completely wired and tested, with transmitter, receiver, actuator, nicad battery airborne pack and charger, switch and connectors. Transmitter battery not furnished.

10G15—Baby System '72	$69.95
10G15T—Baby Twin System '72	$72.95
10G16—Standard System '72	$71.95
10G17—Stomper System '72	$74.95

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

ACTUATOR/BATTERY COMBOS

Here is what makes the '72 Commander sc versatile. All you need to put in plane for extra installations. With connectors, so you just plug in receiver.

15K15—Baby/225 ma Batt.	$11.95
15K15T—Baby Twin/225 ma Batt.	$14.95
15K16—Standard/500 ma Batt.	$13.95
15K17—Stomper/500 ma Batt.	$16.95

FLITE PAK WEIGHTS & RECOMMENDATIONS

Complete weight of each unit and suggested application:

Unit	Weight	Recommended
Baby	2.5 oz.	Pee Wee .020 Up to 48" gliders
Baby Twin	2.7 oz.	Tee Dee .010-.020 Up to 72" gliders
Standard	4.4 oz.	.049 to .10
Stomper	4.8 oz.	Tee Dee .049-.23

ACE MINI FOAM WINGS

These jobs are being used by more and more modelers to come up with their own designs. See recent issue of AAM for P38 and RCM for Mr. Mulligan. Ideal for 1/2A Racing--and other planes of semi-scale or fun types.

Constant chord measures 35" span, 5½" wide, area 192.5. Weighs 3+ ounces.

Taper section is 35" span, center 5½, which tapers to 4"; area 166.25. Just over 2 ounces.

13L166—Ace Mini Foam Taper Wing	$2.95
13L192—Ace Mini Foam Constant Wing	$2.95

DICK'S DREAM KIT

Highly Recommended for Beginners

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

No. 13L100—Dick's Dream Kit $6.95

ACE HIGH GLIDER KIT

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

No. 13L104—Ace High Glider Kit $14.95

SKAMPY KIT

If you have mastered Rudder-Only pulse proportional flying, and are looking for new ventures, the Skampy is for you. Resembles a stand-off Goodyear Scale Racer. Owen Kampen touches in both the design and kit assures the experienced modeller of a satisfactory RO pulse experience. It is NOT recommended for beginners.

Has 30" span wing cut from Ace mini foam tapers. Construction of the fuselage is a bit harder than a box type, but still simple for modellers with experience. Fuselage is 23½", recommended power is Tee Dee .020. Recommended radio installation is Commander Baby Twin. This makes total weight of 12 to 13 oz.

Kit contains taper foam wing set, precision band sawed and sanded top grade balsa and hardwood parts. Bent landing gear, wire for torque rod and plastic bearing, and hinge material is also supplied. Wheels and engine mounting hardware not included.

Full step by step instructions make this a simple job for the experienced RO flyer.

No. 13L103—Skampy Foam Wing Airplane Kit $6.95

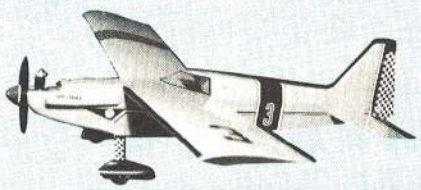
2T KIT By Ron Jacobsen

Uses two sections of the Ace Mini Foam Taper Wings, and one Constant Chord section for a total span of 50 inches, 262 sq. in. Coupled with an .049, the 2T was designed primarily for the two channel Brick type digitals that are on the market, or two servos of any digital system.

Also, when constructed correctly, it performs exceptionally well on Rudder Only using the Commander Standard or Stomper. Motor control can be added to at a later date by using the KRD motor control.

Kit contains three wing panels, all balsa wood completely band sawed and precision sanded, bent landing gear, and miscellaneous parts. Is of the same general high caliber as previous Ace kits. Hardware for hinges and linkage and wheels is left to the buyer.

No. 13L106—2T Foam Wing Airplane Kit	14.75
No. 13L206—Three Foam Wing Sections For 2T	5.00



UPSTART 1/2A RACER KIT

- † Midget Racing Just For Fun!
- † 34" span, 6" chord, 200 sq. in. foam wing
- † Top grade band sawed wood
- † .049 to .051 Tee Dee Engine
- † Two channel operation
- * Owen Kampen design

No. 13L102—Upstart Custom Kit $10.95

R-O PULSE HANDBOOK WITH UPDATED CATALOG

Only $1.00

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

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CITY _____ STATE _____ ZIP _____

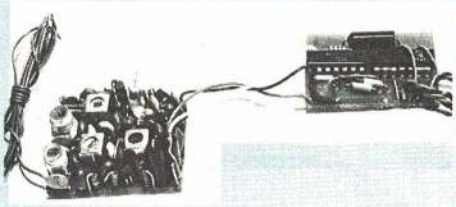
QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

Master Charge or Bank Americard No.

Add $1.00 shipping-handling for direct mailorders except catalog

ACE R/C digital commander

* Two channel system using IC's and latest state of the art; may be expanded to 4 channel.
* Receiver-Decoder will work with ANY modern 4-6-8 channel digital transmitter on same frequency! Reads aileron and elevator signals--ignores the rest.
* Receiver-Decoder works any modern digital servo.
* Receiver-Decoder 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 KIT

IC's simplify wiring and set up of 2 channel decoder. Receiver is conventional double tuned front end using discrete components. Complete with detailed step by step instructions.

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

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.

No. 14G20—Digital Commander Servo Kit $25.95
No. 14G20L—As above, except with D & R DS2P Linear Mechanics $26.95
(Less connectors)

digital commander FLITE PAK KIT COMBO

If you intend to use Commander Digital 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.

No. 12G30—Flight Pak Combo $69.95
No. 12G30L—As above, but with D & R DS2P Linear Mechanics 71.95

Please Specify Frequency

For complete listing of Transmitter and Combo Pak, Batteries, Packs, Connectors, or components and PC boards--see our Handbook-Catalog. Price is $1.00 via BULK Third Class. $1.50 via First Class.

digital commander TRANSMITTER KIT

IC's make the encoder a cinch, and easy conversion later to 4 channel. Built up to a standard of excellence; not down to meet a price. Complete kit with step by step instructions.

No. 11G20—Digital Commander 2 Channel Kit $49.95
(Please specify frequency)

COMPLETE KIT COMBO

Consists of Transmitter Kit, and all parts of the Flight Pak Combination and saves still more. Available initially on 27 mHz spots.

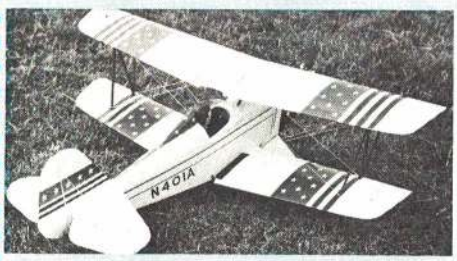
No. 10G2—Digital Commander Kit Combo $117.95
(Please specify frequency)

BATTERY & CHARGER OPTIONS

While alkaline energizers may be used for Flite Pak, Nicads are recommended--4.8 volts.

38K33—Nicad 225 ma Cylindrical cells	2.00
38K50—KRD Flat Pack for above (4)	1.00
38K35—Nicad 450 ma Cylindrical cells	2.50
38K8—D & R Square Pack for above	1.95
38K77—XL-ent 4.8v 500 ma button pak	8.98
34L10—XL-ent 225 ma charger kit	3.95
34L11—XL-ent 500 ma charger kit	3.95
34K22—Varicharger kit	7.95
34K21—Varicharger, assembled (Varicharger will charge both 225 and 500 ma and other packs)	9.95

No. 38K54—Mallory 1603, 9 volt Transmitter Battery 2.25



ALL STAR
BIPLANE KIT
Designed by Roman Bukolt
FOR UP TO .15 ENGINES

The ALL STAR Bipe by Roman Bukolt is a real winner--and will appeal to old timers and newcomers alike. Fashioned after some of the EAA home builts as well as the nostalgic planes of the 30's, this design overcomes most of the problems encountered in the building of bipe simple with easy construction of the N struts and cabane.

Modified Ace Foam Taper sections are used--again a simplification and an assurance of exact duplication of wings.

Span is 34". Area 350 square inches. Designed for .049 to .15 power. Use with .15 and three channels, .09-.10 for two channel OR with .049 and Rudder Only Pulse! Truly an All Star.

Kit contains 60 precision band sawed and sanded balsa, spruce and ply wood pieces, two sets of Ace taper foam wings, miscellaneous wire parts, and complete step by step building instructions. (Wheels and pilot not supplied.)

No. 13L200—Ace ALL STAR Deluxe Biplane Kit $21.95

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

ACE R/C INC.
HIGGINSVILLE MO 64037

Dear Friend:

The Flite Paks with the D & R servos are the big sellers of the Ace AAM Digital Commander. Designed by Fred Marks, these jobs are outstanding!

Big news is that the receiver-decoder is now also available on all AMA approved 50-54 mHz spots--at no increase in cost.

Also Dick Rehling's D & R Bantam is the stock kit for the servo, BUT you can get Dick's new linear output job for only a buck extra. That makes the Flite Pak with two linear servos come up only $2.00. For low cost you have a two channel system that is compatible with almost any current digital transmitter.

Expandability is coming. Fred Marks is working on it. When this is definite, we'll let you know.

Better get your order in and get on the list. The demand is so heavy that, like most R/C manufacturers, there is a waiting list. We promise to ship "in rotation" --first come first served.

The Flite Pak is shown with Romey Bukolt's All Star. The All Star is also on the best seller list.

Now to the subject of PULSE. The Commander '72 R/O Paks have been going out at a record rate. We have not always been able to keep up with the increased demand.

The clue to their real popularity is the way kit manufacturers are making plane kits especially for them. Sterling's Stick Models are easily adapted. Micro Models has their Old Timers. Competition Models is coming with a Rumpler Taube.

The Nomad glider has been given new life by "House of Balsa". The new kit is considerably updated, some of the latest techniques are used. It features the Commander R-O Pulse!

On top of this, there are rumors by several other manufacturers of plans for more small kits designed for Rudder Only and you sort of get the feeling that the Commander Pulse jobs have started something!

Needless to say, we've got a couple of new plane designs in the works. They feature our foam wings. Scheduled for 1973.

Are you in on the fun of pulse? Many a full house flier is; many a beginner has started this way. How about you?

Keep 'em flying!

Yours sincerely,

Paul F. Runge

THE Royal LINE

...no matter how you cut it, it's still at the center of innovation and quality. Visit your local dealer, compare for yourself and find out why.

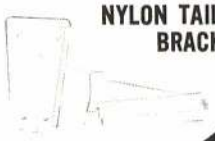
CONTROL HORNS

An all nylon horn that is complete with mounting plate and hardware.
Standard . . . 2 for 45¢
Long . . . 2 for 45¢

FUEL FILTER

Price . . . 2 for 45¢

NYLON TAIL WHEEL BRACKET



Price . . . 45¢ ea.

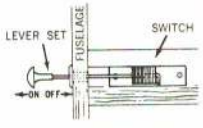
NEW EXTRA THIN "BETTO" MASKING TAPE

Minimizes paint build-up on the tape's edge and is also flexible enough for curved stripes.

1" wide x 60'.....25¢ ea.
¾" wide x 60'.....18¢ ea.
½" wide x 60'.....12¢ ea.

NEW Switch Lever Set

A nylon bushed accessory that is designed to actuate internally mounted slide switches. **Price . . .2 for 79¢**



R/C AND U/C ACCESSORIES

4-WAY METRIC WRENCH NEW

Price . . . 95¢

An accessory ideally suited for those foreign prop nuts.

NEW U-CONTROL BELLCRANKS

All nylon and complete with mounting bearing and hardware.

1¾" . . . 35¢
2¼" . . . 45¢
3" . . . 55¢

SCALE-LIKE STEERABLE NOSE GEAR

Price . . . $4.95

A height adjustable, nylon bushed and dual coil nose gear which is designed for scale projects.

DEALER INQUIRY INVITED

ROYAL PRODUCTS CORPORATION
6190 E. EVANS AVENUE, DENVER, COLORADO 80222

Aqua-Vent Floats

(continued from page 40)

traced from the plans; cut the largest ones first, making two at a time. The same pattern is used for each successive frame. Just cut the bottom to the outline of the next frame after each pair is made. Accurately mark the centerline of each frame to ensure good alignment later. Frame 7-A is made the same as the bottom of frame 7; it should form a triangular piece with a straight cut between chines (see Step 12).

Step 3: Using the frame location lines as guides, cut 1/16" wide notches through each strip down to the skin. Cut these simultaneously, using two fine-tooth hacksaw blades taped together at the ends and guided with a block of wood held across the strips. Do not cut into the skin, as this will weaken the float structure. The notches may be individually deepened down to the skin using the end of the hacksaw blades.

Step 4: Tack glue each frame into the notches of the center strip. Use the marked centerlines on each frame to help get them centered, and check each frame centerline with a square to ensure that they are perpendicular to the skin.

Step 5: Reinforce frames 1 through 9 with 1/16 x 1/4" balsa strips. These should run across the grain of the frame upward from the center strip.

Step 6: Run glue on the skin at each frame location and into the chine notches. Roll the skin up around the

frames, making sure you have a good glue joint and that the frames are bottomed into the chine notches. Use rubber bands at each frame location to hold the skin in place and check alignment before allowing to dry.

Step 7: Determine the mounting locations for your model. The positions shown on the plan top-view are for the H-Ray with tricycle landing gear. If you have a "tail dragger," relocate the mounting positions to put the step under the center of gravity of the model. The main cross-strut will be forward for this type of undercarriage. Fit 1/4" square balsa between frames on each end of the center strip at both mounting locations. These must be beveled slightly to fit the curvature of the skin and covered with 1/8 x 3/4" ply or hardwood. When dry, drill holes at the proper mounting locations and epoxy the 6-32 blind nuts in place.

Step 8: Fair the chine strips using the frame bottoms and skin chine edges as guides. Check at each frame with a straightedge. When complete, you should be able to hold a balsa sheet against the frames and form a good fit between the sheet and the skin at the chine.

Step 9: The stern fin is not absolutely necessary for good performance. The prototype floats did not have these fins; they were added to the plans to improve directional stability when the model "lands" or is decelerating after an aborted take-off run. During this stage, the wetted surface area is far forward of the CG and the model may suddenly skid, making a quick 90° turn. This usually happens when you give some rudder control during this stage of the landing. If you feel this characteristic is objectionable, add the fin as shown on the plans.

Step 10: The afterbody bottom is covered first with 1/16" sheet balsa. Extend the sheeting into frame 9 and around frame 8 so there will be no open areas when the step sides are brought in.

Step 11: Make the step post from 1/4" square balsa. Bevel to fit the angle formed by the step sides at the point where they come together. Cement this post to the afterbody, using the step sides held together to determine the proper location. Next cement the step sides to the center post, frames 8 and 9, and the afterbody bottom. A fillet between the step sides and the bottom sheeting will form a strong and watertight joint—use cement or other filleting material such as Hobbypoxy Stuff.

Step 12: Cut out four pieces of 1/16" ply 2 1/32 x 3" with the grain running parallel to the longer dimension. These pieces, which make up the step plate, must be shaped to form a twist so that the bottom is straight across at the step and forms a "V" farther forward at frame 7. Soak the pieces in boiling water for 10 minutes, then form them to the correct shape by pinning down to a flat surface and over frame 7A (see plan view under Step 12). Increase the twist slightly beyond the correct shape with 1/16" shims under the outside trailing edge corners. Allow to dry completely. This will take at least

be prepared for the toughest competition or just a lot of fun with these Dumas hi performance R/C and U-control models

HI PRO GLIDER
fiberglass fuselage
101" wingspan $39.95

Thunderbird $19.95

Spectrum $7.50

Triton $39.95

THE SMOOTHIE
Contest U-Control
Stunter, 52" span $15.95

Ole Tiger $8.95

Evolution 2 $14.95

Crusader $13.95

When it comes to contest performance, Dumas RC and Ukie kits deliver. Whether you compete, or just want models that will really give you thrilling action, you'll find the right kit from Dumas. The new HI PRO glider for all purpose soaring using brick or separate 2-channel RC units is easy to fly and has excellent flight and control characteristics. Our famous SMOOTHIE Ukie stunt job . . . excellent contest performance with .35 power, even in windy weather. The THUNDERBIRD Ukie stunt job for .35 engines is a winning beauty. The hot 120 mph SPECTRUM combat ship turns tighter and features rugged spruce tail booms and leading edge doubler, recessed engine and plastic bubble for pacifier fuel tank.

The famous TRITON RC stunt and pattern ship features a 62" foam wing and fiberglass cowl. It's an easy to fly winner with .45 and .60 engines. Everyone is having fun with .15 powered profile pylon racing and many are winning contests with the solid balsa Dumas OLE TIGER. EVOLUTION 2 is a 1/2 A glider . . . soarer or RC trainer with a 66" wing . . . when you take off the removable wing tip panels you have a great 42" wingspan RC sport ship! Then there's the fantastic CRUSADER profile control line carrier plane . . . she flies fast . . . lands slow, and wins contests. 36" wingspan for .35 engines. Dumas has over 80 model plane and boat kits, send 25¢ for complete catalog.

dumas planes

Dumas Products, Inc., 790 S. Park Avenue, Tucson, Arizona 85716

24 hours under normal room conditions but may be speeded up in an oven. When dry, reassemble with glue onto frame 7A, leaving off the shims at the corners.

Step 13: Check all joints for fit and glue the step plate assembly in place. Frame 7A of the assembly is glued against and flush with frame 7 of the main structure. This will form a 1/16" step made with the edges of frame 7 and the step plate so that the forebody planking can butt against the edge of the step plate. Small fillets may be added at the joint between the step and the taper.

Step 14: The 1/16" forebody planking is added one side at a time. Before gluing, trim the keel edge to final size. The chine edge can overhang and be trimmed off later. Hold the planking down at each frame location with 1/4" square by 5" long sticks held with rubber bands. Use spring-type clothespins or similar clamps to hold the planking in place at the bow.

Step 15: Trim all edges and sand the entire float assembly. Keep edges reasonably sharp; the chine should not have more than a 1/16" radius. For covering I used silk and about seven coats of clear dope. Some of the newer covering materials can be used but may be difficult to fit in around the step. An epoxy finish should give good results with two or three coats.

Step 16: Make all mounting hardware as shown. Locate the main cross-strut at the rear mounting position for planes with trike landing gear and at the forward position for two-wheel landing gear. The fuselage height should be sufficient to allow a one in. clearance between the lowest propeller arc and the float tops as viewed from the side. If you have permanent type wire landing gear as in the H-Ray, these may have to be bent downward to get the required height and angle of incidence. The diagonal struts attach to the forward position at the floats and are lashed with rubber bands to the main gear at the fuselage.

Adjust the floats so the angle between the zero lift line of the wing and the top of the floats is +3° (leading edge

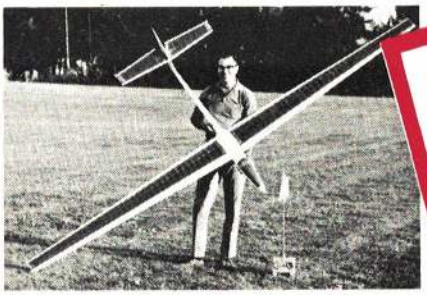
(continued on page 74)

MONOKOTE* GETS LETTERS... LOTS AND LOTS OF LETTERS!

*T.M.

"I've never taken the opportunity to thank a manufacturer before, but I do want to express my opinion on your Super Monokote. I've just covered five new wings and stabs with it, and it is great!

Chuck Broadhurst
Sacramento, Calif.



The ship came in 250 ft. straight down in a radio failure and there was only a small tear on the underside of one panel.

Harl
W

In these days of tising it's a real into a product everything claim

I have not "silked" a Monokote became availa Monokote job was regular on an Antic, since then have covered 14 models of my own. 3 Bikes, 1 Tripe & 4 Kwik Fli were included in this total.

Don Johnson
Denver, Colorado

I've been showing it to everyone I know demonstrating how hard it is to damage and the ease with which it can be repaired. Believe me it's all the ad says and more.

Winston Hockenberry
Waterbury Center, Vt.

I have found that Super Monokote works easier than any other covering that I have ever used. Super Monokote surprised me at how smoothly it covers curved areas like wing tips.

Brian McAvoy
Greenock, Pa.

MONOKOTE IS THE GREATEST!! I've experimented with most of "them" and always go back to Monokote.

Dan Rhoads
Newington C n.

Being a litt
mem
position
the most

ene Rubel
Torrance, Calif.

It's the prettiest finish I've ever had.

Dr. Walter Good
Bethesda, Md.

Even Naomi, my wife, loves Monokote because it is odorless, and also I have been able to stop getting paint all over my clothes. I am sold on this item and intend to trade in all of my paint brushes for a new "iron."

Donald Rothbaum
Silver Spring, Maryland

I'm a fairly new modeler and thought Monokote was too expensive until I saw your ads comparing Silk & Dope costs to Monokote. I tried Monokote . . . and you're right—Monokote's cheaper than Silk & Dope, and holds better too!

Marc Hoit
Michigan City, Ind.

ired the damage and recovith a fresh section of trans- Super Monokote. Only a eye would ever spot the The good old days of and wait, then steam it again to make adjust- gone forever if Super is used.

Richard A. Lape
Dewitt, Mich.

THESE ARE JUST A FEW OF THE MANY, MANY LETTERS WE RECEIVE EACH MONTH ABOUT SUPER MONOKOTE. TAKE A TIP FROM OUR USERS — SUPER MONOKOTE WILL CUT YOUR COVERING TIME TO A FRACTION AND IT'S MORE ECONOMICAL THAN THE OLD SILK AND DOPE METHOD. IT'S BEEN PROVEN . . . MONOKOTING GETS YOU FLYING, FASTER!

*Pat. No. 3,388,651

TOP FLITE

TOP FLITE MODELS, INC.
2635 South Wabash Avenue
Chicago, Illinois 60616

NOW THERE ARE 16 SUPER MONOKOTE FINISHES

3 NEW COLORS

26" WIDE

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CHROME	1.35	RUNNING FOOT
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OLIVE DRAB & DOVE GRAY FOR TRUE-TO-LIFE MILITARY MODELS

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Aqua-Vent Floats

(continued from page 72)

higher than trailing edge). This will make them approximately parallel to the underside of a flat-bottomed wing and 3° down from the centerline of a symmetrical airfoil wing.

If your model does not have a reasonably large vertical fin or long tail moment, it may be necessary to add additional fin area to balance the forward area added by the floats. My H-Ray was originally flown without a sub-fin but was much more sensitive to rudder control during flight. The sub-fin, although much larger than necessary, greatly improved directional stability. The sub-fin is also a good place to attach a water rudder—a must for good water handling when there is a little breeze. The rudder was made from tin can stock soldered to 1/16" piano wire. The wire ran through small plastic tubing attached to the trailing edge of the sub-fin, then bent back and up so it was just behind the rudder. At this point it was formed into a loop which engaged a 1/16" wire pin epoxied to and protruding from the bottom of the rudder. The entire fin-rudder assembly was attached to the bottom of the fuselage with rubber bands and is easily removed for land flying. It is a good idea to slant the leading edge of the water rudder so that if you snag any weeds, they will slide off.

Do not allow the rudder to extend deeper than necessary to provide the proper steering while taxiing. This is especially true of the type which extends down from the tail of the model, usually on the end of a length of piano wire. Sufficient drag can result from this arrangement to cause a downward moment at high speeds which keeps the wing angle of attack low and prevents liftoff unless extreme up-elevator is used. In such cases when the model does become airborne, it is in a near stall condition and quite unstable.

Flying

If the floats are mounted as described and your model is trimmed properly as a land plane, you should have no problem getting into the air. After some test flights, you may adjust the angle of incidence between the model and the floats to improve the takeoff characteristics. If your model reaches maximum speed on the step but will not lift off without up-elevator, increase the wing angle of incidence. It will be much more difficult to make realistic takeoffs if you have to "haul" it off the water; because of the sudden dumping of water drag, all conditions tend to create a ballooning action with the model leaving the water at a steep angle.

Reduce the wing incidence if the plane leaves the water at relatively low speed and is near a stall condition at takeoff. Also, if the wing incidence is too high, the model will fly slower than normal and will appear to have excessive up trim. This is due to the aerodynamic effect of the floats acting as a control

surface. When the angle is correct, you should be able to fly off the water "hands-off."

A few additional points should be mentioned in regard to converting a land model to hydro-flying. Foremost on your list of preparations should be waterproofing of your RC equipment—a few drops of water in a receiver or servo can be disastrous. A receiver can be fairly well protected in a plastic bag and sealed around the leads with a rubber band. Servos are not as easily sealed due to the necessary control linkages.

A completely sealed compartment is the best approach to waterproofing; this can be a completely separate unit with sealed output shafts from the servos or a watertight fuselage compartment with nylon tubing feedthroughs for the control cable guides. Do not use long lengths of nylon tubing for the inner control rod, as these have a tendency to vary in length with temperature and humidity changes. Grease packed between the inner and outer control tubing will keep water from seeping through into the fuselage.

The wing joint to the fuselage should be sealed with adhesive-backed foam tape to keep spray from running down the wing and into the fuselage. A low wing is more likely to pick up spray, especially where the leading edge crosses the fuselage. It is good practice, until you are confident of your model's water integrity, to check your radio compartment after every two or three flights and the CG after each flight. A hydromodel which unexpectedly changes trim has most likely picked up some water in the tail or wing. It is preferable to have a clear or translucent covering so that you can quickly determine if any water has seeped into the structure. If not, shaking the model will usually reveal the soggy areas.

One last point to make is that of retrieving. You should have a boat or some method of returning your model from the middle of the lake. In most cases you will be able to taxi your model back to shore after "landing," but there will always be that one time when the engine quits or you make those one-point landings so common to radio-controlled models.

Hydro-flying can be an answer to the continuing scarcity of flying sites or just a new challenge to the modeler who has tried "everything"; in any case, those first moments when you see your favorite model taxi out into open water, accelerate with full throttle onto the step, reach air speed, and smoothly lift off will well be worth the effort put into this project.

The Ultimate Rubber Ship

(continued from page 32)

pitch to diameter, and decreasing pitch with increasing prop radius. Therefore, a Schwartzback prop with a higher 31" mean pitch was selected.

The airfoil section is the same section I have used successfully on my Wake since 1965. I increased the thickness of the section to 7%, as I wanted to

build a higher aspect ratio wing to gain lower airplane sink speed. This was achieved by reducing the undercamber but leaving the upper surface of the 9% section unchanged. Dual turbulators were added as have been used on my Wakes. This combination of section and turbulation has given a sink speed approaching 1.25 ft./sec.

Flight testing of this model has been an interesting experience. Instead of using 150 gram motors, I have tested with 50 gram motors using an aluminum tube of 3/8" diameter, two-thirds the length of the fuselage and weighing 100 grams. This combination of rubber motor (50 grams) and aluminum tube (100 grams) maintains the same flight weight as that of a 150 gram motor. Recorded flight time for the 50 gram motor is multiplied by a factor of 3 to give the corresponding flight time for the 150 gram motor.

I set up a flight test procedure for the purpose of obtaining flight times for measured values of rubber motor energy release. I used Bob Wilder's torque meter to measure torque as a motor was unwound after having been wound to a predetermined number of turns. A plot of torque versus those turns was made. The area under this curve gave released energy. (Figure 2 shows a plot of torque versus remaining number of turns for a 50 gram 16 strand 1/4" Pirelli motor wound to max turns.) I flew with that same motor with the same number of turns and recorded the flight time. By making several flights (around sunrise and sunset) an accurate figure of flight time for a known value of energy release was obtained. Table II shows the ratio of flight time per foot-pound of energy release and max torque for each number of turns flown.

Values given in Table II are plotted in Figure 3. Figure 4 puts this same information in non-dimensional form which makes it possible to determine maximum values for each parameter when an intermediate value is known.

This model has actually demonstrated a flight duration of 3 times 285 or 855 seconds if 150 grams of rubber are used.

I want to call attention to the ratio $\Delta t/\Delta U$ which varies with number of turns. This ratio drops with increasing

(continued on page 78)

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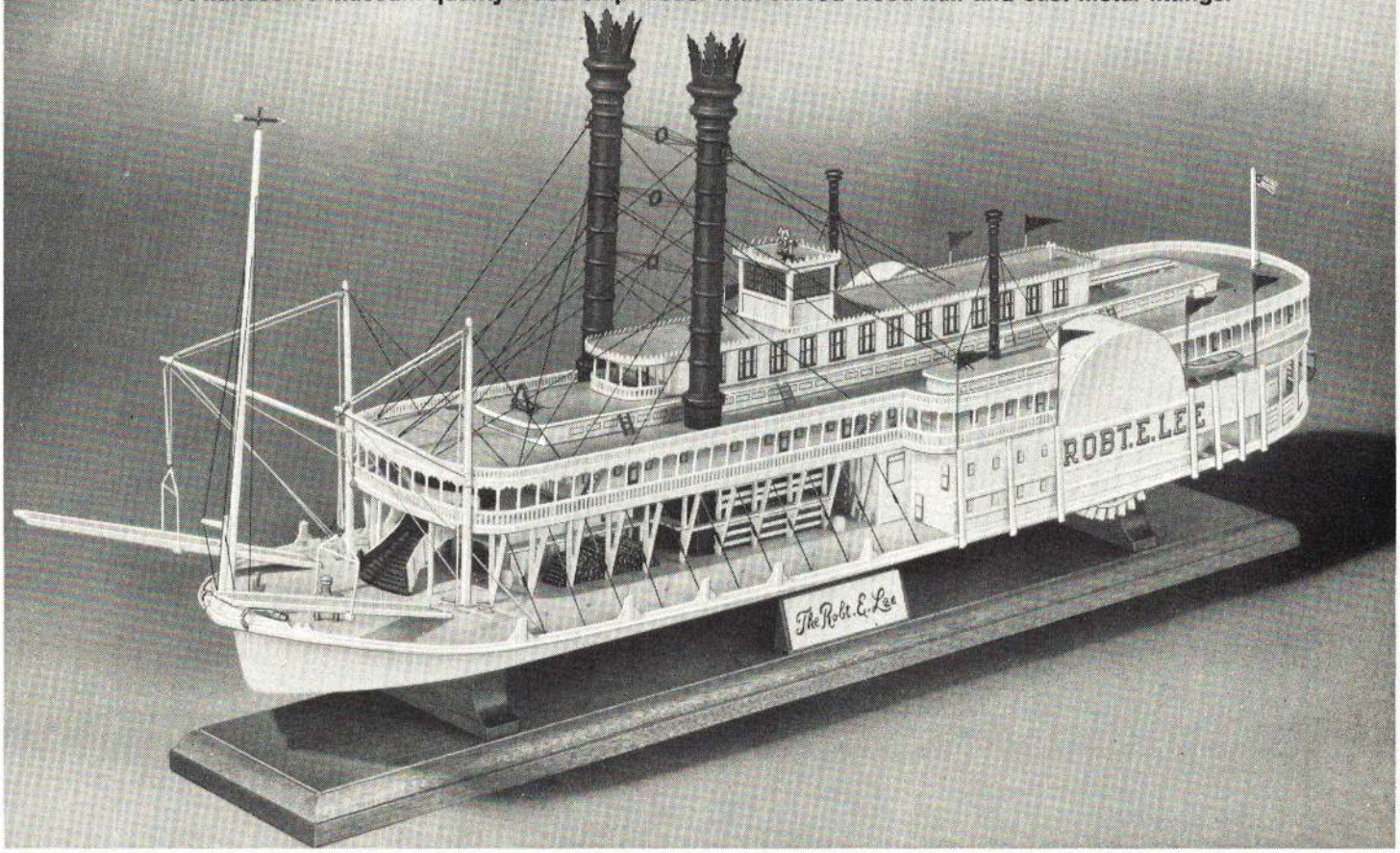

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The Ultimate Rubber Ship

(continued from page 76)

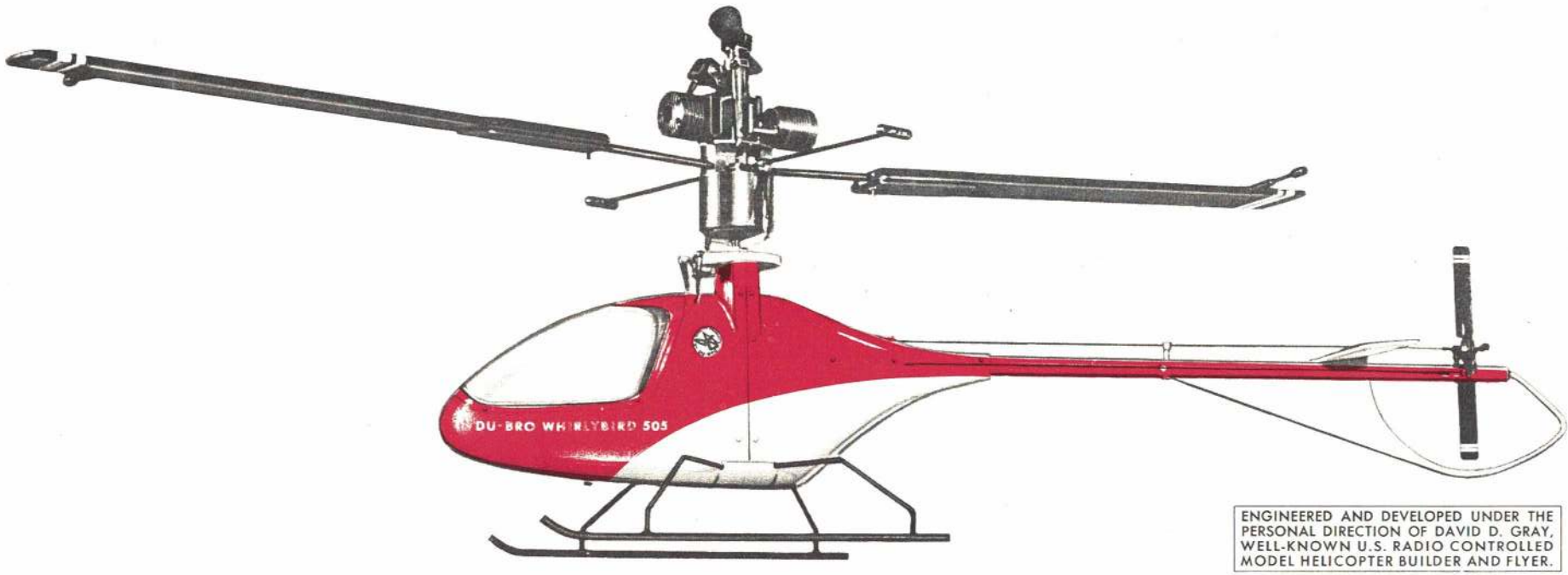
number of turns, indicating less efficient use of released energy. If a ratio of .96 could be maintained throughout the motor run, duration would rise from 285 to .96 times 356 or 342 sec. A loss of time of 342 minus 285 or 57 sec. has occurred for several reasons—increased airplane drag, and non-optimum trim during the high torque portion of the power run. Propeller efficiency may have dropped also. I didn't expect this large a loss in energy expended when flying maximum turns. This tells me I need to improve my power trim setting to gain more altitude on the initial power burst. More flight testing is required which could push this ship's duration to 900 seconds or 15 minutes. Impossible!

Let us take a look at prop efficiency. By definition, prop efficiency is expressed as the ratio of output energy to input energy. Flight time in terms of seconds per foot-pound of energy release has been measured and recorded. Figure 3 shows the maximum value of $\Delta t/\Delta U$ to be 1.0. This flight time of one second per foot-pound of energy release represents input energy. Output energy is represented by the product of altitude loss and airplane weight in one second of flight time. Prop efficiency can be expressed as: $e = W\dot{h}\frac{\Delta t}{\Delta U}$; where W=flight weight; $\dot{h}$ = airplane sink velocity in ft./sec. substituting for "$\Delta t/\Delta U$" and "W," the expression becomes, $e = .595\ \dot{h}\ (1.0) = .595\ \dot{h}$.

Glide tests from a known height can determine sink speed "h." I have not been able to do this with my ship. Should prop efficiency "e" equal .75, then airplane sink speed is equal to $\frac{.75}{.595}$ or 1.26 ft./sec. These values for prop efficiency and airplane sink speed can be considered quite respectable.

The challenge of this project has given me insight and better understanding of the important design parameters affecting flight duration. It has shown me what can be attained in flight performance when design factors are recognized and an attempt is made to optimize each one.

Next month we will present the model itself as a construction feature. Presentation will permit construction without ordering plans.



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Hot Pants

(continued from page 25)

Now add balsa block filler at trailing edge of wing between ribs 1 and 2. (Use Hobbypoxy No. 4, which will fill any voids between the block and sheeting.) Install landing gear mounting bearers and temporarily mount landing gear retract unit. Make necessary cutouts in wing ribs as required for pressure hoses, pushrods, wire connectors, etc. Install aileron bellcrank on plywood plate and attach to wing; then add 1/16 dia. wire aileron pushrod flush with rib 1—this will enable you to find the neutral location of the aileron bellcrank when the wing is finished. The pushrod will be joined with matching pushrod from the other panel after the panels are joined. Install four-in. long 1/16 dia. wire aileron/aileron bellcrank pushrod. (A Du-Bro solder link is connected to aileron control horn after ailerons are hinged to wing panel). Attach Midwest 1/8 dia. one-piece hinges to mounting gussets. Sheet remainder of bottom of wing and remove panel from jig. Trim sheeting at root and tip ribs and trailing edge. Attach 1/8 x 1/4" spruce or hard balsa trailing edge and contour leading and trailing edge to correct shape.

Cut out aileron using the reference cuts previously made on top sheeting. Remove an additional 3/32" from the wing panel and aileron to allow for 3/32 sheeting to close rear of aileron cutout in wing and the front of the aileron. Noting bevel of lower aileron leading edge as shown on the drawing, remove bottom aileron sheeting as required. (Don't forget to allow for the 3/32 sheeting on the front of the aileron.) Install 3/32 sheet aileron root rib and 3/32 sheet aileron front sheeting. Add 1/4 dia. dowel, previously drilled and tapped for 8-32 thread for Rocket City dual-output servo screw. Drill 1/8 dia. holes for Midwest hinges and insert them into wing panel and ailerons, but do not glue hinges in place at this time. Tack glue tip in place. Carefully shape, rough sand, remove and hollow out as required and then install tip permanently. Cut out wheel well. Duplicate procedure for opposite wing panel.

Mount 5/16 sheet dihedral shim rib on the root of one wing panel (grain with chord). Bevel shim as required for correct dihedral. Join other wing panel to dihedral shim. Reinforce center section with six-in. wide fiberglass cloth and Hobbypoxy No. 1 glue. Cut out center section as required for aileron servo, and for retract servo if used. Install servo mount and servo tray; then join aileron pushrods with 1/16 ID brass tubing and solder in place. Bend short length of 1/16 wire as required to attach to pushrod and servo output arm (wrap with soft wire prior to soldering to aileron pushrod). Screw Rocket City double-ended servo output arm into aileron control horn bracket (see side view of aileron on drawing). Place Du-Bro solder link in position so that aileron is in a neutral position. Install wing hold-down dowels. Total aileron travel should be 3/8" up and 3/8"

down. It is best to use rotary output arm servo so that total servo travel can be adjusted.

Cut the sides of the fuselage from Midwest 1/8" matching body sides. Add 1/32 plywood doublers with Hobbypoxy No. 4. Attach 3/16 sq. stringers. Cut bulkheads to shape and install. Insert 1/16 plywood tank floor, cutting out as required for nose gear installation before gluing in place. Fabricate 1/8" sheet rear fuselage top section. Cut to side view and top view shape and then tack glue solid nose, top, and bottom blocks in place. Mark spinner location, oversize 1/16", on front block. Carve and rough sand blocks to shape, then remove them and hollow as required. Install 5/16 square gussets, behind bulkhead No. F8, and 3/32 plywood stabilizer bearing block bracket.

Cut two Chopp nylon motor mounts, or one piece of 3/8 thick nylon, into two identical halves as shown on fuselage top view. Drill 15/64 dia. holes and ream to .250 dia. as shown on plans. The 1/4 dia. brass tube must fit into nylon blocks as perfectly as possible. Drill nylon block mounting holes. Fabricate 1/4" aluminum control horn. Drill and ream pivot rod hole to .250 dia. Main pivot rod as well as 1/8" drive pin must be tight fit into control horn.

Install pivot rod assembly into nylon bearing blocks—main pivot rod must rotate freely in blocks. Make elevator pushrod and attach to control horn. (Use a fiberglass pushrod with 1/16 wire end and solder a small washer for a keeper.) Cut out holes in bulkheads as required for pushrods. Attach control horn/bracket assembly to fuselage using No. 4 sheet metal screws. Add hardwood servo mount rails as required. Temporarily install rudder and elevator servos. Install 3/32 plywood elevator reducer bracket. Attach 3/8 x 1/2" maple bellcrank mounting block and then add Williams Bros. 30 degree bellcrank, as shown, prior to gluing mounting block in place. Attach 1/16 wire to end of stabilizer pushrod. Connect Du-Bro solder link to stabilizer pushrod and attach to reducer bellcrank as shown on plans. Mount Du-Bro KL49 Kwik-Link assembly from elevator servo to reducer bellcrank as shown on plans. Total stabilizer travel as measured at trailing edge root is 1/4" up and 1/4" down. Temporarily install nose gear retract unit on firewall as required, using blind mounting nuts in front of firewall so unit may be easily removed. Add hardwood firewall gussets. Cut away right side of front nose block as required for engine clearance.

The engine is mounted slightly less than 90 degrees, exhaust stack down, so that muffler will just clear against fuselage side. Note that muffler extension will probably be required. With fuselage vertical, nose up, place engine mounted on a metal motor mount on firewall in approximate position. Trim nose block as necessary to fit over engine; with nose block in position install muffler

(continued on page 86)

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No. 0511, Five Wagon—Contest free flight model for ½A, by James Clem. Diagonal-ribbed wing resists warps. **$1.75**

No. 0512, Platypus—Unusual-looking RC aerobatic seaplane, made with balsa-coverted foam blocks. Uses a 60. **$3.00**

No. 0513, Troop Glider and Tug—Two models, one a twin-engine, 19-powered C-46 Profile, the other a scale CG-15 troop carrying WW II glider. Both on one large plan. **$2.75**

No. 0611, Phatom Stunter—Very realistic jet-like model of Blue Angels plane with typical stunt moments and airfoil. For 35-45 engines. **$2.75**

No. 0612, Crusader Stunter—Anhedral wing, ventral fins and full array of missiles and drop tanks. It is a unique but truly competitive flyer on a 35 or 40 engine. **$3.00**

No. 0613, Simple-Fly—Semi-symmetrical CG airfoil low-wing on box fuse. Performance for beginner on 29 or novice contest ship with a 50. **$2.50**

No. 0614, Sopwith Pup—Single or multi-channel, nearly-scale model for 10 to 19 power. Highly detailed plans. Stable flyer. **$3.50**

No. 0615, Santana—Jon Davis' contest-winning towliner A/1. Uses fiberglass boom, stiff wrap-resistant wing. **$2.00**

No. 0711, Phoenix 5—Don Lowe's latest in a series of swept-wing competition stunters for 60 and retracts. **$3.00**

No. C712, Bonanza/Debonair—Build either V-tail or conventional version of this popular fast light plane for full-house radio and a strong 60. Fine-flying ships, foam wing construction. **$5.00**

No. 0713, I.F.O.—Would you believe a FF 020-powered flying saucer which really flies? Built-up construction looks real. **$1.00**

No. 0714, Helldiver—Semi-scale CL model of WW II torpedo bomber builds fast and is rugged. **$1.50**

No. 0811, Douglas Mailplane—Large FF scale of Western Air Lines M-2 bipe. For 09 power. Could fly with light radio. **$3.00**

No. 0812, Hot Canary—Unique Formula II/FAI racing biplane by Bob Sigelkoff. Although unusual-looking, it is fast and quickly built. **$3.25**

No. 0813, Pogo—Model of Owl Racer for Formula I features midwing, low stab, non-cheeked cowl. Very stable and plenty fast. By Bob Morse. **$3.50**

No. 0814, Flying Fortess—Not a scale plane, but a novelty CL flying medieval castel for a 19. **$2.75**

No. 0911, Fletcher—McCullough's magnificent tri-geared, low-wing crop duster scale job for 60's. Generous area and moments. All balsa. Highly-detailed plans on 2 sheets. **$7.50**

No. 0912, Killer—Fast, responsive combat plane. All-balsa for 35's has many wins. **$3.00**

No. 0913, ACE High—Featherweight 049-powered RO glider uses a set of ACE R/C foam taper and constant chord wing sets. **$2.25**

No. 0914, Sakitumi—Highly-developed 40-gram Wakefield plane by Brian Donn features latest trends in gadgets and design. Well-detailed plan. **$3.00**

No. 1011, FAIMan—Competition FAI free flight job for screaming 15's. Simplified construction with warp-preventing wing. Build a winner. **$2.75**

No. 1012, Peregrine—All-out RC slope soaring racer for ailerons and elevator. Balsa fuselage with foam wing. **$3.50**

No. 1013, Hi-Pro—Highly proficient slope/thermal soarer. Build several versions from these plans. Balsa wing and glass fuselage. **$3.50**

No. 1015, Marut—Named for the Wind Spirit. Designed for windy weather CL contests. Large-size jet appearance uses 45 engine. Two sheets. **$4.50**

No. 1111, Longster—Large-size free flight scale ship for 09 power, also ideal as small RC. Construction similar to real plane. **$2.75**

No. 1112, Buster—Built-up profile Goodyear racer well-streamlined and a winner. For hot 15's. **$1.75**

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

No. 1211, Fireball—Jim Walker's great design presented as it was by Bruce Lund. For ignition 23's or smaller on glow. **$2.00**

No. 1212, Brooklyn Dodger—Sal Taibi's great old-timer FF job presented as it was by Bob Harrah. For ignition 23-35 or smaller glow engine. **$1.75**

No. 1213, Canus—Sixty-powered and large-size FAI aerobatic RC plane. Very quick building. **$4.00**

No. 0125, Firecracker—FAI scale RC pylon racer with special fast airfoil and homemade retracts (in text), a winner by Bob Root. **$3.50**

No. 0121, Penguin—Unusual scale CL flying model of post-WWI pre-flight trainer. Simple and RC-able. Uses 19 to 35 engine. 3-views on plan. **$2.50**

No. 0122, Pay-Up—TeeDee 020-powered AMA Pay Load event winner also nice for sport FF. Simple and sturdy. **$1.50**

No. 0123, Nifty Novice—049 thru 15 power for monoplane or biplane Tenderfoot CL trainer. With power, bipe is stuntable. SPECIAL PRICE **$1.00.** decal included.

No. C124, P-38—Semi-scale WWII fighter with single 049 flies rudder-only pulse RC with ACE mini-foam wings, others usable. **$1.25**

No. 0221, Big Flapper—Large high wing is docile flyer for a 60 engine and 4 channels. Nice trainer/sport plane. **$3.50**

No. 0222, BV-170—Three 35's power this sort-of-scale German profile fighter. It is big, pulls hard in flight, stunts too. **$4.75**

No. 0223, Canard Drop-Off—Rubber pusher sport flyer drops its prop and rubber when unwound, then drops a piggy-back glider. All balsa and flies great. **$2.00**

No. 0224, Cardinal—Excellent FAI European-type RC pattern plane of foam/balsa construction. Up-to-date ship if for 60's, suitable for retracts. **$4.50**

No. 0321, Turbo-Pilatus Porter—Fine flying CO2 or Rubber powered FF scale model and scale floats for ROW. All on one plan. **$1.50**

No. 0322, Little Bird—Midwing RC pattern plane handles wide range of power up to 71's, yet is small in size. **$3.50**

No. 0323, Two For the Show—Biplane CL stunt for 049 Tee Dee. This one offers precision flying in small areas, great for practice. **$1.50**

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Total: $

No. 0324, 2T—ACE-foam-winged RC trainer for 049 power carries 2-channel bricks with case. Ample wing area for long glides too. **$2.00**

No. 0421, Quarter Pint—A 020-powered Tenderfoot free flight patterned after an antique design of 30 years ago. With decal. **$2**

No. 0422, RCX4—Bat-like winged sport RC plane for big motors, 4-channels, and crowd pleasing flights. $4.50

No. 0423, Squeeze-Banger—FAI combat anyone? Fast flying 15 ship from Canada is a winner. **$2**

No. 0424, Dragonette—Compact version of Kraft's Dragon Fil uses hot 40 and flies just like a big one—fast and smooth. **$3**

No. 0521, Satellite 1000—Huge and highly-detailed plans for one of FF's most winning designs. For screaming 40's. **$8.50**

No. 0522, Lil' Rebel—Fast and very durable 15 Goodyear CL racer is a consistent winner. **$2.25**

No. 0523, Pegasus—A take-apart RC job designed for transportation in its own box. Full house with a 19, stunts well. **$2.50**

No. 0621, So-Long—miniaturized Old-Timer for 020 power event and sport flying. Easy to make. **$1.50**

No. 0622, Denight Special—Well updated four-year-old Forum I racer by deBolt has many unique features for speed. All balsa construction. Two-sheet plans. **$2.00**

No. 0623, Chance Vought "Skimmer"—U.S. Navy experimental shipboard fighter is real flying saucer. For profile carrier events, by Frank Scott. **$4.50**

No. 0721, Douglas Devastator—Navy Carrier competitor for 40 or 60 of colorful shipboard fighter. A tough plane and a winner. **$3.00**

No. 0722, Wizrod 350—Ron St. Jean's combination of past FF power winners in a 350 sq. in. 049 screamer. **$1.75**

No. 0723, Quickie Mk 4—RC competitor for Class A and B. Conventional looking low winger flies easily, builds very fast. **$2.00**

No. 0821, Capstan—For one- or two-channel RC, a small sport/scale all-balsa glider. Has a fine glide. **$2.00**

No. 0822, Nemesis II—Howard Rush's winning AMA Combat ship. Ultra-light, balsa and silk, very quick. **$2.25**

No. 0823, Apteryx—New style Mylar-over-foam wing on fast, tough, AMA Combat plane by Robert Mellen. Construction offers perfect airfoil and tapered wing. **$2.25**

No. 0824, Ryan SC—Unusual 049 free flight scale model is low winger with excellent flight stability. Flies fast and handles wind easily. **$2.75**

No. 0825, S.S.P. RC Helicopter—Gene Rock's simplified and well-proven design for home builder needs minimum critical machined parts. Features belt-drive, 45-60 engine, gyro stabilized main and tail rotors. Large, highly detailed plan is full-size including sub-assemblies. **$6.00**

No. 0826, Full-size drawings for making special machined parts for Gene Rock's RC Helicopter. Not essential, parts are available from Stock Drive Products, Inc. See article. Parts plan only **$2.00**

THIS MONTH'S PLANS

No. 0921, Hot Pants—Jerry Nelson's large-bodied, realistic-looking, home-built type RC Pattern design. Smooth flyer uses all-moving stab. **$4.00**

No. 0922, Aqua-Vent Floats—Simple curves make these easy to build. Sized for 15 to 30 powered planes. Designed for quick lift-off with low power. **$2.50**

No. 0923, Vertigo—A CL vertical take-off-and-landing biplane. Uses throttled 19 for power. Really flies, lots of fun. **$2.75**

Hot Pants

(continued from page 83)

and spinner backplate. Trim nose block as required; then remove nose block and install right thrust shim washers behind motor mount with contact cement. Accurately locate engine on firewall with cowl, spinner backplate, and muffler installed. Mark mounting holes and attach motor mount with 6-32 socket head screws and large blind nuts. Permanently affix nose cowl. Remove nose gear retract unit. Attach bottom block and cut as required for nose gear installation and operation. Fit wing to fuselage; attach 1/32 plywood wing seat to fuselage. Hold wing seat in place with wing in position. Install bulkhead No. F2A—drill 1/4 dia. holes and fit to wing prior to gluing to fuselage. Wing should be in place while No. F2A is being attached to fuselage. Install 3/8 x 1/2 hardwood wing mounting brackets. With wing properly located on fuselage, drill 3/16 tap drill hole through wing and through mounting brackets. Tap mounting brackets for 3/16 nylon bolts. Drill out holes in wing for 3/16 bolt. Install remaining linkage for motor control, nose gear unit and gas tank. Add top block, cockpit floor and instrument panel. Plank bottom of fuselage. Paint inside of cockpit as required and put canopy in place. (Canopy can be obtained from designer for $3.50 postpaid.)

The fin and rudder are constructed according to drawing. The stabilizer is constructed in a similiar manner as the wing; however, instead of using the wire rod wing jig system, shims are installed under the ribs and spars to correctly position them during assembly. The 1/4 ID aluminum tube is held in place with epoxy (use ample epoxy especially at the root rib). After the sheeting is added, install 1/4 dia. dowel retainer screw bracket on the underside as shown on plans. (The No. 2 x 3/8 long sheet metal screw is a tight fit into the dowel.)

The original model weighed out at eight lb. dry. Using an HP61FR RC and a Pattern King 11-7 propeller, sufficient power is available to perform any maneuver including an extended top hat or vertical four-point rolls. No particular tricks are necessary to do the maneuvers, as the flying of the model is quite straightforward.

Don't Call Her 'Jug'

(continued from page 35)

half the gross weight, but its lines were those of the immediate forerunner of the Thunderbolt.

Troubles within Seversky with the Army's P-35 contract, and some questionable dealings with the Japanese for 22 two-seat dive bombers, led to the reorganization of the firm into Republic Aviation in 1939. But development of the basic airplane continued. The final production P-35 was modified with inward-retracting landing gear instead of its straight-back, semi-retracted style, and a supercharged P&W engine rated at 1200 hp in place of the 950 hp model. This was the XP-41, and led directly to the P-43 Lancer, of which more than 250 were built just before the U.S. entered the war. Each new version looked a little more like what was soon to appear as the P-47.

That historic event occurred in May 1941. The machine dwarfed anything previously called a single-engine fighter plane. It had several feet more length and wingspan, and weighed 4000 lb. more than anything else in its class. But it was amazingly clean for such a complicated airplane, and its cleverly supercharged 2000 hp P&W R-2800 engine drove it at no less than 412 mph. That was 100 mph faster than the Army's standard P-36 pursuit, and 50 mph more than the new P-40 could achieve.

But speed wasn't everything. This

Looking out over the nose in taxiing position, the open cowl flaps and huge four-blade fan hold the eye. The pilot was a busy guy.

was the time when maneuverability was rated so high, for while the era of the jaunty little biplane had ended, airmen still thought in such terms. The main fighters of the time—Hurricane, Bf-109, Spittire, Oscar, Zero—were lightly loaded and hence quick to turn and dart. The hefty Thunderbolt was an entirely different breed, relying on out-

WHAI—Bob Beckman

(continued from page 43)

pattern contest, but you can't learn to race cars by yourself. Add just one other car on the track dicing with you in the turns and the fun and excitment start.

Sportsmanship: All branches of our model building hobby/sport develop and depend on good sportsmanship. A Novice entrant at the Tyson's Corner Series 72 East meet provided a good example. He had run well enough in the qualifying heats to be on the starting line for the 35-lap Novice Main Event. After four or five laps, however, he pulled his car into the pits, left the drivers' area, and turned his transmitter into impound.

The reason? He had found that the combination of his skill level and the setup of his car made him considerably slower in the turns than the other cars. He felt that his car was a hazard on the track and that it was unfair to the other drivers for him to continue. He already had some ideas on how to fix the car, and he knew that he needed more practice, but that wasn't the time or place for either. That novice was Elliott Rabin of Bayside, New York, and I predict he'll be right in there with the experts before long.

Parts and Things: In the June issue I made a plea for people with car parts to send me their catalogs. The first and only response as yet wasn't even from an RC car supplier. Herb Arum of Stock Drive Products called me and sent a catalog and other info. SDP has a wide variety of items useful in our cars and often hard to get. What's even more important, they sell things in small quantities at reasonable prices. They have gears, shafts (for axles), bearings, timing belts and pulleys, metal and plastic screws, nuts, and washers, etc., etc.

They also have an adhesive called Permabond that may have some interesting applications in our cars. I'm making some tests with it and will report the results. To get their catalog, send $1.49, which is returned on your first order, to Stock Drive Products, 55 South Denton Ave., New Hyde Park, N.Y. 11040.

I Told You So Dept.: I have often commented that there is useful information to be found in any branch of modeling. The May issue of AAM is a case in point. The CL column by Bill Boss has a description of a device that was obviously designed for laying out RC race car tracks. Take a look.

New Shapes Coming: Took time off from writing this to watch the Trenton 200 on TV April 24. The Trenton races are particularly interesting to me because the track does have one right turn in it; but the really striking thing was the tremendous change in the appearance of the cars in just the last two or three years. Scale models of some of the cars running today would have been called "thingies" last year. It's questionable that a scale midbody V-wing will have much effect on 1/8 scale cars, but there is no doubt that someone will try. It will be interesting to see what this year's Can-Am cars look like.

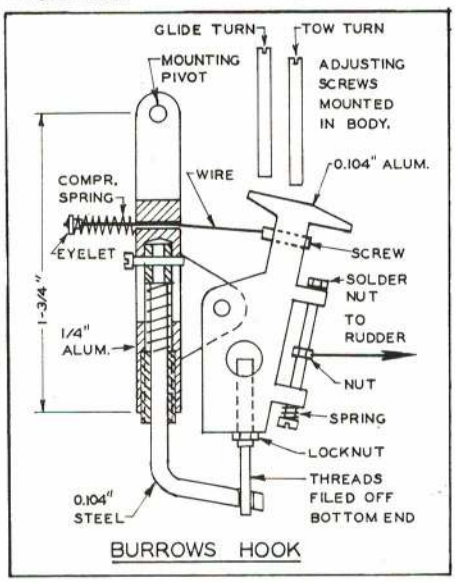
There have been some comments that the 1972 ROAR rules might encourage some manufacturers to start making thingy bodies. It looks like there should be more concern over the thingies the real car makers are coming up with.

WHAI—Bob Hatschek

(continued from page 46)

The Burrows Hook: Extremely similar in basic concept is the tow hook designed by New Zealander Gary Burrows (see drawing). If the functioning of Markov's hook still eludes you (and the above description is necessarily brief), study the drawing of the Burrows hook. Though its details appear quite different, the function of the Burrows hook is identical to the Markov hook with but one important exception: the zoom rudder position is achieved by the release of the latch, rather than by the vertical motion of the hook proper. Burrows' reason for this is to avoid a partial offset due to partial travel as a result of high line tension in strong winds.

Straight-tow, circle-tow, and glide settings are adjusted in basically the same way as with the Markov hook. Zoom-rudder setting is adjusted by the position of the nut to which the rudder cable is attached (this cable being 0.012" control-line wire). And unlatching tension of approximately 4½ lb. is adjusted by varying the length of the threaded latchpin, made of a long, slender machine screw. Details of this hook were obtained from *Free Flight News*.



The Herzberg Hook: Another derivative of the Markov hook is the one designed and built by Giora Herzberg. This hook is considerably simpler to build than the Russian versions or

(Continued on page 104)

standing diving ability and the terrific firepower of eight .50 cal. machine guns.

Production began early in 1942, the first P-47B was delivered to the AAF later that year, and the first few got to combat outfits in November. Those first "razorback" models showed the signs of growth that have become so common today: gross weight was up almost 10% over the prototype, though careful re-engineering had raised the top speed at altitude to almost 430 mph.

After fewer than 200 P-47Bs had been built, the P-47C appeared, with a foot-longer fuselage, and provisions for a 200-gal. drop tank needed to increase its range for long-distance escort missions deep into the heart of Occupied Europe. Again the gross weight was up by 10%, this time to almost 15,000 lb., fully loaded. But the Thunderbolt was doing its job, and no amount of wisecracks could change that.

Next came the P-47D, and the airplane graduated to the status of a standard type in the arsenal of the USAAF. Maximum power was boosted to 2300 hp, and maximum speed to 433 mph. Not only did the P-47 make an increasingly destructive impression on the German fighters which came up to challenge it, but the big fighter moved into the Pacific Theater of Operations, where the contrast to the flimsy little Japanese fighters was even more pronounced: it weighed three times as much as the Mitsubishi Zero!

Until late 1942, all Thunderbolts had been the "razorback" type, with a slim turtledeck reaching back from the canopy to the vertical fin. After 4000 D-models had been built this way, Republic decided to improve pilot visibility by switching to a bubble canopy. One from a Hawker Typhoon had been tested on a P-47, and the improvement was considered more than worth the slight loss in top speed. From the P-47D-25 onwards, all had this quite different appearance, and from the D-27, a dorsal fin was added to recover the stability lost when the rear fuselage was cut down. More than 8500 D-models were built this way, as were all that followed.

As each new version of the Thunderbolt appeared, it showed the ability to carry greater armament. Combat experience indicated that the best use for the big bird was in low-altitude support of ground forces and fighter-bomber attacks on fixed installations such as airfields and, in Europe, V-weapon launching sites. As much as 2500 lb. of bombs and rockets could be carried; with the deadly spray from eight machine guns, this made for a very potent weapon.

Among the most interesting episodes in the career of the Thunderbolts was the effort to radically increase its already imposing speed. Two early-model P-47Ds were given experimental 2500 hp Chrysler V-16 engines, and were able to reach 490 mph. A third test machine

was fitted with a special P&W R-2800 engine and a very tight cowling, and was good for 504 mph. This speed was turned at high altitude and not under formal record-setting conditions, and so remains completely unofficial. But it is the highest speed ever claimed for a piston-engined airplane.

As the war wound toward its close, there appeared on the production lines the P-47M. A larger supercharger boosted high-altitude power to 2800 hp, and enabled the type to reach 470 mph in its pursuit of German V-1 buzz bombs. The final version of the Thunderbolt was the long-range, clipped-tip P-47N, built especially for operations in the Pacific, where distances between islands were a problem to earlier versions.

Yet another page in the story was planned, but never written. The P-72 was to have been a 490 mph buzz-bomb chaser, and two prototypes were built with the 3400 hp P&W Wasp Major engine; one even had contra-rotating propellers. But the jets made it obsolete before production could be started.

Of the 15,676 Thunderbolts built, few have survived. As the pilots who flew them were quickly sent home to civilian life after the war, the remaining supply of airplanes disappeared. A few were sold or donated to small Latin American air forces, and a few were still in service until the late 1960s. One was bought by round-the-world flier Bill Odom, who would have raced it in the 1948 Bendix Transcontinental Race except for a bad fuel leak at the last minute. This airplane quite possibly was one of the three souped-up YP-47Ms, and much of it is at the Victory Air Museum in Mundelein, Illinois.

At least ten others are known to exist. Perhaps the only flying P-47s are several owned by the Confederate Air Force, which are late D-models. Others include USAF-owned late-Ds at Kelly AFB, Texas, the Air Force Academy and in Lebanon, Pennsylvania; and a razorback-D at the USAF Museum in Dayton, Ohio. The National Air & Space Museum in Washington, D.C. has a late D, as does the Musee de l'Air in Paris.

Not much to show for such an important airplane. But it remains in the memories of a lot of guys who fought in them. . .and others who fought against them.

Specifications: (P-47D-25)

Dimensions:
Length—36' 1"
Wingspan—40' 9"
Height—14' 2"
Wing Area—300 sq. ft.
Empty Weight—10,700 lb.
Gross Weight—17,500 lb.

Performance:
Top Speed—429 mph at 30,000'
Initial Rate of Climb—2780 ft./min.
Service Ceiling—40,000'

Versions and Variants

XP-47—lightweight fighter with Allison V-12 engine; never built.

XP-47A—stripped XP-47; never built.

XP-47B—prototype, first flew May 6, 1941.

P-47B—171 built in 1942.

P-47C—longer P-47B with 200-gal. drop tank; 602 built in 1942-43.

P-47D—12,602 built in 1942-44; most had bubble canopy.

XP-47E—last P-47B tested with pressurized cabin.

XP-47F—P-47B tested with laminar-flow wings.

P-47G—354 built in 1942 by Curtiss-Wright; same as P-47D.

XP-47H—two P-47Ds with Chrysler XIV-2220 engine; 3 ft. longer.

XP-47J—P-47D with R-2800-57(C); flew Nov. 26, 1943.

XP-47K—P-47D tested with bubble canopy.

XP-47L—P-47D tested with increased internal fuel.

YP-47M—three P-47Ds with R-2800-57(C), improved supercharger.

P-47M—130 built in 1944.

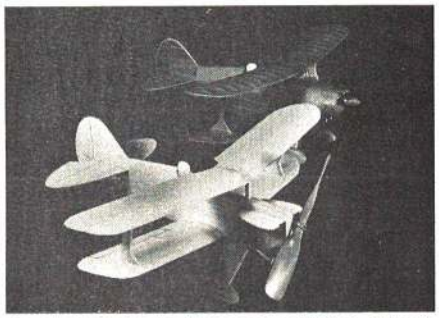
XP-47N—second YP-47M with new wing; flew Sept. 1944.

P-47N-1816 built for Pacific operations with 1200 gals. fuel, R-2800-77.

Profile Peanut Pitts Special

(continued from page 56)

Weighing the effort-to-satisfaction ratio, I would say the Peanut Profile Pitts Special wins hands down over the admittedly more elegant flying scale replica.



So what if the built-up scale version is more elegant—the profile model is more fun. Note cut-down prop gives lots of blade area in small diameter.

Since I found such joy in this alteration of the Peanut Scale concept, I wanted to see how others would take to it, so I took the time to make these plans. Actually, there is another reason for drawing the plans. It occurred to me that using the general system of simple construction I've shown here, almost *any* full-size flying machine can be rendered unto the "Peanut Profile" size. Who will be the first with a Peanut Profile Spitfire? Or FW-190?

And should such models become a competition item, it is easy to see that the general construction dilutes the need for detailed scale authenticity and there is a basic uniform flyability inherent in such designs. Since profile models can be built quickly, it is a natural for small club activity.

Build yourself a flying armada and send snapshots of your air force to **American Aircraft Modeler**. Anything as fun as this should be shared with others!

On The Scene

(continued from page 16)

The 12 Meter boats are six ft. long and weigh about 40 lb. Bob DeBow was the winner of this six-boat fleet which made his trip from San Diego a success. These six were also all on different frequencies, so again all six entries were able to race in all six heats. Bob only beat Don Prough by half of one point—you can see how close the races were.

The Santa Barbara One Design was the big event of the weekend with 18 entries. Would you believe that out of those 18 entries five were women? You don't see that kind of a percentage in too many model airplane meets and they are hard to beat. Joyce Protheroe only tied me but all of the rest of them beat this tired old writer! This "Women's Lib" thing is getting out of hand!

Another RC Pylon racer won this event. Yep, Bob Francis beat out Tom Protheroe by 3/4 of a point to win it. Dave McClure was seven points back of Tom for the third spot to give you some

idea how well the top boys were doing. The Santa Barbara Class was run off in six boat heats and six rounds of races. Scoring is done by giving the winner of a heat 3/4 of a point and all others being given the points indicated by their finish, i.e., second gets two points, third, three points, etc. After all that racing there wasn't a tie until you got down to the eleventh spot, with Fran Robins and Evelyn Montague having that honor(?). Thats all right—I was tied for 14th.

Model sailboating has been around for years but it took the formation of the American Model Yachting Association last fall to really get the ball rolling in radio control. Model yachts can only be sailed on the 27 mgh and 6 meter bands, so frequency change radios are quite popular with the participants of this sport. It also isn't uncommon to find a model boat skipper on 27.255 mgh and nobody in his right mind would try to use this one to fly a model airplane. The only thing you need to sail these boats is a little wind and a pond that is just over a foot deep. Why don't you give it a try? I think you will like it.

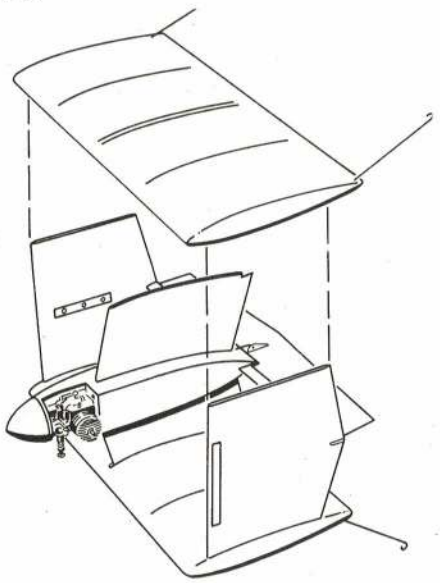
Vertigo

(continued from page 62)

had to be made. A few degrees forward rotation from the vertical gave a horizontal thrust component sufficient to start moving the model around the circle. As the speed increased, the angle of attack was reduced, and wing lift began to supplement the upward thrust component. About half a lap was required to reach normal flight, although this distance could be extended at will.

Landing was the reverse of the take-off procedure. Closing the throttle slowed the model, and to maintain height, the angle of attack was increased. As the nose came up, the drag was overcome by application of extra power, until the model was once again hanging on its propeller. A slow descent could then be made on the throttle, quick blips being easier than trying to balance the thrust against the weight. It was the touchdown which caused the biggest problem. As mentioned earlier, the model leaned out of the circle and could not be set down squarely. When contact was made with the ground, the natural reaction of the pilot was to let the lines go slack to allow the model to land securely. This, of course, allowed

While the completed model is not scale of anything real, there are some real prop-driven experimental designs which could be built like this.



ASSEMBLE MODEL AFTER COVERING

the throttle to open, and off we went again. On the few occasions when the throttle was kept closed, there was still enough thrust to form a ground cushion and the model tended to skate about like a hovercraft.

The original model was becoming slightly the worse for wear, so the opportunity was taken to carry out extensive modifications. The wings were removed and the center wing supports cut to give swept fins. A hardwood spar was slipped through the fuselage, fortunately without fouling the control mechanism, and a slightly swept wing was built around it, using the original tailplane as the trailing edge.

Tip weight was added to the outboard wing, and long wire supports trailed back from the extremities of the flying surfaces. Heavyweight tissue was again used for covering. The weight came out at 16 oz., and, as previous flights had shown the engine thrust to be a little in excess of 22 oz., prospects looked good.

Flight tests confirmed this optimism by showing the model to be capable of a good vertical acceleration. It was obvious, though, that the model was excessively nose heavy, so wheels were added to the landing legs to move the center of gravity rearwards. This improved the handling of the model without adding unduly to the weight.

This second model, however, suffered two major disadvantages. In the re-build from the original the control

leadout lines had been swept back, and because of the geometry of the bellcrank system, the throttle movement had become restricted. Also, the relatively high idling speed of the diesel was now further increased, and due to the lighter structure of the model, the residual thrust at the fully throttled positon was only marginally below the weight of the model, making descent a long and difficult process.

The interest that had been aroused by these models prompted the re-design of Vertigo I, incorporating the features thought necessary for complete success. The spring-loaded throttle mechanism was discarded, and a balanced system introduced as in Carrier models. A modern engine was obtained for better throttle response (an O.S. Max 19 RC), and the tissue covering of the wings was replaced by "Solarfilm."

The final weight of this model is 21 oz., which is just about right for the motor.

Construction

The first unit to build is the engine bearer control mechanism assembly. The balanced bellcrank system is supported from one bearer, and must be completely free in operation. With the fuselage formers in place and the engine bolted in position, the throttle link can be accurately positioned. Before adding the fuselage sides, glue in the center fin, cutting away the center to clear the control mechanism. Then add the sides, and when dry, the tailplane and elevator. Position the fuel tank as far forward as possible, so it does not foul the control mechanism.

The wings are very simple, an identical pair being required. Make sure that the tip skids are firmly secured in place—they will have to absorb a fair amount of punishment.

When you have made all the components, try fitting them all together and make sure the model is perfectly symmetrical and square. You are now

Introducing New Silk-Spun Coverite

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ready to cover the model, remembering to keep the weight as low as possible by refraining from adding your favorite psychedelic patterns. When ironing on the wing covering, do not completely shrink the film before cutting out the slots for the center fins and endplates, otherwise the ribs will bend. The film must be firmly affixed to the ribs next to the slots.

Glue all the structure together, and when dry, the wing covering can be finally shrunk tight.

Check the balance of the model and if any adjustment is required, add weight only at the extremeties—either in the spinner or at the end of the tip skids.

You are now ready for your first flights. Connect up your lines (not more than 30 feet initially) and check, with the motor running, that the throttle works smoothly over its full range. If you can fly over grass it is wiser to try a normal flight from a hand launch first to give you the feel of the model. This will also show you whether the balance is correct. If everything is satisfactory, bring the model to a nose high position, maintaining height by use of the throttle. With increased confidence you will progress to a point where the model is pointing straight up, and from where you can translate back to horizontal flight. When you have done this successfully several times, you are ready for touch and go landings, only a short step away from VTOL. A word of warning: there is only a limited fuel capacity, so keep your flights short. Power-off landings are not recommended, especially from the hover.

If you think you can fly anything control line, then try this!

AMA Contest Calender

(continued from page 64)

Md. 20770. Sponsor: Sky Lancers of Washington, D.C.

AUG. 27—MIDLAND, TEX. (AA) Flying Chaparrals Annual CL Meet. Site: Midland Air Park. F. Morgan CD, 4613 Thomason Dr., Midland, Tex. 79701.

AUG. 27—MINNEAPOLIS, MINN. (AA) Minneapolis Piston Poppers Fall CL Meet. Site: N. Hennepin Jr. College. J. Welliver CD, 7525 N. 29th Pl., Minneapolis, Minn. 55428. Sponsor: Minneapolis Piston Poppers.

SEPT. 2-3—ST. PAUL, MINN. (A) 1st Annual RC Pylon & Scale Meet. Site: University Airport. D. Brueshaber CD, 6925 Newton Ave., N., St. Paul, Minn. 55430. Sponsor: St. Paul Radio Controllers.

SEPT. 2-3—MEMPHIS, TENN. (AA) Annual Memphis RC Meet. Site: Club Flying Site. R. Roberts CD, 2769 McCulley St., Bartlett, Tenn. 38005. Sponsor: Memphis Radio Control Club.

SEPT. 2-3—CHATTANOOGA, TENN. (A) TVRC RC Meet. Site: Chattanooga. J. Wyatt CD, 502 Young Ave., Chattanooga, Tenn. 37405. Sponsor: TVRC.

SEPT. 2-3—ANDERSON, IND. (AA) Madison County RC Contest. Site: Anderson Airport. D. Huffman CD, RR No. 3, Box 350B, Elwood, Ind. 46036. Sponsor: Madison County RC Flyers.

SEPT. 2-3—E. GRANBY, CONN. (A) Nor'East RC Air Races '72. Site: Peterson Farms. B. Williams CD, 347 Southwick Rd., Westfield, Mass. 01085. Sponsor: Northern Conn. RC Club.

SEPT. 2-3—SALT LAKE CITY, UTAH (AA) "Lucky 13th" Annual FF (Cat. I) & CL Model Air Show. Site: Saltair Model Port. F. Haslam CD, 3731 S. 5450 West, Salt Lake

City, Utah 84120. Sponsor: Utah State Aeromodelers, Inc.

SEPT. 2-4—MONROE, N.C. (AA) MR/CC RC Air Races III. Site: Monroe RC Club. V. Helms CD, 800 Tyvola Rd., Charlotte, N.C. 28210. Sponsor: Monroe RC Club.

SEPT. 2-4—ANNVILLE, PENNA. KRCS Labor Day Invitational Fly for Fun. Site: Indiantown Gap. W. Maidl CD, 5 Berkely Dr., Middletown, Penna. 17057. Sponsor: Keystone Radio Control Society, Inc.

SEPT. 3—LEXINGTON, KY. (AAA) Mid-America CL Championships. Site: Kearney Field. S. Harding CD, 3544 Camelot Rd., Lexington, Ky. 40503. Sponsor: Lexington Model Airplane Club.

SEPT. 3—CHICAGO, ILL. (AA) IIAA Annual CL Meet. Site: Cumberland & Irving Park. M. Booker CD, 15711 Dixie Hwy., Harvey, Ill. 60426.

SEPT. 3—PARKERSBURG, W. VA. (A) Vienna Skysharks Annual RC Contest. Site: Pettyville RC Field. S. Sturm CD, Box 5234, Vienna, W. Va. 26101. Sponsor: Vienna Skysharks Model Airplane Club, Inc.

SEPT. 3—TAFT, CALIF. (A) W.F.F.A. Annual FF Meet. Site: Taft. C.W. Bogart CD, 469 Paulette Pl., LaCanada, Calif. 91011. Sponsor: Southern California Aero Team.

SEPT. 3—BRIGHTON, WISC. (AA) 12th Annual Illinois Model Aero Club Invitational FAI FF Contest. Site: Bong Field. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: Illinois Model Aero Club.

SEPT. 3—LAKEHURST, N.A.S., N.J. Annual Burlington County RC Club Fun-Fly. Site: U.S. Naval Air Station. H. Clark CD, 1130 Monmouth Rd., Mt. Holly, N.J. 08060. Sponsor: Burlington County RC Club.

SEPT. 4—MIDDLESEX, N.J. (AA) Middlesex Modelers 4th Annual CL Contest. Site: Mountain View Park. C. Myers, Jr. CD, Box 127 Lower Kingstown Rd., Pittstown, N.J. 08867. Sponsor: Middlesex Modelers, Inc.

SEPT. 4—SALEM, OHIO RC Short Circuits Club Annual RC Fun-Fly. Site: Quaker City Drag Strip. J. Marshall CD, RD No. 4, Lisbon, Ohio 44432. Sponsor: RC Short Circuits Club.

SEPT. 9-10—DAYTON, OHIO (AAA) Dayton Buzzin' Buzzards CL Jamboree. Site: Municipal Flying Circles. J. Martin CD, 551 Aberdeen, Dayton, Ohio 45419. Sponsor: Dayton Buzzin' Buzzards.

SEPT. 9-10—ST. JOSEPH, MICH. (AA) Whirlwind 3rd Annual RC Meet. Site: Whirlwind Alt. Field. C. Ellis CD, 3383 Valley View Dr., St. Joseph, Mich. 49085. Sponsor: Whirlwinds of Southwestern Michigan, Inc.

SEPT. 9-10—TAFT, CALIF. (AA) Thunderbugs 26th Annual FF Meet (Cat. I). Site: Taft. E. Kelley CD, 4202 W. 172nd St., Torrance, Calif. 90504. Sponsor: Thunderbugs Model Airplane Club.

SEPT. 9-10—FT. WAYNE, IND. (AA) 19th Annual Mid-States RC Contest. Site: Smith Field Airport. P. Gieseking CD, 1212 Delta Blvd., Ft. Wayne, Ind. 46805. Sponsor: Fort Wayne Flying Circuits, Inc.

SEPT. 9-10—RHINEBECK, N.Y. (A) World War I RC Jamboree. Site: Olde Rhinebeck Aerodome. G. Bickel CD, Rt. No. 52, Hopewell Jct., N.Y. 12533. Sponsor: Mid-Hudson Radio Control Society, Inc.

SEPT. 9-10—AMARILLO, TEX. (AA) ARKS 12th Annual RC Contest. Site: Amarillo. B. Irwin CD, 3302 Lewis Ln., Amarillo, Tex. 79109. Sponsor: Amarillo Radio Kontrol Society.

SEPT. 10—MIAMI, FLA. (A) Florida Miniature RC Pylon Races. Site: Miami. W. Schoonard CD, 2080 Sharon Dr., Winter Park, Fla. 32789. Sponsor: R.C.A.C.F.

SEPT. 10—COUNCIL BLUFFS, IOWA (A) Cobras RC Pylon Meet. Site: Cobra Field. P. Edmunds CD, 4729 Easkine, Apt. 4, Omaha, Neb. 78100. Sponsor: Cobras Radio Control Club.

SEPT. 10—ALEDO, ILL. (A) 1st Annual Pylon Races (NMPRA). Site: Mercer County Airport. H. Pohlmann CD, 720 S. Ohio Ave., Davenport, Iowa 52802. Sponsor: Davenport RC Society.

SEPT. 10—LIVINGSTON, N.J. (AA) Livingston Flying Tigers CL Air Meet. Site: G-V Controls-Okner Pkwy. C. Schaefer CD, 109 Madison Ave., Fanwood, N.J. 07023.

SEPT. 10—ODESSA, TEX. Odessa Semi-Annual RC Fun-Fly. Site: Odessa RC Field. J. Davis CD, 3633 Adams, Odessa, Tex. 79660. Sponsor: Odessa Prop Busters RC Club.

SEPT. 10—FT. LEE, VA. (A) Mid-Virginia RC Scale Meet. Site: Ft. Lee Airstrip. F. Gregg CD, 12709 Richmond St., Chester, Va. 23831. Sponsor: Mid-Virginia RC.

SEPT. 10—WARSAW, IND. (A) 3rd Annual RC Fun-Fly. Site: Warsaw. J. Kay CD, 903 E. Canal, Winona Lake, Ind. 46590. Sponsor: Warsaw Aero Modelers.

SEPT. 10—RIVERSIDE, ILL. (AA) Chicago Scalemasters 4th All-Scale FF, CL & RC Rally. Site: Miller Meadow. D. Platt CD, 104 Talcott Ct., Bolingbrook, Ill. 60439. Sponsor: Chicago Scalemasters.

SEPT. 10—BRIGHTON, WISC. (AA) 29th Annual Midwestern States FF Championships. Site: Bong Field. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: Chicago Aeronuts.

SEPT. 16-17—BOSSIER CITY, LA. (AA) SHARKS Annual RC Meet. Site: Sharks International. J. Monk CD, 574 Janet Ln., Shreveport, La. 71106.

SEPT. 16-17—S. EL MONTE, CALIF. Air Circus. Site: S. El Monte. J. Garabidian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: San Gabriel Valley RC Club.

SEPT. 16-17—MORGAN HILL, CALIF. (A) "Western Front" WWI Model Aircraft RC Jamboree. Site: Hill Country Air Museum. M. Groves CD, 791 Nisqually Dr., Sunnyvale, Calif. 94087. Sponsor: Pioneer RC Club.

SEPT. 16-17—TUCSON, ARIZ. (AA) Cholla Choppers Fall CL Invitational. Site: Rodeo Park. F. Townsend CD, 2751 N. Campbell Ave., Tucson, Ariz. 85719. Sponsor: Cholla Choppers.

SEPT. 17—ROCHESTER, N.Y. (AA) United Pylon Racing Circuit RC Meet. Site: Rochester. R. Walder CD, 129 Westmoreland, Rochester, N.Y. 14620. Sponsor: RC Club of Rochester.

SEPT. 17—URBANA, ILL. (A) Midwest All-Stunt CL Meet. Site: Illini Airport. J. Fasimpaur CD, 310 E. Benham St., Tolono, Ill. 61880. Sponsor: Champaign-Urbana "Aeronuts."

SEPT. 17—COLUMBUS, OHIO (A) 3rd Annual CORKS RC Meet. Site: CORKS Field. B. Lutz CD, 118 Miller Ave., New Albany, Ohio 43054. Sponsor: Central Ohio RK Society.

SEPT. 17—OHIO CITY, OHIO SHOO Flyers Fly-for-Fun. Site: Club Field. J. Acheson CD, P.O. Box 181, Willshire, Ohio 45898. Sponsor: SHOO Flyers M.A.C., Inc.

SEPT. 17—BLAINE, MINN. (A) Minneapolis Model Aero Club 12th Annual LittleFF (Cat. II) Internats. Site: Hentges Sod Farm. D. Monson CD, 131 W. Wentworth, W., St. Paul, Minn. 55118. Sponsor: Minneapolis Model Aero Club.

SEPT. 17—NEW YORK, N.Y. (AA) Assoc. M.A.C. of Greater N.Y. 12th Annual CL Meet. Site: Flushing Meadow Park. W. Boss CD, 77-06 269th St., New Hyde Park, N.Y. 11040.

SEPT. 17—COUNCIL BLUFFS, IOWA (AA) Cobras Pattern RC Meet. Site: Cobras Field. J. Simpson CD, 2736 Ellsworth, Omaha, Neb. 68123. Sponsor: Cobras RC Club.

SEPT. 17—ALBANY, ORE. (A) Northwest Old Timers Championships. Site: Parker Field. J. Shafer CD, P. O. Box 322, Dallas, Ore. 97338. Sponsor: Willamette Modelers Club, Inc.

SEPT. 17—EAST MEADOW, N.Y. (AA) L.I.D.S. Invitational RC Contest. Site: Mitchel Field. T. Feicco CD, 3989 Florence Rd., Seaford, N.Y. 11783. Sponsor: Long Island Drone Society.

SEPT. 17—COLLEGE PARK, MD. (A) Summer Stunt CL Meet. Site: Paint Branch Flying Field. R. Greene CD, 5902 Cherrywood Terr., No. 101, Greenbelt, Md. 20770. Sponsor: Sky Lancers of Washington, D.C.

SEPT. 17—WESTFIELD, IND. (A) Hamilton County Fly-for-Fun. Site: Westfield. H. Vandiver CD, 28 Wilson Dr., Carmel, Ind. 46032. Sponsor: Hamilton County Flying Modelers.

SEPT. 17—FT. WORTH, TEX. (A) RC Pylon Formula I Meet. Site: Ft. Worth. G. Ware CD, 609 S. Lake, Ft. Worth, Tex. 76104. Sponsor: Fort Worth Thunderbirds.

SEPT. 17—WICHITA, KANS. (AA) 6th

Annual Wichihawks Fally FF & CL Rally. Site: Beech Field. L. Woolard CD, 1558 N. Battlin, Wichita, Kans. 07208. Sponsor: Whichihawks.

SEPT. 17—LAKEHURST, N.J. (A) Ocean County Fledgling RC Fly-Off. Site: Lakehurst N.A.S. J. Birgel CD, 229 VanSant Ave., Island Hts., N.J. 08732.

SEPT. 23-24—DENVER, COLO. (AA) 7th Annual Great West Rocky Mountain FF (Cat. II) Championships. Site: E. Colfax Air Park. E. Collins CD, 4318 E. Utah Pl., Denver, Colo. 80222. Sponsor: Magnificent Mountain Men.

SEPT. 23-24—MEMPHIS, TENN. (AA) Memphis Prop Busters Annual Control Meet. Site: McKellar Park. T. Cimino CD, 981 June Rd., Memphis, Tenn. 38117.

SEPT. 23-24—HUNTSVILLE, ALA. RC Masters '72. Site: Old HSVL Airport. C. Scholefield CD, 2709 Briarwood Dr., Huntsville, Ala. 35801. Sponsor: Rocket City Radio Controllers, Inc.

SEPT. 23-24—FRESNO, CALIF. (AA) Fresno's 32nd FF (Cat. I) Annual Meet. Site: Near Kerman. F. Ginder, Jr. CD, 5740 E. Ashaland, Fresno, Calif. 93727. Sponsor: Fresno Gas Model Club.

SEPT. 23-24—TRACY, CALIF. (A) Western States RC Pylon Championships. Site: Municipal Airport. R. Morse CD, 3351 Pruneridge Ave., Santa Clara, Calif. 95051. Sponsor: Pioneer RC Club.

SEPT. 23—24—KNOXVILLE, TENN. E.T.R.C. Fun-Fly. Site: Knoxville. R. Rhyne, Sr. CD, Route 4, Clinton, Tenn. 37716. Sponsor: East Tenn. RC Society.

SEPT. 24—ROWLEY, MASS. 1972 Cape Ann Fly-for-Fun. Site: Cape Ann RC Field. R. Gaerttner CD, 9 Brookbridge Rd., Peabody, Mass. 01960. Sponsor: Cape Ann RC Model Club.

SEPT. 24—E. BERLIN, PENNA. YARC 2nd Annual RC Fun-Fly. Site: YARC Field. K. Reber CD, Mounted Route, Mt. Holly Springs, Penna. 17065. Sponsor: York Area RC Club.

SEPT. 24—QUEENS, N.Y. (A) Cash Bash Forest Park CL Meet. Site: Flushing Meadow Park. R. Sobrino CD, 87-26 88th St., Woodhaven, N.Y. 11421.

SEPT. 24—ROCKAWAY, N.Y. (A) 1972 East Coast RC Scale Championships. Site: Riis Park. J. D'Amico CD, 9224 Rost Pl., Brooklyn, N.Y. 11236. Sponsor: Pennsylvania Avenue RC Society of N.Y.

SEPT. 24—BRIDGEWATER, MASS. Fun-Fly. Site: Bridgewater. S. Rizzoto CD, 30 N. Lillian St., Randolph, Mass. 02368. Sponsor: South Shore RC Club.

SEPT. 24—BRIGHTON, WISC. (AA) 10th Annual Chicago Aeronuts Fall Old Timers' FF (Cat. II) Contest. Site: Bong Field. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: Chicago Aeronuts.

SEPT. 30-OCT. 1—E. GRANBY, CONN. (AA) N.C.R.C.C. Annual RC Pattern Meet. Site: E. Granby. G. Sawn CD, 6 Audrey Ln., Enfield, Conn. 06082. Sponsor: Northern Connecticut RC Club.

SEPT. 30-OCT. 1—ELMIRA, N.Y. (A) National RC Soaring Contest. Site: Harris Hill. R. Miller CD, 22 Kings Cir., Corning, N.Y. 14830. Sponsor: The Flying Sparks, Inc.

SEPT. 30-OCT. 1—JAMESTOWN, N.Y. (AA) United Pylon Racing Circuit RC Championships. Site: Hartfield. W. Johnson CD, 153 Hallock St., Jamestown, N.Y. 14701.

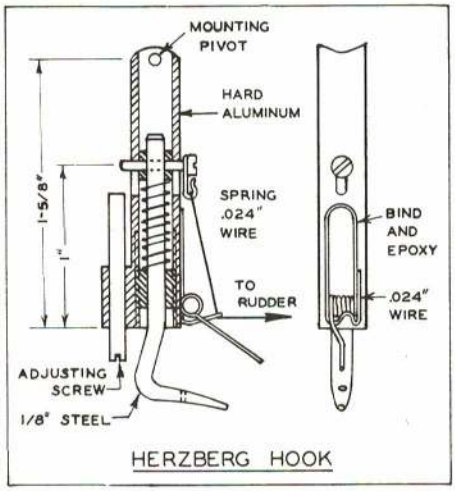
SEPT. 30-OCT. 1—MONROE, N.C. (AA) N. Carolina State RC Meet. Site: Monroe. D. Pearce CD, 1005 Ainsworth Ct., Greensboro, N.C. 27410.

WHAI—Bob Hatschek

(continued from page 89)

the New Zealand adaptation. This simplification has been achieved by returning some of the stop positions to the rudder itself. A forward stop for the hook is still required and zoom rudder position is established in the same manner as on the Markov hook. Unlatching tension, also set at about 4½ lb. maximum, is adjusted in the same manner as on the Markov mechanism.

How, then, does Herzberg achieve the other two rudder positions for circle-tow and glide turn? Simple enough: He uses a two-position stop against the rudder horn. The two-position mechanism is a spring-loaded bolt mounted lengthwise on the body, which is free to slide fore and aft in a tube. A nut on the front and one on the back provide the settings, and a typical autorudder release mechanism allows this stop to move to glide position when the towline comes off.



HERZBERG HOOK

Getting Started in RC

(continued from page 12)

are the servo gears; then come the batteries and the cases. Electronic component vulnerability is being reduced by extensive use of Integrated Circuits which include as many as 100 discrete components in a single chip. At one time potting (pouring goo around the components) was in vogue, but this has the disadvantage of making repair or replacement of failed components virtually impossible. Proper shock mounting and padding in accordance with the manufacturer's instructions will reduce system vulnerability. System reliability is determined by "whether it works when it's suppose to." Some assurance of dependability can be gained by a knowledge of the manufacturer's past performance—whether or not he's had a high incidence of early system failures, whether or not he uses a "burn-in" (runs the units for some period of time before final checkout and shipment), whether he used high quality components. One of the lowest reliability items is the nickel cadmium cells used in the batteries. This is generally beyond the control of the manufacturer. Use of a "three-wire" system (that is, one lead for battery negative, one lead for battery positive and one for signal) can reduce the severity of a battery failure. This will be discussed at greater length in another installment.

Next month: More on radio performance.

Editor:
Carl Wheeley

MODEL AVIATION

Official magazine

A.M.A. NEWS

Academy of Model Aeronautics • 806 Fifteenth Street N.W., Washington, DC 20005

TRANSPO FLIGHT LINE SHOWS HUGE CROWD WHICH COVERED A HALF-MILE-LONG FENCE IN FRONT OF THE GRANDSTAND AREA. AMA'ERS, AS A PART OF THE NATIONAL AERONAUTIC ASSOCIATION SPORT AVIATION COUNCIL, PUT ON 25 AIR SHOWS OVER TRANSPO'S 10 DAYS. GREAT PR!

Transpo photos by John Clemens, Sandra Sweeney and AMA HQ Staff

AMA's closing theme at Transpo shows—banner towed by Big John biplane by Graham Lomax.

Twenty-five air shows in ten days—that's what AMA's Magnificent Men and Their Flying Machines did at Transpo 72—the greatest sustained public relations effort ever for model aviation. During those ten days (at Dulles Airport, near Washington, D. C., May 26 - June 4) there were over a million and a half people at Transpo, and hundreds of thousands of them saw model flying and heard about it over the public address systems.

Transpo 72 was the greatest aviation event ever held in this country, perhaps in the world. No similar event ever had so many air shows or was attended by so many people. Last month the general story of Transpo 72

Typical Transpo scene—Aerobatic Club of America full scale team taxies by as AMA modelers prepare for air show flight. Most all NAA divisions and affiliates participated. Right: John Strong, DC/RC Club member, ran daily Transpo RC monitoring operation, an important aspect to minimize the chance of accident, with equipment provided by the Hewlett-Packard Company. AMA-Transpo workers Lillian Worth and Tom Rankin in background.

Transpo air show action about to begin. Foreground—Carlin Hulick ready to release Ugly Stik, Bob Lopshire in walkie-talkie communication with announcer stand, John Patton coordinating. In the center slot, Leon Shulman and his Cru-Tender are raring to go.

was reported in this magazine . But model aviation's part in Transpo, as organized and conducted by the Academy of Model Aeronautics, is a story in itself. Here's how it went.

There were actually two prime audiences at Transpo 72. One was the general public—the huge crowds which were entertained and educated at the event. The other audience was the aviation community—hundreds of exhibitors, air show performers and officials to whom model flying was something most hadn't been aware of until Transpo.

AMA's crew of performers earned the respect and praise of aviation people at Transpo: parachutists, balloonists, sailplaners, aerobatic teams, racing pilots, company demonstration teams, executives, salesmen, writers. Our pilots scooped all other performers by getting the only rave story in the local papers—a feature article in the Washington Post—which no other group achieved during Transpo.

On several days stiff breezes of 20-25 mph grounded much activity. Balloonists couldn't operate, parachutists couldn't jump, antique and experimental aircraft couldn't fly, sailplanes stayed on the ground, model rockets were not launched, but the AMA planes never missed a call. In fact they filled in for many grounded acts and also some which were delayed or aborted. At one point AMA officials led by President Johnny Clemens, were hoping for more wind in order to gain more air time!

At daily air show briefings, the AMA crew was praised for instant reaction time and constant readiness. Model flying kept things moving when a weary World War II B-17 had a flat tire on the main runway; the only flying for about a half hour was done by models. In tribute to the modelers, AMA was given half-hour and ten-minute show spots on the final day, when no model flying had previously been scheduled.

Col. Chuck Aly, Transpo Operations Director, made particular note in a last briefing to all air show performers that any future air shows should include model flying as the ideal schedule saver, to fill in during emergencies and smooth out lulls between full-scale acts. AMA's ability to get in the air with only a minute or two notice was singled out as a great advantage to air show directors.

Most of the model flying was by Radio Control, but Control Line got a lot of attention, too. Air Force Sgt. Gordon Ford flew huge four-engined models of a C-5A and a C-133, (he also had a B-52 on display!). Cox and Testors Control Line Flying schools were run for kids by Bill Harris and members of the Northern Potomac Club of Virginia, who also gave demonstrations of Stunt and other forms of Control Line flying. Jack Fastnaught, Ron Forthman, and Ed Gold led the club activity, assisted by many other club members. RC race cars were demonstrated in a cooperative effort between AMA and Bob Beckman of R.O.A.R., the national association for RC car activity.

RC planes, however, provided the greatest proportion of air show time allocated to models. The crowd particularly loved Al Signorino's Doghouse (with Snoopy aboard) as well as Fran McElwee's Flying Saucer which dropped chutes and streamers and towed banners, and Graham Lomax's Big John biplane which did the same. Other favorites were Bob Karlsson's rocket-firing Eyeball, Tony Wilford's smoketrailing Aeromaster, the AMA-AAM team of Blue Angles (three flying simultaneously in follow-the-leader formation), Joe Solko's precision aerobatic Phoenix, Jim Martin's fantastically fast Banshee, Tony Bonetti's super smooth

Above: Stars of Transpo air show—Al Signorino's Snoopy and Fran McElwee's Flying Saucer; Scotty McCray's aerobatic glider in background, and the Air Force Thunderbirds overhead. Below: AMA-AAM Blue Angels RC Bearcat on the air show line—world champion aerobatic Pitts Special behind. Models were flown over taxiway close to crowd, full scale planes flown over runway farther out.

Right: Control Line Flying School in progress during Transpo. One young lad is getting his first taste of model flying with a gentle hand to guide him along. Cox and Testors participated. Below: Part of the AMA-Transpo model show team, members of which varied from day to day. Shown, from left to right, are Tony Wilford, Maynard Hill, Fran McElwee (with Snoopy), Joe Solko, Horace Hagen (helicopter), Bob Crosby, Bob Karlsson (kneeling), Bernie Murphy and Carlin Hulick. Rohr monorail people mover in background had a two-hour wait to ride.

Troublemaker, Ollie Washburn's Powerful twin-engine Cessna and Horace Hagen's Huey Cobra helicopter.

Many others added to the show: Bob Crosby's Antic, Mitch Weiss' Cavalier, John Preston's J-3 Cub, Carlin Hulick's Ugly Stik, Jack Spalding's Banshee, Leon Shulman's Crutender, Dave Gray's Du-Bro Whirlybird, Len Sabato's Bell Ranger helicopter, Maynard Hill's parachute-landing Hustler, Bob Karlsson's Astro Hog, Bernie Murphy's Sportmaster.

The Blue Angels team flew beautiful scale models of U.S. Navy F8F Bearcats, vintage 1946-50. This was a special joint project of AMA, the RC industry and American Aircraft Modeler Magazine—created especially for Transpo and subsequent air shows, including the '72 Nats in July. The project is known as the official Academy of Model Aeronautics Formation Flight Demonstration Team. Pilots at Transpo were: Ed Sweeney, Bob Violett, Jim Martin, Tom Carey, Hank Walker, Bernie Murphy. Jack Shupe acted as maintenance chief and had four Bearcats ready to fly on both Transpo weekends.

At times there were seven planes up at once. Typically, AMA's mini-show consisted of a ten-minute period of frantically paced two- or three-minute flights—planes going up and down constantly to keep action moving. Precise frequency control was a critical factor in juggling combinations of pilots and planes which varied from day to day. When more time was available, precision aerobatic FAI patterns were flown and described.

Air shows were rewritten daily by AMA's Public Relations Director, Bob Lopshire, in accordance with frequent schedule revisions. Flight Controller Tom Rankin and his assistants, John Spalding and John Patton, made it all work, while John Strong and a special crew—Jim McNerny, Jack Albrecht, Ben Givens, Walt Good—monitored all transmissions to avoid interference problems. AMA's Executive Director, John Worth, narrated all shows. Patton also installed a mile-long telephone line system that provided communications between performers, the narrator, and monitors. Other helpers were John Strong, Jr., Mark Worth, Bob Denney, Bob Scott and Cliff Telford.

This team did much of the behind-the-scenes work for AMA-Transpo air shows: (L-R) Tom Rankin, flight line controller; John Worth, narrator; Bob Lopshire, air show director.

Meanwhile, every day from 9 am to 6 pm, volunteers staffed AMA's booth in the National Aeronautic Association exhibit area. Judy Rankin and Lillian Worth worked all ten days of Transpo, assisted by others from day to day: Glenn Scillian, Peg Spalding, Rose-

Above: AMA Transpo booth, staffed here by AMA wife-volunteers Lillian Worth, Judy Rankin, Peggy Spalding. Hundreds of Delta Darts sold, thousands of AMA brochures distributed. Models loaned by DC/RC Club members. Below: CL models at Transpo. C-5A and C-133 by Sgt. Ford, Ohio; others by members of the Northern Potomac Club which also helped run Cox and Testors Flying Schools.

Above: T/Sgt. Gordon Ford, Wright-Patterson AF B, Ohio, prepares C-5A for CL flight before Transpo crowd. Ron Forthman helps. Four-engined craft weighs 38 lbs., flew on three engines. Below: National Aeronautic Assn. van provided flight line transportation for modelers, parachutists. Tony Wilford and enlarged Aeromaster, rear.

mary Strong, Velma Teubner, Joyce Good, Elinor McEntee. Working even longer hours each day were HQ employees Roy Relph and Art LaLonde; they served in every conceivable manner: transportation of people and equipment, communications, stringing phone wires, loading and unloading. Other helpers were john Strong, Jr., Mark Worth, Bob Denney, Bob Scott and Cliff Telford.

Jay Gerber, AMA's pro movie photographer, produced a 16mm color film of AMA's participation in Transpo. He did it in record time, during the first three days—had it edited, copied and showing in the NAA exhibit area during the last half of Transpo! Additional copies will soon be made available to AMA clubs.

The general public message in all shows was that model aviation was an activity for all ages, noting that three-quarters of AMA's forty-two thousand members were adults who flew for fun and sport, while for thousands of youngsters the activity was an educational pursuit with tremendous side benefits as an effective deterrent to juvenile delinquency. It was regularly explained over the loudspeakers that professionals (pilots, doctors, lawyers, etc.) and people from all walks of life were involved, over twenty thousand having become new AMA members in the past five years, mostly through AMA's network of over 800 clubs.

Considerable public response was measured by the fact that over 5,000 membership brochures were given out at the AMA booth. These were not simply piled up for the taking—they were individually handed out to people who stopped and seemed interested. What also helped considerably was a dazzling display of models in the exhibit area. These drew steady crowds to the National Aeronautic Association area in general and the AMA booth in particular.

Only one basic problem was encountered which caused some AMA members and some of the public to miss the model flying shows at Transpo. There was no prominently displayed daily schedule of events, so it was difficult for most people to know just when models would be flown, if at all. Some found out about the flying at the AMA booth; otherwise it was a matter of watching the overall air show all day long or happening by accidentally when models were scheduled. Fortunately, the grandstands were full during most of the morning and afternoon air shows, so tremendous public exposure was gained for model aviation despite this communications problem.

Models provided by DCRC Club members acted as a common link to all the NAA organizations, helping to unify the exhibit area appearance. Bob Hires provided a Cirrus sailplane for the Soaring Society of America and an Aeromaster biplane for the Aerobatic Club of America, Reg Mitchell loaned a Curtiss Jenny for the Antique Airplane Association, Tom Rankin provided a Pylon Racer for the Professional Race Pilots Association, Ed Sweeney a J-3 Cub for the Experimental Aircraft Association; Maynard Hill displayed his world record speed and altitude models for the National Aeronautic Association booth. There were also other gorgeous models of a P-51 by Mike Grady, A F4J Phantom (ducted fan) by Duane Johnson, an Antic by Bob Hires and a Wright Flyer by Glenn Scillian.

The booth space was donated by Transpo in appreciation for air show performances. In addition, Transpo paid some basic expenses for AMA performers and officials, including motel rooms for out-of-towners. At least 40 AMA members participated as workers or flyers. The team was selected from volunteers representing many states: New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Illinois—Al Signorino (AMA VP, District VI) was the performer who came the farthest, from Missouri, and AMA President Johnny Clemens was the official from the greatest distance, Texas.

Aside from the satisfaction of showing off model aviation to the uninitiated, perhaps the greatest reward to all concerned came from AMA members visiting Transpo—many stopped by to express their pride to see AMA so well represented in so prestigious an activity. They were proud that the Academy of Model Aeronautics was a fully equal partner with other aviation organizations in Transpo 72.

It was a glorious 10 days for AMA and model aviation at Transpo 72, and thinking has already been started for the next show in '74. We've already been invited!

The AMA at TRANSPO 72

PRESIDENT'S MEMO

Superlatives are so easy to roll off the tongue until one comes to something as gigantic as TRANSPO 72! When things are bigger than "huge" and better than "terrific", what does one say? TRANSPO 72 was just that sort of happening. And the ACADEMY OF MODEL AERONAUTICS had a big part in the planning of TRANSPO and a prominent part in the activities of all 10 days of TRANSPO's public life.

For the uninformed, and to explain just what a TRANSPO 72 might be, it was simply the WORLD'S BIGGEST SHOW OF EVERY SORT OF TRANSPORTATION DEVICE. Somewhere near one-and-a-half million people felt it was important enough to attend. And it was held at the huge DULLES INTERNATIONAL AIRPORT, some 25 miles west of Washington, D.C., with a background of the beautiful lush green Virginia countryside. Dulles Airport, by the way, is itself so vast that normal passenger and freight flights continued to operate during all but a few minutes of the daily full-scale air shows. And the safe handling of this strange mixture of air traffic is certainly a tribute to those dealing with this complex problem.

Since TRANSPO was held on Dulles Airport, it was only rightful that AERONAUTICS, AS A FORM OF TRANSPORTATION, should hold center stage! The never-ending parade of aeronautical demonstrations ran from a flyable 1911 aircraft to outer space vehicles and astronauts. There was every propellered, jetted, rocket, or wind-driven aeronautical device that man has devised. The sizes ran from Goodyear's blimp and the gargantuan "C-5" transport—the world's largest in-service aircraft—through all of the military and passenger planes, the private and sporting man-carrying types, and on down in size to OUR OWN AMA MODEL AIRPLANES. And the ACADEMY OF MODEL AERONAUTICS and its members' model planes LOOKED MIGHTY GOOD!

The first day of TRANSPO was a special VIP day, by invitation only. As president of AMA I attended Secretary of Transportation John Volpe's reception and had the pleasure of meeting him and expressing AMA's pleasure and pride at being included as a formal part of TRANSPO 72.

Beginning with VIP Day there was a formal air show every afternoon and a National Aeronautic Association Sport Aviation Spectacular most evenings. Before and between these formal shows there were almost constant "product demonstrations" of nearly every exhibiting manufacturer's flying devices. In fact, if you didn't "dig" aviation, this would have been a dandy place to have stayed away from. However, it would take a pretty numb sort of human to not be excited at the variety of entertainment. The air shows ran the gamut of every exciting kind of aircraft—the Navy's Blue Angels, the Air Force Thunderbirds, Britian's splendid Red Arrow Precision Flying Team and thunderous Vulcan Bomber, soaring gliders, man-carrying balloons, fabulous parachuting, wing walking, precision aerobatics, the Confederate Air Force and its parade of World War II beauties, and of course, MODEL AIRPLANES!

AMA President John Clemens, left, inspects rocket installation on RC Eyeball being prepared by Bob Karlsson for air show. Twenty-five AMA model shows put on during Transpo.

And with our MODEL AIRPLANES we showed them that you can do just about anything with a model plane that you can with a man-carrying aircraft, and some things you wouldn't dare do if the seat-of-your-pants was actually in the aircraft (Snoopy's Doghouse, if you doubt me!). A further feather in mdoel airplaning's cap was the fact that, during the one day of bad weather, when nearly all of the full-scale aircraft were unable to perform, our bunch of AMA flyers went right ahead and entertained the crowd with some of the finest flying they did in the entire 10 days.

AMA's path into all of this recognition and activity was through the NATIONAL AERONAUTIC ASSOCIATION, of which AMA is the largest membership division. The NAA is the "gathering ground" and governing body for Sporting Aviation in the United States, and represents this country in international sporting and record aeronautics. It was directly through the prestige and respect gained over the years by the National Aeronautic Association and its divisions that all phases of Sporting Aviation were invited to actively participate in TRANSPO 72.

When TRANSPO was in its earliest planning states, AMA's leaders eagerly offered to accept a large share of the responsibility for the planning. This offer of cooperation was a "natural". AMA's leaders are very conscious of creating a community awareness toward model aviation. And it was a "natural", too, because the NAA office is only about 40 feet down the same hall from AMA's busy office and eager staff. AMA's Executive Director John Worth, NAA's Col. Roth, and National Pilots Association Director Bill Ottley managed the total NAA effort in TRANSPO, coordinating the participation of all NAA divisions.

We AMA'ers saw TRANSPO as an excellent public relations springboard and an outstanding chance to acquaint the huge number of spectators with the versatility and sheer fun of MODEL AVIATION. And if you think model airplanes play no part in transportation, just think of how a model plane can transport you into a whole new world of fun and relaxation, and the ticket price is SO reasonable. Want proof? ASK SNOOPY!

John E. Clemens
AMA President

1974 Control Line Team Program

The stated concept has been adopted following a poll of entrants in the previous AMA program to select 1972 U.S. teams for the CL Speed, Stunt and Team Race World Championships. This idea was acceptable to 62% of those responding to the poll; thus, AMA officials concerned with FAI programs recommended implementation to the AMA president, and he approved.

In the West, where nine modelers or teams in each event will be qualified for the 1973 Team Finals, the Semi-Final will be at the Los Alamitos (Calif.) Naval Air Station under the direction of Bev Wisniewski, 4261 Petaluma Ave., Lakewood, Calif. 90713. The Eastern Semi-Final, where an additional nine in each event will be qualified, will be at the Cleveland (Ohio) Model Airport–directed by Johnnie Smith, 960 Brenner Ave., N.W., Massillon, Ohio 44646.

The exact flying schedule at either location was not known when this was written; for more information concerning the flying days for Speed, Stunt and Team Race contact the directors listed.

Despite a solicitation for host sites sent to previous program entrants (and also in the AMA Competition Newsletter), the only offers received by AMA were the accepted ones for Los Alamitos and Cleveland.

QUALIFYING IN 1972 SEMI-FINALS OVER LABOR DAY WEEKEND AT LOS ALAMITOS AND CLEVELAND; ADDITIONAL QUALIFYING IN REGULAR OR SPECIAL MEETS IN 1973; TEAM FINALS OVER 1973 LABOR DAY WEEKEND.

HOW TO ENTER THE '72 SEMI-FINALS: Send to AMA HQ, 806 Fifteenth St., N.W., Washington, D.C. 20005, a $5 check or money order, payable to AMA HQ, postmarked no later than August 15, 1972, indicating whether the East or West meet will be used to qualify for the '73 Team Finals and also which event will be entered. (For Team Race teams, the pilot and the mechanic must each enter and pay the $5 fee.) Note: '72 U.S. team members need not pay a fee for or fly in the '72 Semi-Finals; they are automatically qualified for the Team Finals.

QUALIFYING IN 1973. For those who do not qualify at the '72 Semi-Finals meets, or for anyone else who wants to try for team selection next year, a special point system means of qualification (via regular AMA or special FAI meets) will be used in 1973 to qualify nine additional finalists for each class. Look for point system qualifying details in this publicaiton before the end of the year.

Between the 1972 Semi-Finals, the 1973 point system qualifying, and the 1972 U.S. team members who are automatically eligible, a total of 30 contestants or teams will be qualified in each event to fly off at the Team Finals in 1973 over Labor Day weekend. The location of the Team Finals may not be determined until after the Semi-Finals this year–in order to provide opportunity to poll the qualifiers as to their preferences.

TO RECAP, the easiest way for most flyers to get into the CL team program is by entering either the West or East Semi-Finals this year, requiring submission of the $5 program fee to AMA HQ by August 15, 1972. For those who get a late start, or who fail to be within the top nine at a Semi-Final, the point system part of the program (which will take place in 1973) should be entered as soon as details are announced.

THE EVENTS are FAI Speed, FAI CL Aerobatics (Stunt) and FAI Team Race. Model specifications and competition rules are in the 1972 Model Aircraft Regulations book, pages 62-63, 66-70, and also page 29.

RC Pylon Acceptable Engines

Statements have been received from the manufacturers and importers listed below declaring that the engines specified meet the requirements of AMA rule book section 23.4.1 concerning quantity and availability. Such engines are, therefore, eligible for competition in RC Pylon Racing Formula I and II.

Fox Manufacturing Co.–All Fox 36; All Fox 40.

K & B Manufacturing–Torpedo .40 R/C Series 71 (Stock No. 8013); Torpedo .40 R/C Series 71 w/fuel shutoff (Stock No. 8056); K & B .40 R/C Series 72 (Stock No. 8065).

Nelson Model Products–HP40 Front Rotor; HP40 Rear Rotor.

R.A.F. Custom Engine Service–RAF 40 Rear Rotor.

The Testor Corporation–McCoy 40 Red Head Series; McCoy 40 Custom Series; McCoy 40 Series 21.

World Engines, Inc.–Supertigre G-40 ABC R.V.; Supertigre G-21/40 F.V.; Supertigre G-21/40 R.V.; OS MAX H 40 Pylon; OS MAX R 40 (2-ring w/exhaust baffle).

Such statements were sought from manufacturers and importers on the advice of RC Contest Board Chairman Bill Northrop, who indicated that the authenticity of each statement is the responsibility of the person or persons issuing it.

All manufacturers and importers interested in having their engines considered as acceptable for Formula I and II AMA sanctioned competition are urged to provide AMA HQ with similar statements for any other appropriate engines which comply with rule 23.4.1, especially as concerns new entries to the marketplace.

Chartered Club officers who receive the AMA Monthly Mailing found out in July what was July's big modeling news. Did you? If not, ask your club officers why not!

FAI Activities Committee

Following approval by AMA President John Clemens, AMA recently established an FAI Activities Committee whose basic areas of responsibility are: to find out how the majority of members feels about FAI activities and what AMA should do to best serve these desires, and also to develop and publicize team selection programs and try to build up modeler participation.

The make-up of the committee provides representation in all major area of FAI interest through a broad channeling of communication. FAI Activities Committee Chairman John Patton, with the assistance of Committee Secretary John Spalding, organized the following committee members to serve in their areas of expertise: all team selection program administrators–Dave Linstrum (FF Outdoor), Bud Tenny (FF Indoor), Laird Jackson (CL), Tom Rankin (RC), all Contest Board chairmen–Joe Boyle (FF), Jean Pailet (CL), Bill Northrop (RC), Claude McCullough (Scale); various special interst representatives–Norm Page (RC Pattern), Cliff Telford (RC Pylon), Dan Pruss (RC Gliders); various major orgainzation representatives–Bror Faber (NMPRA), Dick Lyons (NFFS).

These FAI Activities Committee members will serve as the link between the AMA membership and the AMA-CIAM delegate who votes at the FAI annual meetings. After compiling information based on communications from the membership, the FAI Activities Committee will instruct the AMA-CIAM delegate how to vote.

The Committee's first order of business is to review items which have been referred to FAI subcommittees for future action and which may be on the agenda of the next annual FAI meeting in December. The committee will also solicit proposals for possible FAI rules revision. Even though the rules freeze is currently in effect, changes based on extensive discussion and preparation might be accepted on a provisional basis, for testing in competition, so that when the rules freeze is ended, any well received provisional rules can then be quickly adopted as official.

In order to insure the maximum communication in all areas of FAI activity, individual AMA member inputs are essential. Suggestions, comments, or any thoughts concerning FAI Activities Committee business should be sent to any of the committee members or to AMA HQ so that copies may be forwarded as appropriate.

Quarter Midgets

Applicability of AMA liability insurance for radio controlled Quarter Midgets has been approved by RC Contest Board Chairman Bill Northrop and AMA President John Clemens in a special ruling that provides minimum requirements of the model aircraft and the course layout. This action has the effect of extending normal AMA insurance coverage to this class of flying and preventing disruption of many currently planned contests.

Even though the rules freeze is currently in effect, this ruling was made necessary by the increasing interest in Quarter Midget activity and, too, by the fact that there are no official racing class rules to which the Quarter Midgets conform while being flown in competitions. (There will be no other official AMA rules for Quarter Midget racing until 1974.)

The authorized requirements listed below are to be considered as additions to the current official AMA model aircraft regulations, but it should be understood that they are only minimums which Contest Directors must follow for insurance to be applicable, and that other requirements may be included in contests so long as they do not conflict with any stated below.

Model Aircraft Requirements

Wing Area–300 sq. in. minimum (no deltas or tail-less airplanes).

Wing Thickness–EITHER 7/8 inch at the root with not less than straight line tapers to the tip; OR 10 percent of chord (minimum) at any point. . .whichever is preferred.

Engine–Nominal .15 displacement (not more than .1526 cu. in.). Must demonstrate 10-second idle.

Weight–Minimum: 2½ pounds, maximum: 4 pounds.

Course Layout

Three pylon course shall be similar to AMA layout for Formula I and II, FAI and Sport Pylon, though distance between pylons may vary. Minimum distance between No. 2 and No. 3 shall be 50 feet, and pilot location shall not be more than 75 feet from a line between No. 2 and No. 3.

A two-pylon course may be used provided pilots stand at least 150 feet from a line between the pylons.

In either case, the spectator line must be no less than 300 feet from the course.

AMA News Bits

RC Insurance Without Mufflers?

The answer to recent inquiries regarding the AMA muffler rule is that Sunday-type RC sport flying without use of a muffler IS covered by AMA insurance. The use of a muffler (or failure to do so) does not concern safety, and thus there is no affect on AMA liability insurance. The new (for 1972) rule requires a muffler for RC Pattern competitions, but even this rule can be waived by a Contest Director if he provides adequate notice to prospective entrants as called for in the rule book.

Even though mufflers are not an unbending requirement, it is wise to use them, obviously, in areas where noise may be considered a public nuisance and therefore potentially jeopardize flying privileges.

Distinguished Service Award

Al D'Amico (AMA 29180) vice-president of the AMA chartered Pennsylvania Ave. RC Society (New York) and a newscaster for radio station WPIX FM in New York City was presented with the AMA Distinguished Service Award for his work in obtaining Floyd Bennett N.A.S. as the club's flying site.

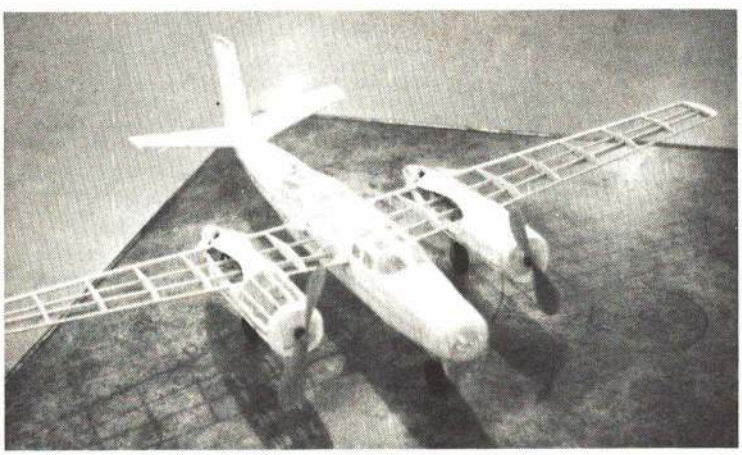
The award was presented on behalf of the AMA Executive Council by District II AMA V.P. Bill Boss (left in photo above) at the club's November meeting, following D'Amico's 18 months of work on the flying site project. RC flying at Floyd Bennett is under strict control to prevent any possibility of the model aircraft being in the same airspace as full size planes. As an example, telephone communication is maintained between the flying area and the Officer of the Day (O.D.). In cases of emergency, the phone is used for quick response (the phone is routinely used to indicate the beginning and end of model flying sessions).

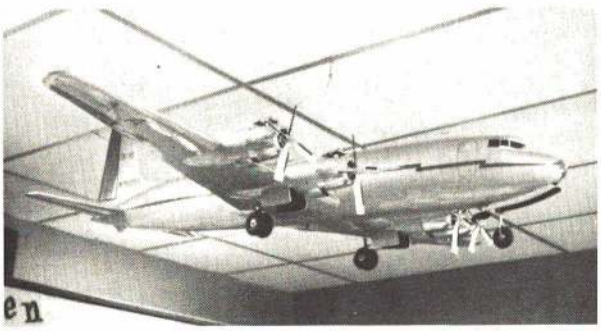
Bill Chenault of the Dallas Cliff Cloud Climbers sets up his field shop at a recent Abilene FF contest. Murry Frank photo.

DCRC "Howard McEntee Award"

Among his many aeromodeling achievements, Howard McEntee was a brilliant writer in several capacities during his life; he passed away in January. Just prior to his death he was the first and only man to be named to the 1971 Model Aviation Hall of Fame (March 1972 AAM, p. 57.). Since then many of his friends from all over the world have expressed a desire to continue in Howard's name whatever efforts he had greatest interest in. A fund for this purpose has been created by AMA; contributions sent to AMA HQ should be designated for credit to the "AMA Fund for Howard McEntee".

Howard McEntee will be remembered





Pictured are two of the models used in the Key City Prop Twisters (Abilene, Texas) static display at the opening of a local store. Left: Rubber-powered B-26. Above: Club President Don Smyth's DC-7. The display was appreciated by all, especially the store owner who was particularly pleased with the interest shown. Submitted by Jerry Farr.

fondly in many other ways. We see, for instance, that the Board of Directors of the AMA chartered District of Columbia Radio Control Club has decided to initiate an annual "Howard McEntee Award" for the best technical article published in the club's DCRC Newsletter each year. Writing, especially of technical articles but in non-technical terms, was a special talent of Howard's—thus, the basis for the DCRC memorial award is very fitting.

N.Y. RC Association

Formative meetings for a new association of New York area RC clubs were held in December and January, the initial meeting called by Dick Brooks of the AMA chartered RC Society of Marine Park. Eleven clubs were represented at the December meeting, nine in January.

The name of the association agreed to by the club representatives is the RC Association of Greater New York, Inc. Officers elected temporarily are John Byrne, president (Long Island RC Society); Bob Luhrman, vice-president (LIRCS); Sam Garcia, secretary (Pennsylvania Ave. RC Society). Initial aims of the association are (1) to lobby for RC flyers with area politicians, (2) to obtain and keep flying fields, (3) to improve public knowledge about RC flying, (4) to work with AMA in the solution of area problems.

Any club in the area which has not joined the society would do well to consider signing up. For info concerning the time and place of the next meeting, contact Sam Garcia, 87-77 117th St., Richmond Hill, N.Y. 11418.

Texas Clubs Unite

Model aeronautics in the Corpus Christi (Tex.) area is on the verge of taking a very important step. The three area clubs, the Corpus Christi Bees, the Coastal Bend Aeromodelers, and the Corpus Christi RC Club have recently agreed to form a council composed of representatives from each club. In general the group's purpose is to present a united front for the promotion of model aeronautics in the coastal bend area, with additional specific aims to be added to suit the needs. Thanks to the Newsletter of the AMA chartered Coastal Bend Aeromodelers for this information.

RC Formula II Fastest

The AMA chartered Hampshire County RC Club had some unusual results at one of its contests in 1971. It seems that Vern Smith (AMA 59427) in the Formala II event turned the fastest time of the day (1:38), a time that beat the Formula I 1st place best time of 1:44. The formula I winner was the team of Cliff Telford (AMA 658) and Bob Violett (AMA 8135). Could it be that Formula II's extra wing area (600 sq. in. vs 450) makes very little difference in speed?

Official Sanctioned Contests of the Academy of Model Aeronautics

AUG. 1-3—BRIGHTON, WISC. (AA) National Old Timer FF Champions. Site: Brighton. R. Elman CD, 17707 Burnham Ave., Lansing, Ill. 60438. Sponsor: Pelican Model Airplane Club.

AUG. 5—GARDEN CITY, N.Y. (A) LIDS Annual RC Pylon Meet. Site: Mitchel Field. Dr. W. Fuori CD, 28 Fernwood Dr., Commack, N.Y. 11725. Sponsor: Long Island Drone Society.

AUG. 5-6—KINSTON, N.C. (AA) RCNC Golden Leaf RC Tournament. Site: Kinston. D. Pearce CD, 1005 Ainsworth Ct., Greensboro, N.C. 27410.

AUG 5-6—SAYRE, PENNA. Hobo RC Fun-Fly Meet. Site: Sayre. C. Knowles CD, 124 Ridge Road, Horseheads, N.Y. 14845. Sponsor: Valley RC Model Club, Inc.

AUG. 5-6—SALINA, KANS. (AA) MARCS 1st Annual RC Meet. Site: Airport, East. D. Moden CD, 410 Hart St., Salina, Kans. 67401. Sponsor: MARCS.

AUG. 6—LAKEHURST, N.J. (A) NJRCC/ECSS RC Glider Meet. Site: Lakehurst N.A.S. G. Fuller CD, 1043 Lafayette Ave., Hawthorne, N.J. 07506. Sponsor: North Jersey Radio Control Club.

AUG. 6—CLEVELAND, OHIO (AA) Lakewood Flitemasters Annual CL Contest. Site: Cleveland Flying Field. R. Tran CD, 31635 Lorain RD., No. 25, North Olmstead, Ohio 44070. Sponsor: Lakewood Flite Masters.

AUG. 6—CANTON, OHIO (AA) 12th Annual Canton RC Meet. Site: Club Field-Sherr Rd. J. Yarger CD, 1100 Browning Ave., N. Canton, Ohio 44720.

AUG. 6—SYRACUSE, N.Y. (AA) United Pylon RC Racing Circuit. Site: ARCS Field. R. Danilowicz CD, 3245 Creek Rd., Youngstown, N.Y. 14174.

AUG 6—EVERETT, WASH. (AA) Elk Summer CL Invitational Meet. Site: Mariner High School. T. Wilson CD, 9113 Evergreen Way, Everett, Wash. 98204. Sponsor: Everett Line Kinkers.

AUG 6—CLINTONVILLE, WISC. Clintonville Fun Type Contest. Site: East Side Airport. J. Vanderwalker CD, Rt. 3, Clintonville, Wisc. 54929. Sponsor: Clintonville RC Club.

AUG. 6—EASTON, PENNA. (AA) BAM FF & CL Bash (FF-Cat: II). Site: Easton. R. Gutai CD, 334 West St., Bethlehem, Penna. 18018. Sponsor: Bath Area Modelaires.

AUG. 6—PORTVILLE, N.Y. RC Air Show. Site: Portville. R. Brown CD, 1255 High, Bradford, Penna. 16701. Sponsor: Olean Model Airplane Club.

AUG. 6—PENFIELD, N.Y. Fourth Annual RAMS RC & CL Fly-for-Fun. Site: RAMS Field. C. Boyer CD, 541 Laurelton Rd., Rochester, N.Y. 14609. Sponsor: Rochester Aero Modeling Society.

AUG. 6—LAKEHURST, N.J. East Coast Modelers Indoor Record Trials (Cat. III). Site: Lakehurst. C. Russo CD, 143 Willow Way, Clark, N.J. 07060.

AUG. 6—MICHIGAN (A) CARDS Second Annual RC Soar-In. Site: Unknown. C. Spencer CD, 236 Theo St., Lansing, Mich. 48917. Sponsor: Capital Area Radio Drone Squadron.

AUG. 6—BRIGHTON, WISC. (B) Illinois Model Aero Club-N.I.A.M.A.C. FF Contest (Cat. II). Site: Bong Field. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: Illinois Model Aero Club.

AUG. 12-13—ENDICOTT, N.Y. (AA) 17th Annual Aeroguidance Society RC Contest. Site: Tri-Cities Airport. B. Noll CD, 96 Pine Knoll Rd., Endicott, N.Y. 13760. Sponsor: The Aeroguidance Society, Inc.

AUG. 12-13—TULLAHOMA, TENN. (AA) Coffee Air-Foilers FF Meet. Site: AEDC Airport. A. Mansfield CD, 111 Iris Cir., Tullahoma, Tenn 37388. Sponsor: Coffee Air-Foilers.

AUG. 12-13—MELBOURNE, FLA. (AA) Fingercrackers CL Championships. Site: Brevard Jai Alai. B. Day CD, 4353 Thistleberry Dr., Melbourne, Fla. 32935. Sponsor: Fingercrackers.

AUG. 12-13—FREELAND, MICH. (AA) Saginaw Valley Annual RC Meet. Site: SVRCC Flying Field. D. Daly CD, 110 Edward, Auburn, Mich. 48611. Sponsor: Saginaw Valley RC Club, Inc.

AUG. 12-13—MINNEAPOLIS, MINN. (AA) T.C.R.C. 16th Annual RC Contest. Site: T.C.R.C. Club Field. A. Haynes CD, 4625 Terracewood Dr., Minneapolis, Minn. 55437. Sponsor: Twin City Radio Controllers, Inc.

AUG. 12-13—TULSA, OKLA. (AAA) Tulsa Glue Dobbers 23rd Annual FF (Cat. II), CL & RC Meet. Site: TGD Field. W. Salnikov CD, Rt. No. 1 Box 130-C, Coweta, Okla. 74429. Sponsor: Tulsa Glue Dobbers.

AUG. 12-13—FARGO, N.D. (AA) Red River Valley CL Championships. Site: F.M. Skylarks Field. M. Olson CD, 305 27th Ave., N., Fargo, N.D. 58102.

AUG. 12-13—CHATTANOOGA, TENN. (AA) TVRC 2nd Annual RC Meet. Site: TVRC Field. J. Wyatt CD, 502 Young Ave., Chattanooga, Tenn. 37405. Sponsor: TVRC.

AUG. 13—PIKE, N.Y. (AA) Western New York FF Society FF Meet. Site: Pike. D. Evans CD, 175-1/2 S. First, Bolivar, N.Y. 14715.

AUG. 13—LINCOLN, NEBR. (AA) Aero Design 5th Annual CL Meet. Site: Humane Society. J. Mock CD, 1718 Janssen Dr., Lincoln, Neb. 68520.

AUG. 13—LANCASTER, OHIO (AA) FORKS Annual RC Pattern Contest. Site: FORKS Field. J. Slater CD, 809 Forest Rose Ave., Lancaster, Ohio. Sponsor: FORKS.

AUG. 13—WHEELING, ILL. (AA) Red Barons 2nd Annual CL Meet. Site: Palatine & Wolf Roads. H. Cain CD, 525 Weidner Rd., Buffalo Grove, Ill. 60090. Sponsor: Red Barons Model Airplane Club.

AUG. 13—MADISON, WISC. (AAA) 1st Annual East Towne Mall CL Contest. Site: East Towne Mall. P. Potega CD, 434 Cantwell Ct., Madison, Wisc. 53703.

AUG. 13—PONTIAC, MICH. (AA) Pontiac Open CL Contest. Site: Jaycee Park. H. Hackett CD, 3780 S. Shimmons Cir., Pontiac, Mich. 48057. Sponsor: Pontiac Model Airplane Club.

AUG. 13—BERKELEY HEIGHTS, N.J. (AAA) Flying Bee '72 CL Meet. Site: Columbia School. F. Wolff CD, 68 Berkshire Dr., Berkeley Hgts., N.J. 07922. Sponsor: Berkeley Blade Busters.

AUG. 13—COUNCIL BLUFFS, IOWA 3rd Falcon RC Event. Site: Cobra Field. L. Puls CD, 1020 Ash, Council Bluffs, Iowa 51501. Sponsor: Cobras Radio Control Club.

AUG. 13—E. GRANBY, CONN. (A) Nor' East RC Air Races '72. Site: E. Granby. A. Simmonds CD, 145 Irene Dr., RFD No. 4, Vernon, Conn. 06066. Sponsor: Northern Conn. RC Club.

AUG. 13—DAYTON, OHIO (AA) Mid-Summer Spectacular CL Meet. Site: Municipal Flying Circles. C. Short CD, 346 Lawver Ln., Dayton, Ohio 45431. Sponsor: Dayton Buzzin' Buzzards.

AUG. 19-20—HUNTSVILLE, ALA. (AA) MACH CL Contest. Site: Old Huntsville Airport. E. Harden CD, 2903 Alhambra Dr., Huntsville, Ala. 35805. Sponsor: Model Airplane Club of Huntsville.

AUG. 19-20—OMAHA, NEBR. (AA) Omahawks 18th Annual RC Contest. Site: Omaha. R. Stansbury, 9348 Camden Ave., Omaha, Neb. 68134.

(Continued on page 64)

AMA OFFICER DIRECTORY

The most recent complete directory was published in the August AAM, page 103.

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Rates: 30c per word (including name and address). Minimum—14 words. Send remittance with copy and order to: AMERICAN AIRCRAFT MODELER, 733 Fifteenth St., N. W., Washington, D. C. 20005.

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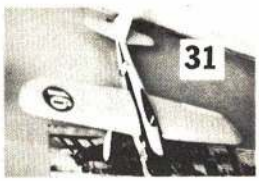

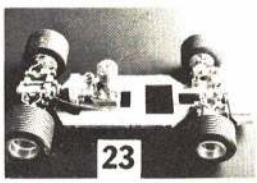

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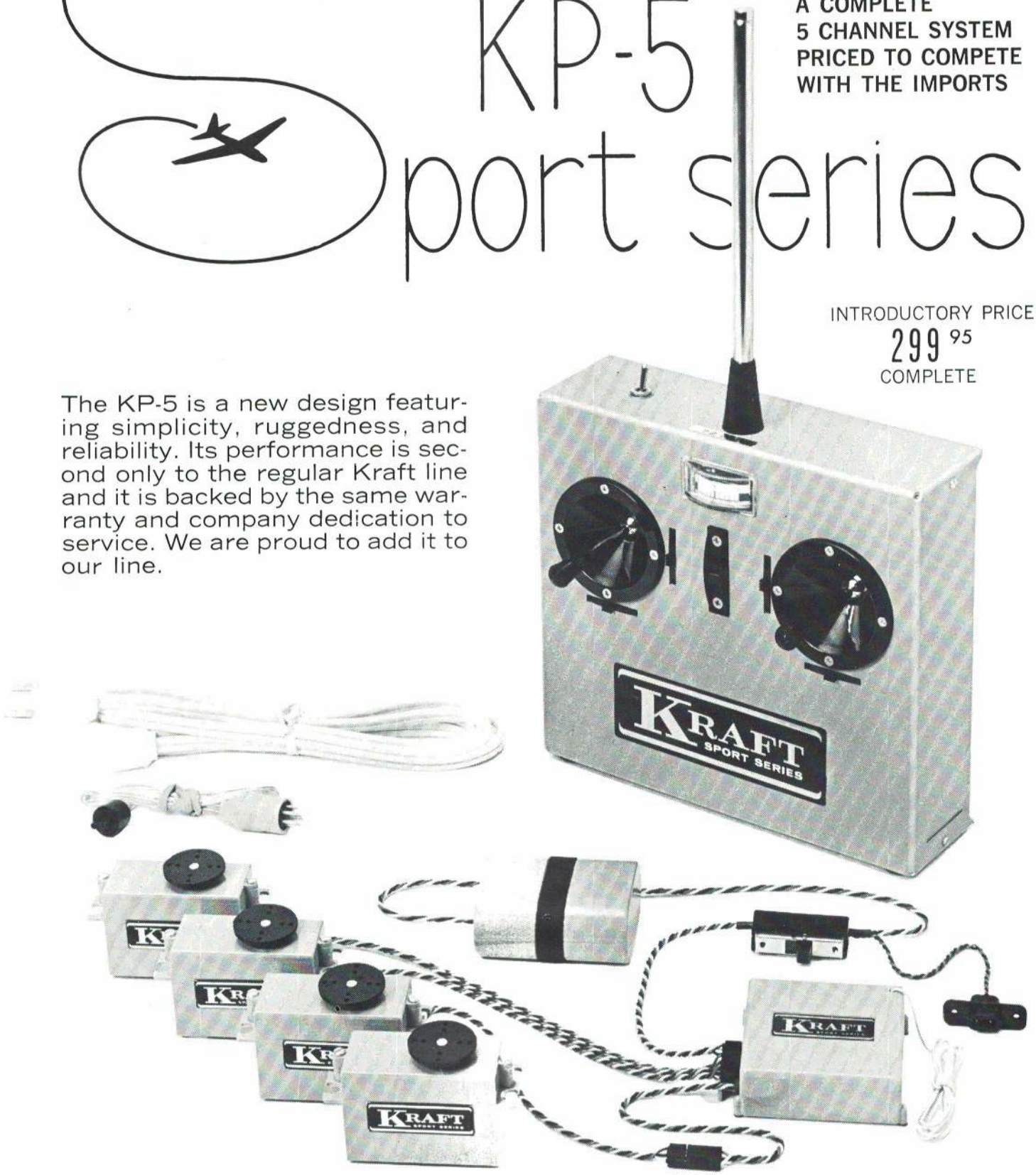

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