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OCTOBER 1970

AMERICAN aircraft modeler

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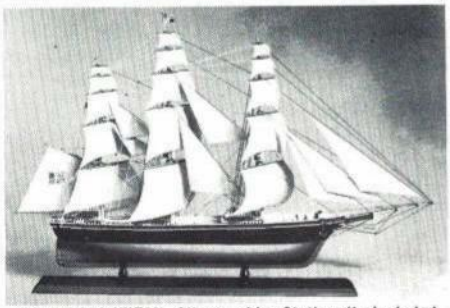

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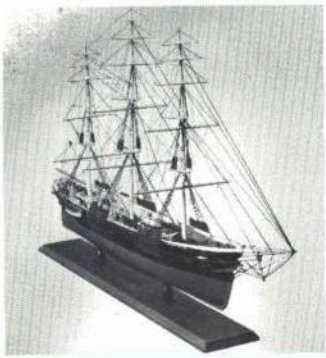

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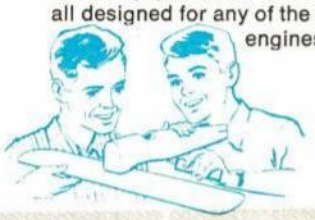

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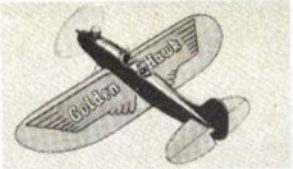

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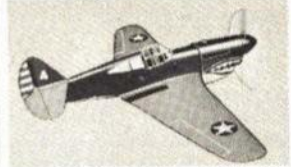

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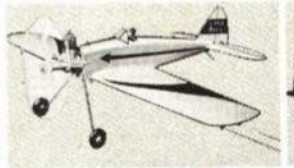

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COVER PHOTO: Ralph Saldivar holds his 11-lb. Dyna-Jet-powered RC Phantom beside the real plane at N.A.S., Miramar, Calif. Photo by Bill Hannan, who provided considerable assistance in preparation of this cover article.

WILLIAM J. WINTER — PUBLISHER
Kathryn Conover, Editorial Assistant

EDWARD C. SWEENEY, JR. — EDITOR
Eleanor Swavely, Editorial Assistant

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Editorial

Straight...and Level

Free flight is dying? The moon is made of green cheese.

"FREE FLIGHT IS DEAD . . . or is it?" is the title stuck on a fascinating article in AMA's Competition News Letter by David W. Jones, Cave Creek, Ariz. By no accident or slip of the tongue were the first four words capitalized. From the dedicated free flighter's point of view, and by dedication we mean the competition-minded guy who has an Indian's viewpoint of the vanishing buffalo, it isn't dead, but high-performance FF is hurting.

Radio control discussed for so long is not a miracle drug. If it were, the patient would have been out of bed long ago. As an old free flight, and radio, man dating back to the happier middle ages of modeling progress, the writer, like other simple souls, doesn't know whether the crate with limited outside guidance is a free flight or radio model. Fifteen years ago we adjusted a Rebel as a sport free flight and had ten-minute hops in calm air with a single transmission, and that to make it land on two wheels out of a gliding turn—at our feet. Soaring high in thermals, it occasionally could be steered out of the lift. That was a radio model, flown almost entirely free flight. It was so much simpler than today's atomic-powered broomsticks that no free flighter would call it anything but an RC even if he were stretched upon the rack.

Dave's article outlines a simple system (for radio) using a ten-tone transmitter, one tone for each contestant. With ten frequencies available he sees 100 active channels. Each X-mitter would have ten phono-jacks and push-button controllers to be used only for anti-drift and perhaps dethermalizing. The works would be incorporated into a Tatone-type timer. The command turn would be opposite to the ship's natural turn. A signal held would produce a spiral counter to the glide turn; blipping would yield straight flight. Remembering early single-channel crates, one perceives this might at least prevent a model from being lost down wind.

Dave's article is well done. The concept is simple and ingenious. But it would be added to a VTO sky-rocket which already is bred almost into oblivion. If the idea will fortify free flight competition without driving true-blue RCers to swallow their fuel, we'd be spellbound observing such events. Probably some guy will put a foam wing on the bottom, instead of the top, do rolls, and there goes the whole ball of wax. Maybe the RCers should try it for a novelty? Something new and perhaps lasting to do?

As Dave points out, fewer modelers wish to travel the great distances necessary to pursue this wonderful, delightful and challenging sport (FF). Well, the electronic guys travel great distances, too, yet there is hardly a site we've seen that isn't big enough for any free flight job designed to present-day requirements. Getting to the site sometimes is like a trip up the Amazon, but the modern free flight job requires a polar expedition by dog sled. Why, in Heaven's name?

Free flight, generally speaking, is not dying, or even fading out, nor is control line. For every mastodon there are a gillion rabbits.

Hand-launched gliders, balsa ROG's are everywhere, sold at thousands of outlets that never heard of the model plane hobby. Once we might have said that a bridge does not exist between the kid with a quarter novelty item—or is it a buck now?—and the guys who design, nurture, and count down their takeoffs. Things like the Delta Dart, the gas-powered Oily Bird (a kind of big greasy Dart), and confused follow-on types at least have stretched the first wires between the stark bridge towers. There it stops for lack of vision, and an obstinate prejudice that, if flying is fun, it isn't modeling, or that it is better to play checkers or watch the television.

Speaking of RC, Dave Jones said, "The super-in-close convenience of a local free flight contest would certainly draw more contestants, interest, airplanes and flying." Swell. But does it have to be a contest—always? And does it take a radio to do it—more bucks, more complexity, and older hobbyists? Can't models be designed to meet today's requirements?

Size and power are obvious factors. Built-in flight patterns another. Super stability. Ruggedness. Simplicity. Low cost. Climb and gliding ability would be de-emphasized. Why not? The old crowd could still go beyond the suburbs, and if their pain will be eased by radio, may their numbers increase (they'd better call the crates RC's, brother!). What we are talking about is to give free flight back to the masses.

Dave reminds us that many kits on the shelves were part of small runs of 100 to 300 or are ancient stock. He thinks RC would put more kits on the shelves. But don't hold your breath. If free flight kits weren't monuments to square hang-ups, what they could be augmented with, or replaced by, would mean something to manufacturer, distributor, dealer, and happy customers.

If kids now can fly gliders and little rubber jobs in such unlikely places as apartment house parking lots, surely we cannot refute natural laws of evolution by down-the-nose indifference. If we weigh every little crosspiece, and argue about tuned pipes, and make the anti-warp wing life's number one objective, we have the brainpower (do we?) to tap dormant ingenuity. Or are "free flighters" just blockheads?

One keeps thinking of that old Veco Dakota, an all-balsa model for an 02. (Dumas took over much of the old Veco line.) Made according to control line kit prefabrication techniques of the 1940's, it had timber-type edges and hefty wood construction which just fell together. Back when K&B made an 02, the first of the tiny engines, whose propwash would not supply air bumps for a butterfly, this heavy crate would fly in tight lefthand circles, just about keeping its hand-launched altitude, maybe gaining a little. When the prop stopped, the ship made a transition to a steep right-hand glide—if you can call it a glide. The result was that the crate stayed on the field even in a fairly strong wind. With an 049 it would plow straight up and then there was a bit of off-field risk. You could even fly the thing with a sawed-off club of a 9 x 6 Powerprop with little stubby blades—and, as we saw a kid do just once, actually catch a thermal. Now why can't the genius designers do something like that?

William Winter

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Always the same?

Apparently in response to several letters, mine included, questioning the existence of Camp Murray as a model airplane complex, an officer of Gen. Robert F. King's staff contacted me regarding a visit to the camp.

A meeting was arranged, and I was impressed with the red-taped Gordian knot that Gen. King has personally cut, simply to make the raw ground available to modelers.

The General has, from time to time (minutes show it) met with local clubs and personalities who went forth from his office bright-eyed and bushy-tailed, never to be seen again. Gen. King, in this environment, has cooled just a tad to whacking down trees and paving parade grounds with nobody there to at least cheer him on.

The lack of local information was tracked down to the flyers, posters and entry blanks relegated to the back rooms (literally) of hobby equipment wholesalers.

At this point I did a little scratching and discovered some $160,000 worth of public service TV time per month available: this in the Seattle-Tacoma area alone!

This again points up the need for standardized 30/60 second video tape or film footage from AMA to plug upcoming model events. These basic spots could then be tagged with times, dates and driving instructions. The public awareness alone would help the image, and I'm sure the FCC would ok our stuff as being public service.

Bob Godden, Seattle, Wash.

In the June '69 issue we ran an article called "Academy for Aerospace Science and Modeling." It had to do with the Air National Guard program at Camp Murray in the State of Washington, which would aim at intensive, broad promotion of active modeling. Since then many readers ask if this is for real. Despite the tremendous personal effort made by Gen. King, the usual apathy on the part of everyone who should be concerned, from manufacturer to modeler, has reared its familiar ugly head. Bob Godden's letter is typical of those received by this magazine after putting doubters in touch with the good General. —The Publisher.

We'll take 40 lashes . . .

In the July, 1970 issue of *AAM*, Mr. Thomas H. Sears had a letter in the You Said It column. He stated that the *Piltdown Man* was exposed as a hoax in 1953. In your note, you said that your reference books still credit the remains as being those of an extinct predecessor to man.

As I have an interest in rocks and fossils, as well as model aircraft, I looked in one of my books and found that it agreed with Mr. Sears.

The following quotations are taken from the book, *Fossils*, by William H. Matthews III, professor of geology at Lamar State College of Technology, Beaumont, Texas; page 178:

"Then, in 1953, these remains were finally exposed as a modern human skull and the lower jaw of an orangutan. These conclusions were reached after careful investigation revealed that the bones and teeth had been artificially stained to look like authentic fossils.

"In short, this specimen, after more than 40 controversial years, was exposed as one of the most successful and carefully perpetrated hoaxes in the history of science . . . *Piltdown Man* has finally been removed from the list of human fossils."

John E. Robinson, Jackson, Miss.

Red carpet for Royal Thai

Enclosed is a photo of my latest modeling endeavor since coming to this B-52 base at U-Tapao, Thailand. I'm hoping you can use it somewhere within the pages of your magazine. We have a small group here but we are active and we demonstrated R/C flying to the local Thai people on three occasions.

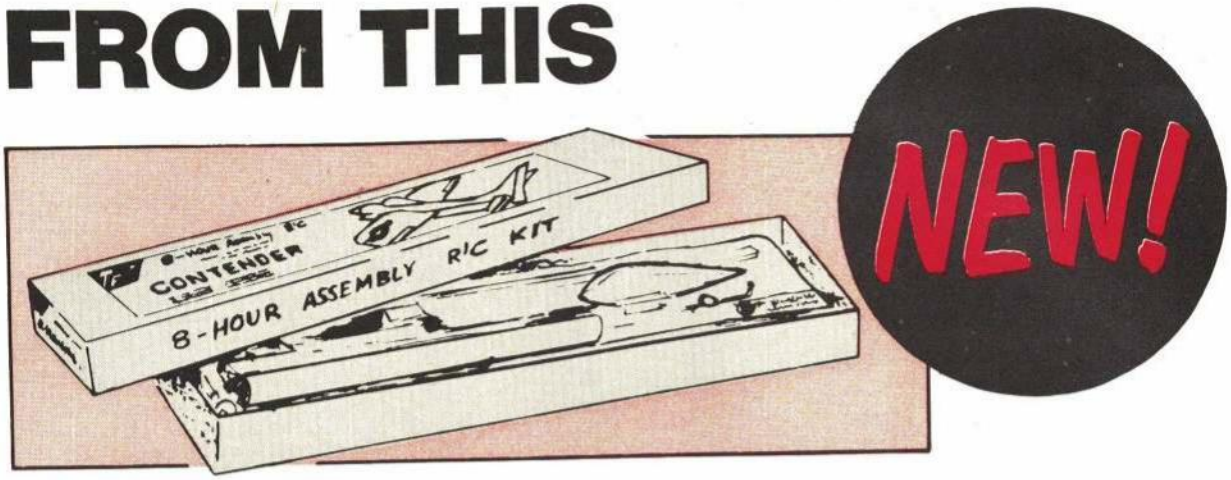
The model, Kwik-Fli III, which you can see I named the "Royal Thai," performed beautifully in each show. The wings and tail are MonoKote, while the fuselage is finished in Aero Gloss. A ST60R/C and TF 11-8 prop up front, with Controlaire MAN 2-3-4 radio.

So far as the Thai people are concerned, you would really have to see it to believe it. Their fascination for R/C flying is amazing. What we see and accept as almost commonplace is totally new to them. They stand and watch with open-mouthed wonderment. Just recently I gave a demonstration at a district city; the entire flight was held up because the District Officer (same as a state governor) had issued instructions to the local mayor to hold everything until he and his entourage arrived.

The reason for the demonstration was to take part in a gigantic fund-raising affair to provide a new school for the area. The local Thai officials gave the R/C flying bit a terrific buildup and when the day came, they sent a car and driver to transport myself and the airplane to the fair site. I had previously explained to them about safety factors and crowd control. When I arrived, the field was small (about 40 by 80 yards), but completely roped off and there must have been

SOMTAI, a native of Bangkok, poses with the Royal Thai. (Some Thai!)

FROM THIS



TO THIS

IN JUST 8 HOURS?

It's NEW from Top Flite! The CONTENDER—the first all-balsa R/C model you can build in just 8 hours.

What makes the CONTENDER so unusual? From its inception, this plane was created and designed by the Top Flite engineering staff so that it can be built in only 8 hours. When you're ready to finish the CONTENDER, you can save additional time by covering it with Super Monokote.

When it comes to performance, the CONTENDER, because of its inherent docility, flies aerobatics as well or better than a model which needs expert handling. It does beautifully with anything from a .29 to a .60 engine.

This is *the* plane for the "fly-boy"—the guy who gets more of a kick out of flying than building—but still wants to build his own plane. So, if you don't want to spend weeks building, go pick up the CONTENDER and get airborne FAST!

TOP FLITE

The CONTENDER

TOP FLITE MODELS, INC.

2635 S. Wabash Ave. • Chicago, Ill. 60616

Wing span—54"
Wing area—650 sq. in.
Engine—.29-.60
Kit #RC-15

Price—$34.95

YOU said it!

(*Continued from page* 8)

50,000 Thai men, women and children. Stretched across between the buildings about 60 feet high was a radio antenna. I cranked up the mighty ST Saturn 60, checked out the radio, and let it rip!

The plane and equipment were flawless, the speed and smoothness of that plane is a beauty to behold. I racked it through all the maneuvers and acrobatics I could think of. I flew the plane three times, to the accompaniment of great, ringing shouts. When I landed it for the last time, they poured onto the field in a great crush to thump me on the back, while holding their thumbs up, which means Number One. We were so tightly packed in just then, I had to grab the plane and hold it high to keep it from being crushed.

Later that evening, the District Officer threw a dinner feast. That was unbelievable in the number of guests, quantity and variety of dishes and drinks.

He toasted us as American friends and thanked us for coming because he, too, had never seen anything like it before. Needless to say, it was a great day for R/C flying!

Charles A. John, MSgt, USAF

Middleman

What about the guy in the middle?

Your Straight and Level column in the July issue spurred me into writing. Your Tenderfoot articles are great: they are what started me into model flying.

However, as one graduates from Tenderfoot articles, he consults the rest of your magazine for something a little more advanced, only to find it loaded with articles on R/C. This is much too complex for the Tenderfoot graduate or the guy who's caught *right smack in the middle.*

How about some articles a few steps up from the beginning level? Like maybe control line planes with slightly larger engines or even throttles, or even plans for a simple carrier trainer.

Brian Kelly, Miami, Fla.

Of cabbages and 'q'ueens

You won't believe this, but it is true: I did see, and did, after much sweat and other things, get the infamous GHQ to run . . .

This all occurred back in the great ignition days, 1946 and on. My school friend had one of these cast iron wonders, and had tried to install it in the old U-control Miss-Behaven. It never made the grade. We could get the Q to run only when the fly wheel was installed, and it must have weighed five pounds. The engine would not, and never did, run with a 12- or 14-inch prop, no matter what the pitch was. I must agree with your closing statement, "it ran—sometimes."

We finally installed it in my Rocket 46 and were able to fly for about a year before we did her in. I think my friend gave the engine to the cast iron drive or possibly to Ford Motor Co. for use in building several engines.

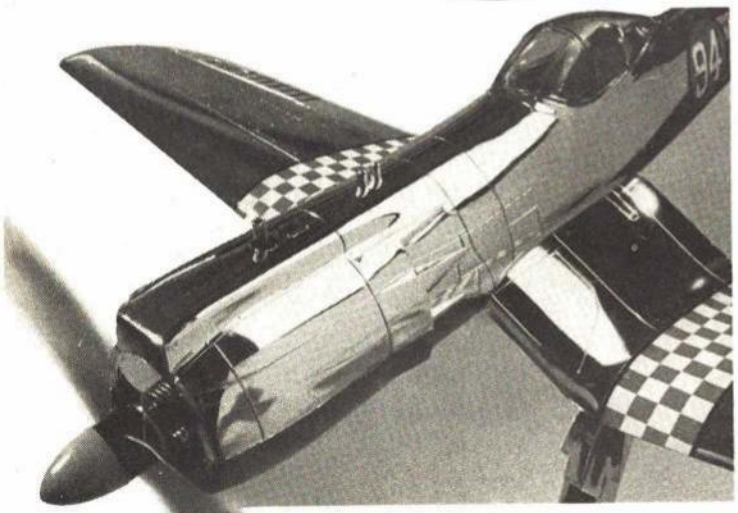
Gene Megas, APO N. Y.

Cox models go.

Everywhere.

Earn your wings with the Cox PT-19 trainer. Exclusive 3-way adjustable engine mount stabilizes plane for beginners. Soups up control for sport flying. Or makes it a spectacular stunt plane. 22" wingspan. And the PT-19 is built to last. If there's a crash or hard landing, Cox's original rubber band wing-to-fuselage assembly just pops apart. So there's little, if any, damage. Which makes it a great trainer. Reassemble and fly it in minutes, too. Comes complete with a tough .049 gas-powered engine.

It streaks out of sight. The Cox Shrike. This 12" long gas-powered model has the new Bonneville aerodynamic body design. Can run free or scream around a tethered line. A rear-engined racer, great for competition runs. Equipped with the famous Cox .049 engine, fully protected with high metal roll bar.



Be a flying ace with the Corsair II, civilian racing version of the Navy's carrier based fighter. Easy to maneuver. Good control line handling. Hits up to 55 mph. Has a chrome plated look. With checkerboard racing stripes. Plus the rubber band wing-to-fuselage assembly. Powered by .049 engine with spring starter. 19" wingspan.

Running wild on the ground. That's the Cox Dune Buggy. A gas on rugged terrain, sand, dirt. A gutsy hill climber, too. Equipped with recoil starter and throttle control. 12½" long. Great Metalflake color. .049 engine. Metal roll bar.

They're your kind of fun. They're ready to run. Send 25¢ for brochure of Cox planes, cars, boats and accessories.

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Dastardly discrepancy?

While reading your article on how to build the HE-111z glider tug in the Feb. '70 issue, I noticed that your overhead diagram differed from an overhead picture of the actual plane I had.

In the enclosed picture, you will see the rear section of the two fuselages is joined by a long spar. The photo also shows that the wing section connecting the two planes tapers back like the regular wing.

James Konoplisky, Chester, Pa.

The picture shown us appears to be an early, experimental model—perhaps the very first. This could account for the strange fuselage-to-fuselage boom near the tail and the different taper on the "center-section." —The Publisher.

Information, please

I enjoy your magazine a great deal. The variety of subjects covered each month indicates a great deal of latitude on the part of your planners. It seems to me that every article is well-thought-out and researched prior to publication.

I would appreciate any information concerning RC reed equipment. I own a 10-channel Orbit and use the Bonner servos for control movement. The only big advantage I have found is being able to fly near wires without interference. But because of the relatively large size of this equipment, do we have any plane with a 65 to 70" wing, about 620 to 650 sq. in., in the 7½- to 8½-pound class for a ST 21/40 FV?

Albert Campus, Ft. Knox, Ky.

How about the deBolt Champion? —The Publisher

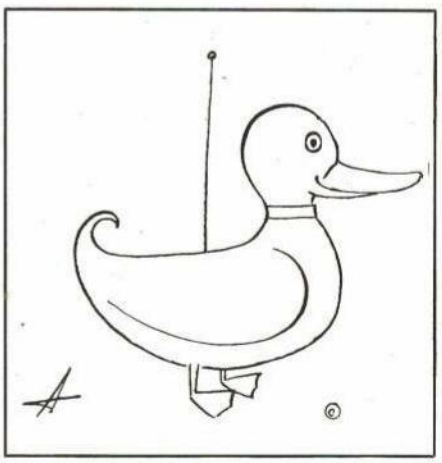
Waco notes

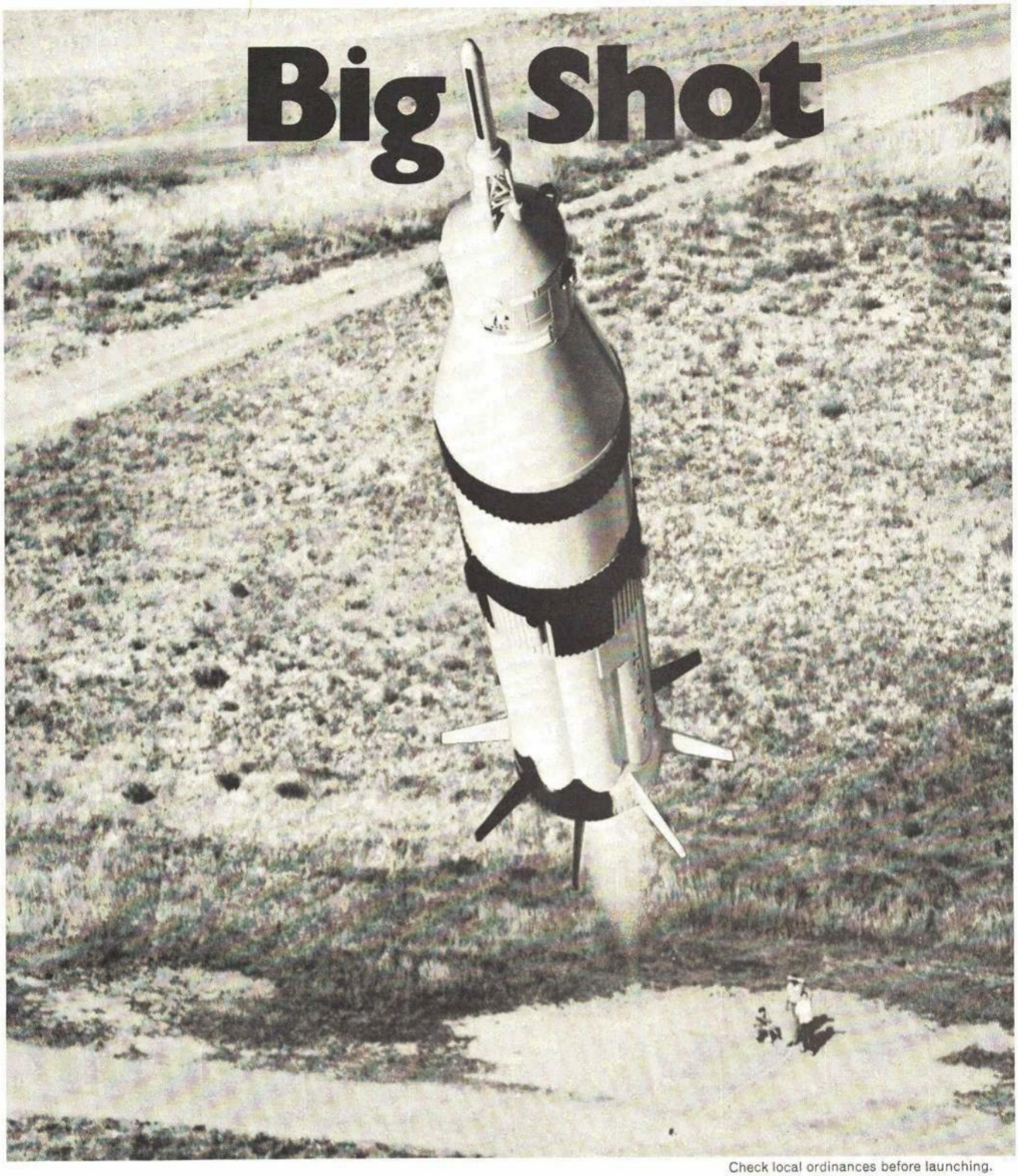
A note to Schreyer and Kimble who did the Waco YKC-S in the June issue: the Waco was made in 1935. It was identical to the YKC made in 1934. In 1935, Waco came out with their first custom series, the UOC and YOC. At the same time, they continued to produce the 1923 YKC and UKC, adding the suffix, 'S', probably to denote standard.

The above information is from Paul Matt's *Historical Aviation Album,* Vol. II. It is now out of print, but AMA supply and service may still have some copies. It gives a very thorough coverage of the Waco Cabin Bipes.

My indoor gliders have been very unsuccessful. The 18" sheds its wings and the 15" has a bad roll on launch. Oh, well—back to the drawing board.

Sears B. McCorrison, Mattapan, Mass.





Check local ordinances before launching.

Seconds after liftoff your Cox Model Rocket hits 1800 feet. Then, the retro rocket pops the chute open, down it floats ready for another space shot. Model Rocketry is the most exciting new hobby in years. And now you can enjoy it minutes after leaving the store. Because Cox Rockets are ready to launch when you buy them. Great hobby to share with Dad.

Six authentic models to choose from, starting at under $4. Apollo Little Joe II, Honest John, Nike Zeus, Astra Glider, the 21" Saturn 1B (shown) and Apollo Saturn V. See them today. Get in on the excitement. Send 25c for our "Handbook of Model Rocketry."

COX

Also see our complete line of gasoline powered planes, cars and boats.

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Nickelsen's twin K&B 40's dig in nose of fine WWII Catalina PBY. Flew briefly, then crashed.

This gas FF had longest, straightest taxi of the day. Couldn't rotate for takeoff.

Dan Lutz won RC event with Piper Cub, J-95. Floats are also scale. Performed well.

On the Scene

Flightmasters' R.O.W. Meet

All classes of scale models flew from Lake Elsinore. With many entries, it will be an annual event.

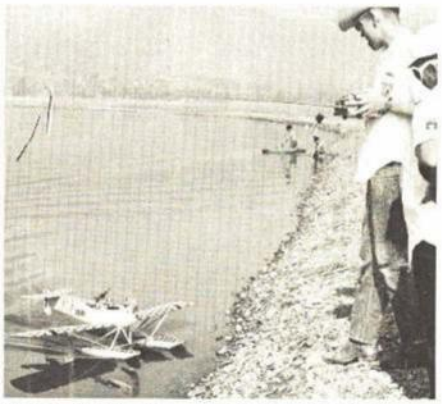
ROBERT ANGEL all photos by Terry Aldrich

A RISE-OFF-WATER (ROW) meet generates a special kind of excitement. It also can generate special problems by adding another medium to be mastered by the model builder. The Flightmasters ROW Scale meet at Lake Elsinore, Calif., demonstrated both.

The scene opened at eight o'clock, Sunday morning, June 14, at the lagoon. Some fliers had camped on shore overnight for an early start before the afternoon breeze began. Kyaks, canoes, rafts and rowboats were present for model retrieval, but those were soon abandoned as the modelers discovered

(Continued on page 62)

Granger Williams used an old Gloster-6 in control line event for first place.



Weird WWI job, Brandenberg-W29 is excellent ROW. All-moving under-rudder.

Bill Warner quickly catches tipped-over rubber model to minimize soaking up the lake.

Enjoying the lake? Left to right: 020-powered Stinson SR-6, rubber-powered Aeronca C-2 and Citabria, WWI Burgess Dunne AH-7.

Non-scale demonstration model, an original design by Rex Raymond pulled along by two Webra 60's. Extremely fast, it leaped off.

CARL GOLDBERG

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

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Radio Control; Also Free-Flight

Span 42"
Length 31"
Area 240 sq. in.
Weight 26-36 oz.

For .049 to .10 Engines

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Can be flown 6 ways:

1. Single Channel Radio, Rudder Only
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3. Two Channels, Rudder and Elevator
4. Three Channels; Rudder, Elevator, Engine Throttle
5. Four Channels; Rudder, Elevator, Engine Throttle, and Ailerons
6. Free Flight

Full explanation of each method given on plan.

FEATURES:

- One-piece molded Wing, high-lift
- One-piece molded Stabilizer
- One-piece molded Vertical Fin
- Molded Fuselage, completely assembled with firewall, nose gear, plywood floor, side rails, and main landing gear block already installed
- Complete fittings — nylon links, horns and keepers; nylon hinge material, screws, blind nuts, washers, eyelets, retaining springs, etc.
- Complete plans, with step-by-step illustrations
- Instructions on Operating Radio Control Models

Radio Control Flying is Fun! You can actually feel the thrill of controlling an airplane in flight — doing stunts, loops and rolls — and making it come back to you and land where you want. And the shortest way to success is with the unique new RANGER 42. This model has been carefully engineered, leaving only the simplest final assembly steps, all clearly illustrated. Flight stability is exceptional, as well as response to control. **All you have to do is add your engine, wheels, and radio control — only 6 to 8 hours work — and you're ready to go FLYING!** Just ask your hobby dealer — he'll be glad to show you the features.

SKYLANE 62

Semi-Scale Beauty in A Great Flying Model!

DELUXE — Includes New Fittings

$34.95

Tough, roomy cabin and front end, takes single to 10 channels or proportional.
Steerable nose gear.

SPAN 62" AREA 540 sq. in.
LENGTH 50" WEIGHT 4½-5 lbs.

FOR ENGINES FROM .19 to .35

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For Single Channel — Escapement, Servo or Pulse
Span 42" Area 244 sq. in.
Length 35" Weight 22 oz.
For .049 Engines

THE FAMOUS FALCON

The Design That Makes The Simplest, Sound, Attractive Airplane

Sr. Falcon Shown

SR. FALCON $34.95

DELUXE — Includes New Fittings. For 10 Channels or Proportional
Span 69" Area 810 Sq. In.
Length 53" Weight 6¼ Lbs.
For .35 to .45 Engines

FALCON 56 $18.95

DELUXE — Includes New Fittings. Takes Single to 10 Channels or Proportional
Rudder-Only or Multi-Training
Span 56" Area 558 sq. in.
Length 43" Weight 3½ lbs.
For .09-.15-.19 Engines

Junior FALCON $6.95

DELUXE — Includes New Fittings. For Single Channel — Escapement, Servo or Pulse
Span 37" Area 250 sq. in.
Length 28" Weight 16 oz.
For .049 Engines

SKYLARK

World's FIRST Single or Twin Engine R/C Models

Skylark 56 Shown

DELUXE — Includes New Fittings

SKYLARK 56 $21.50

Takes Single to 10 Channels or Proportional
Span 56" Area 528 sq. in.
Length 44" Weight 3½ - 4½ lbs.
For Single Eng. .09, .15, or .19
For Twin Eng. Use Two .09's or .15's

JR. SKYLARK $7.95

For Single Channel — Escapement, Servo or Pulse
Span 37" Area 235 sq. in.
Length 29" Weight 18 oz.
For Single Engine Use .049
For Twin Eng. Use Two .01's or .02's

Shoestring

The Goodyear Racer with Enough Wing Area and Stability so YOU Can Fly It!

$27.50

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FOR 6, 8, 10 CHANNELS OR PROPORTIONAL

SPAN 54" AREA 540 Sq. In.
LENGTH 44" WEIGHT 4½ - 5 Lbs.

FOR .19-.40 ENGINES

Most Beautiful R/C Ever Kitted!

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I am sending 10c for 4 pg. Illustrated Catalog with "Recommendations on Starting in R/C," Basic Explanation of R/C Equipment, and Radio Control Definitions.

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FIRST PLACE
Naval Air Station, Kingsville, Texas. Sponsored by VT-21. Class D Expert
Houston Radio Control Club Annual, Houston, Texas. Class C Expert
Alamo Radio Control Society Annual, San Antonio, Texas. Class C Expert
Southwest Championships 1969, Dallas, Texas. Class C Expert
Mexican 8th Concurso International Mexican Nationals, Mexico City, 1969

SECOND PLACE
9th Annual R/C Contest, Baton Rouge, Louisiana. Class D Expert
Spring Alamo Radio Control Contest, San Antonio, Texas. Class D Expert
Dallas Radio Control Annual, Dallas, Texas. Class D Expert
Denver 11th Mile High Meet 1969, Denver, Colorado. Class C Expert
Fourth Annual Dallas R/C Meet 1969, Dallas, Texas. Class C Expert

THIRD PLACE
Mid-Western Championships 10th Annual, Wichita, Kansas. Class C Expert

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See last month's magazine for Sales & Service Center nearest you.

Large fin keeps Islander in the groove during catapult launching. Because of speed of launch, do not alter trim of fin or tailplane. Trim with ailerons only and little bits of clay for weight.

Make a towline catapult glider from scrap balsa, then with ink and felt-tipped pen turn it into an airliner.

Islander

RAY MALMSTROM

FEW BRITISH airplanes have the simplicity of line and obvious flyability of John Britten's and Desmond Norman's twin-engine Islander. When this little feeder-line and charter-type airplane won the London-Sydney Air Race, the world really took notice, and the Islander's order book rapidly filled. With its two-motor configuration, the shapely Islander presents some problems as a gas- or rubber-powered model, but as a simple, yet distinctive, catapult towline glider, it is just the job to start modelers reaching for that balsa sheet! No motors to worry about—just a catapult towline. This useful method of launching a model makes for flying fun with a difference.

Construction sketches are shown on the plan; therefore, building notes are brief. Trace all parts accurately. To complete the fuselage shape, F-1 must be lined up with the front of the fuselage. Transfer the parts to the correct thickness of balsa sheet (medium grade) and cut them out. Sandpaper wing panels and tailplane to the correct sections; round off all edges. Lay out all the parts and give them several thin coats of clear dope, sanding lightly between coats. To avoid warps, pin the flying surfaces down on the building board while drying.

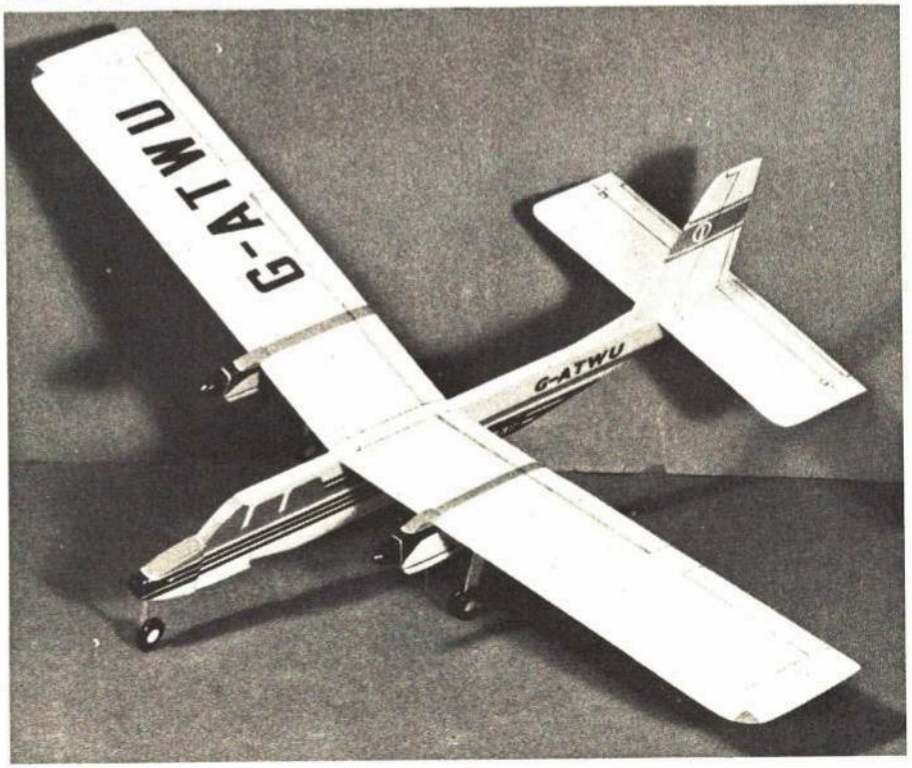
At the wing position on top of the fuselage, cut a shallow V groove. The wing center section rests in this. Cement the 1/16"-sheet nose-doublers in place. Drill a ⅛" dia. hole in the nose and firmly cement in the 1/2" length of dowel rod. Cut the head off a pin and push pin in the launching groove. Add tailplane and fin, being sure fin is perpendicular to the tailplane. Slightly bevel the center edges of the wing panels, and pin one panel to the building board. Cement the opposite panel to it, and raise this panel up onto the wing dihedral jig (see sketch). A strip of greaseproof paper under the center joint will prevent the wing from sticking to the board. Remove the wing when dry and reinforce the center joint with a strip of silk or nylon.

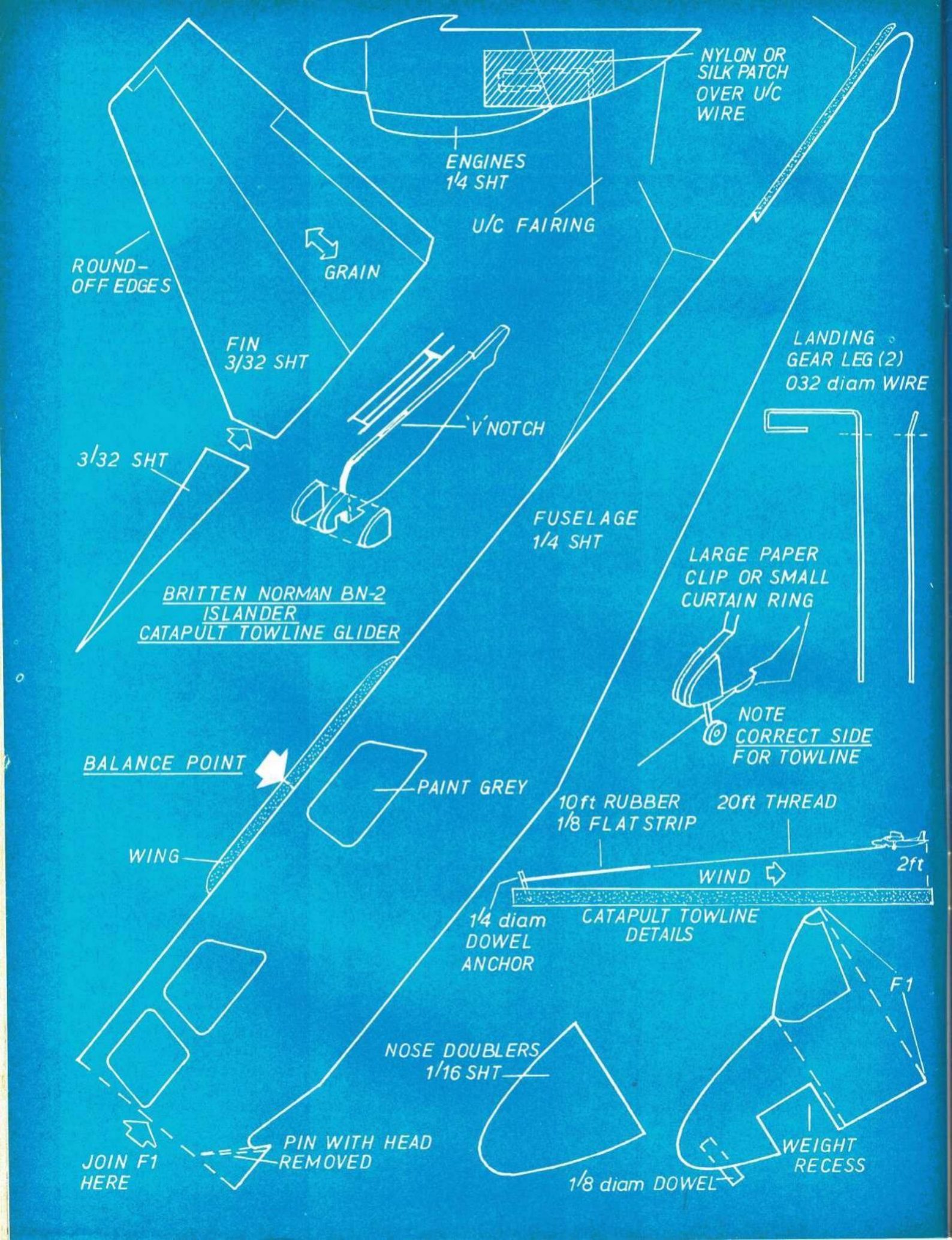
Form the undercarriage legs as shown and cement to the inboard sides of each engine, again reinforcing with a silk or nylon patch. Add the thin notepaper fairings and firmly cement a wheel (cut from 1/8" sheet) on either side of each leg. Cement the engine assemblies to the wing. Cement the wing to the top of the fuselage in the groove already cut out. The simple nose-wheel assembly is shown on the plan. The neoprene tubing is just a tight push fit onto the nose dowel, and is not cemented to it.

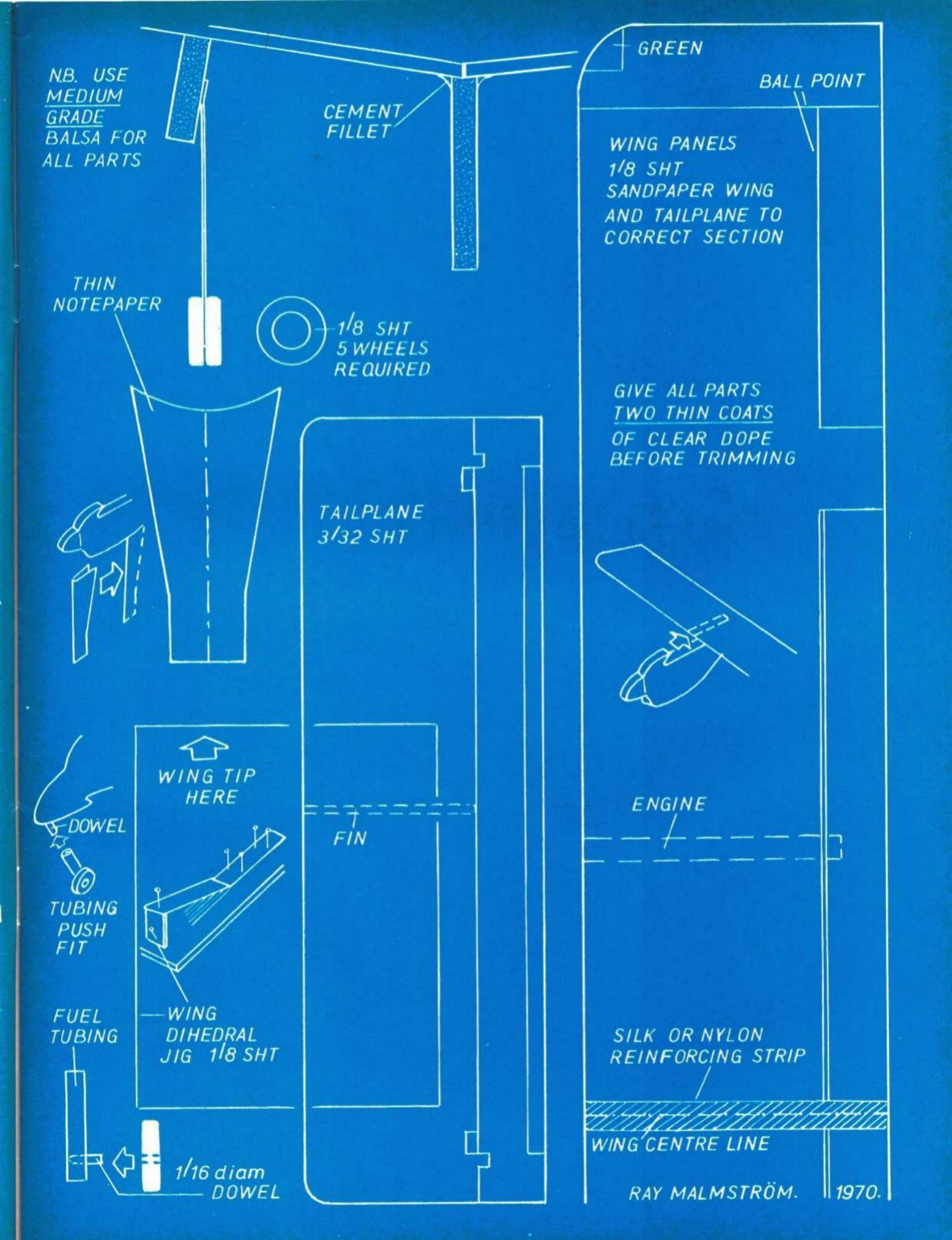
Do not weigh down the Islander with a lot of heavy colored dope. Use trim strip and paint sparingly. The ship may be finished in any one of the many operators' color schemes. Our Islander has

(Continued on page 62)

Model Islander is similar to many small high-winged airliners. Others can be made with these same techniques. Use paint job from a favorite airline. Nose wheel is no problem in launching.




NYLON OR SILK PATCH OVER U/C WIRE
ENGINES 1/4 SHT
U/C FAIRING
ROUND-OFF EDGES
GRAIN
FIN 3/32 SHT
3/32 SHT
'V' NOTCH
LANDING GEAR LEG (2) 032 diam WIRE
FUSELAGE 1/4 SHT
LARGE PAPER CLIP OR SMALL CURTAIN RING
NOTE CORRECT SIDE FOR TOWLINE
BRITTEN NORMAN BN-2 ISLANDER CATAPULT TOWLINE GLIDER
BALANCE POINT
PAINT GREY
WING
10ft RUBBER 1/8 FLAT STRIP
20ft THREAD
2ft
WIND
1/4 diam DOWEL ANCHOR
CATAPULT TOWLINE DETAILS
F1
NOSE DOUBLERS 1/16 SHT
JOIN F1 HERE
PIN WITH HEAD REMOVED
1/8 diam DOWEL
WEIGHT RECESS


N.B. USE MEDIUM GRADE BALSA FOR ALL PARTS
CEMENT FILLET
GREEN
BALL POINT
WING PANELS 1/8 SHT SANDPAPER WING AND TAILPLANE TO CORRECT SECTION
THIN NOTEPAPER
1/8 SHT 5 WHEELS REQUIRED
GIVE ALL PARTS TWO THIN COATS OF CLEAR DOPE BEFORE TRIMMING
TAILPLANE 3/32 SHT
WING TIP HERE
DOWEL
TUBING PUSH FIT
FIN
ENGINE
FUEL TUBING
WING DIHEDRAL JIG 1/8 SHT
SILK OR NYLON REINFORCING STRIP
WING CENTRE LINE
1/16 diam DOWEL
RAY MALMSTRÖM. 1970.

In its combat colors the mighty Phantom in which the author had this fabulous flight looks rather awesome. Dive brakes, wing slats and flaps, all hanging out.

FLIGHT IN A

Stabilizer sections also function as ailerons. Anhedral provides additional lateral area. Needless to say, these fast birds are quite aerobatic.

Preflight briefing in the operations building. Major Kaufman, at left, describes the flight plan to the author.

Exciting moments before climbing aboard. Note "G" suit, flight gloves, and necktie. A civilian for a passenger!

BEN MILLSPAUGH

PHANTOM

Modeler gets the ride of a lifetime in a U.S. Air Force jet fighter.

AS WITH MOST model aircraft builders, I have felt a keen desire to fly the real plane. Not long ago, I had just that opportunity—to pilot the Phantom II, McDonnell's mighty F-4. Here is the story behind a fantastic experience.

The chances of a civilian flying one of the Air Force's first line fighters seemed remote, if not impossible. However, as an aviation writer who reaches the prospective new generation of pilots, I felt my wish just might be granted. Using the philosophy of "You'll never know until you ask," I wrote the Secretary of the Air Force, requesting an orientation flight in the Phantom.

In less than two weeks, a reply arrived. I was informed that my request had been forwarded to the Headquarters of the Tactical Air Command. Anxiously, I awaited final confirmation. Soon a letter came from the Information Office, Holliman AFB, New Mexico. I tore open the envelope and, to my complete surprise, TAC HQ had approved the request, contingent upon my having a high altitude checkout in a pressure chamber. What a break! The chamber ride would present no real problem. The dream of a lifetime was about to come true. I could not wait!

With the letter of confirmation in hand, I drove to the closest Air Force installation, Lowry AFB, Colorado. Lowry had a PTU (Physiological Training Unit) and the CO, Major J. M. Kelso, said giving the "chamber ride" would present no problem. A group of

(Continued on page 86)

When you strap on the Phantom, as in other jet fighters, you really get hooked up: oxygen, intercom, ejection seat, seat belt, rip cord, parachute, etc.

Author has many pulse-jet-powered CL scale ships, such as Sabre jet in background. Here he adjusts canopies on Phantom for display.

all photos by Bill Hannan

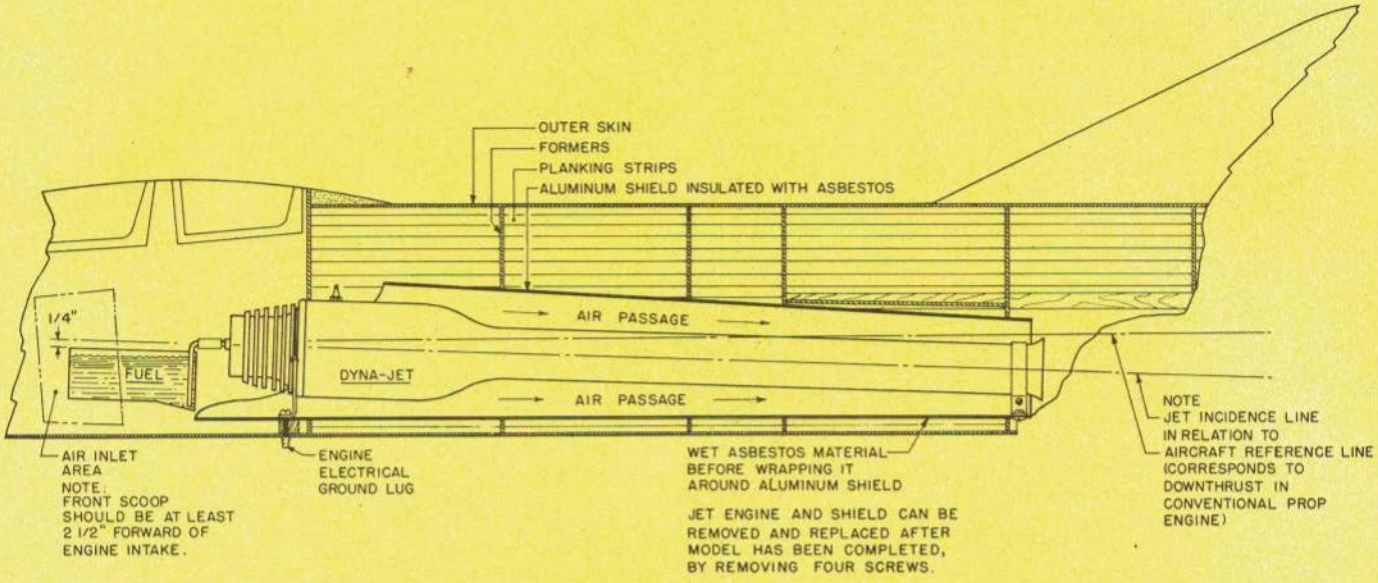
PLANE ON THE COVER

JET RC PHANTOM!

Many years of experience with Dyna-Jets have made this dream plane a practical and successful model aircraft. And it is much simpler than it seems.

Black object in foreground is removable, simulated dual jet exhaust. Only deviations from scale are airfoil and area changes.

Since the model flies at over 160 mph, pilot must be sharp. Canopies are firmly latched down. Landings are always dead-stick.



With model's lifting airfoil, downthrust is needed. Note angle of engine relative to centerline. It is very important.

RALPH SALDIVAR

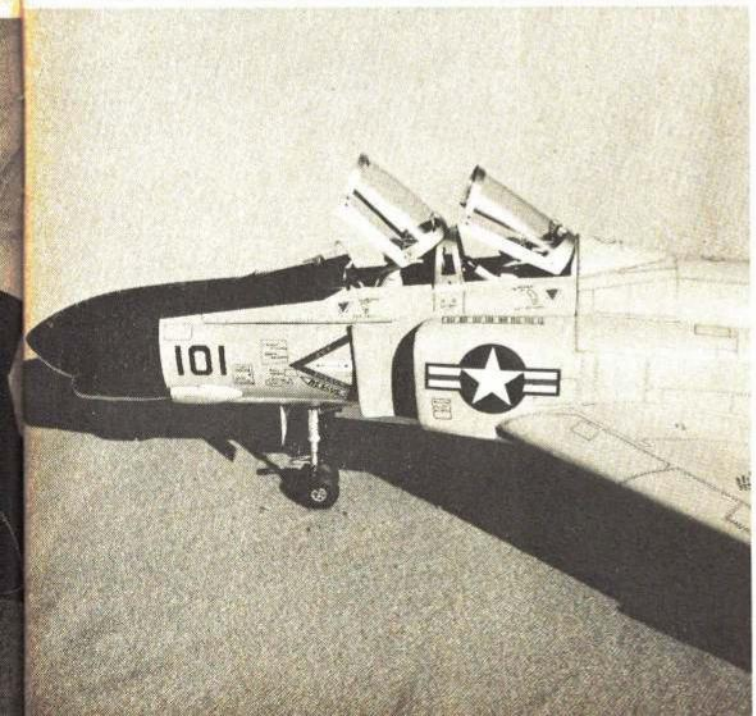
THIS IS THE JET AGE, yet surprisingly few jet-powered models are seen. It is a pity, since nothing is more realistic than the sight and sound of a scale model with a genuine jet engine aboard!

There are several possible approaches to propelling models of jet aircraft. For small free flight models, Jetex units and ducted fans have been used. Ducted fans have also been employed in U-Control and radio-controlled model aircraft with at least some success. Modelers also have resorted to using conventional glow engines and propellers, rationalizing that the prop disk can scarcely be seen in an airborne model. However, none of these forms of propulsion is a complete or truly satisfying answer. After all, when trying to duplicate an actual jet aircraft, why not power it with a jet engine?

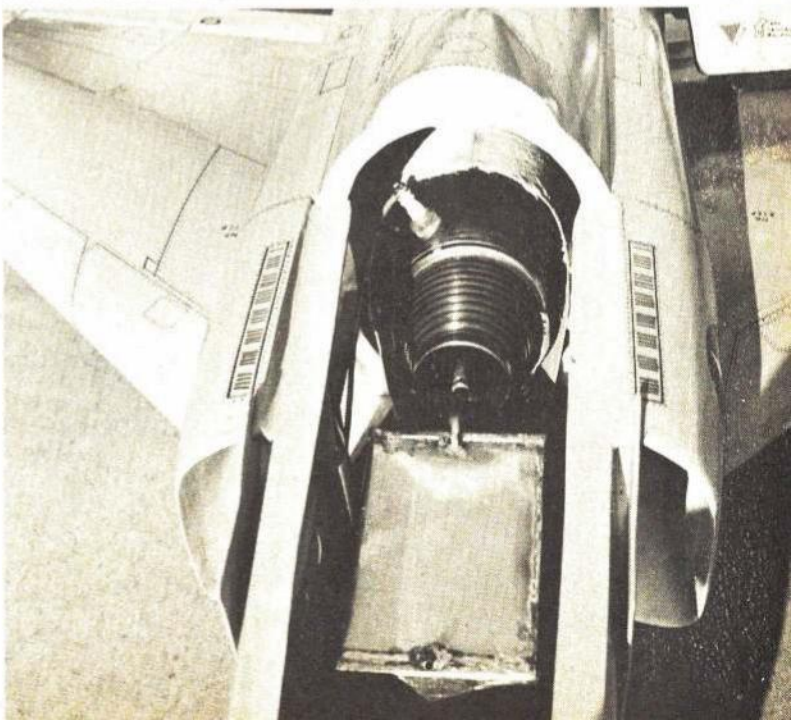
The pros and cons of true jet power should be examined. Without a doubt,

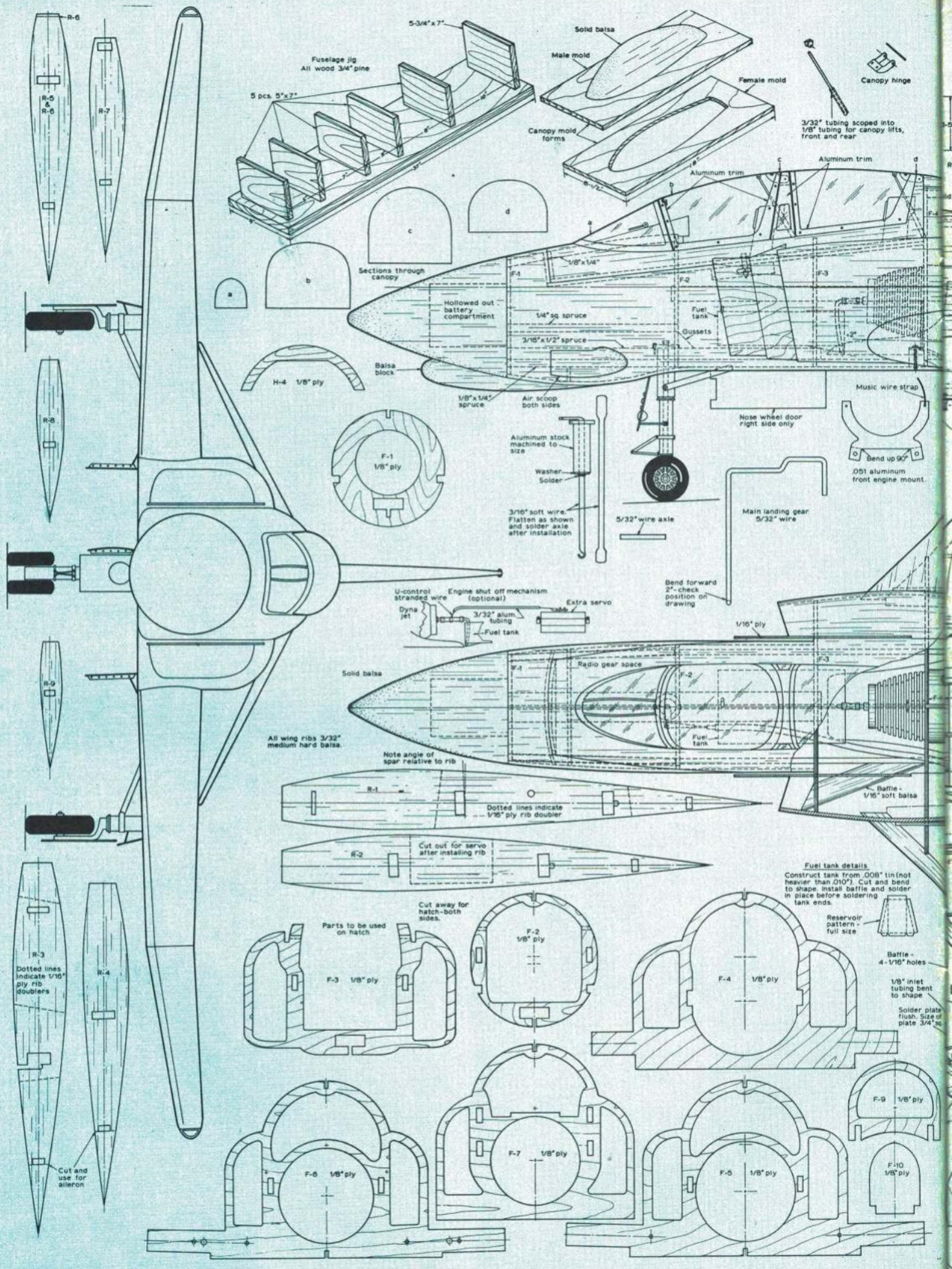
(Continued on page 73)

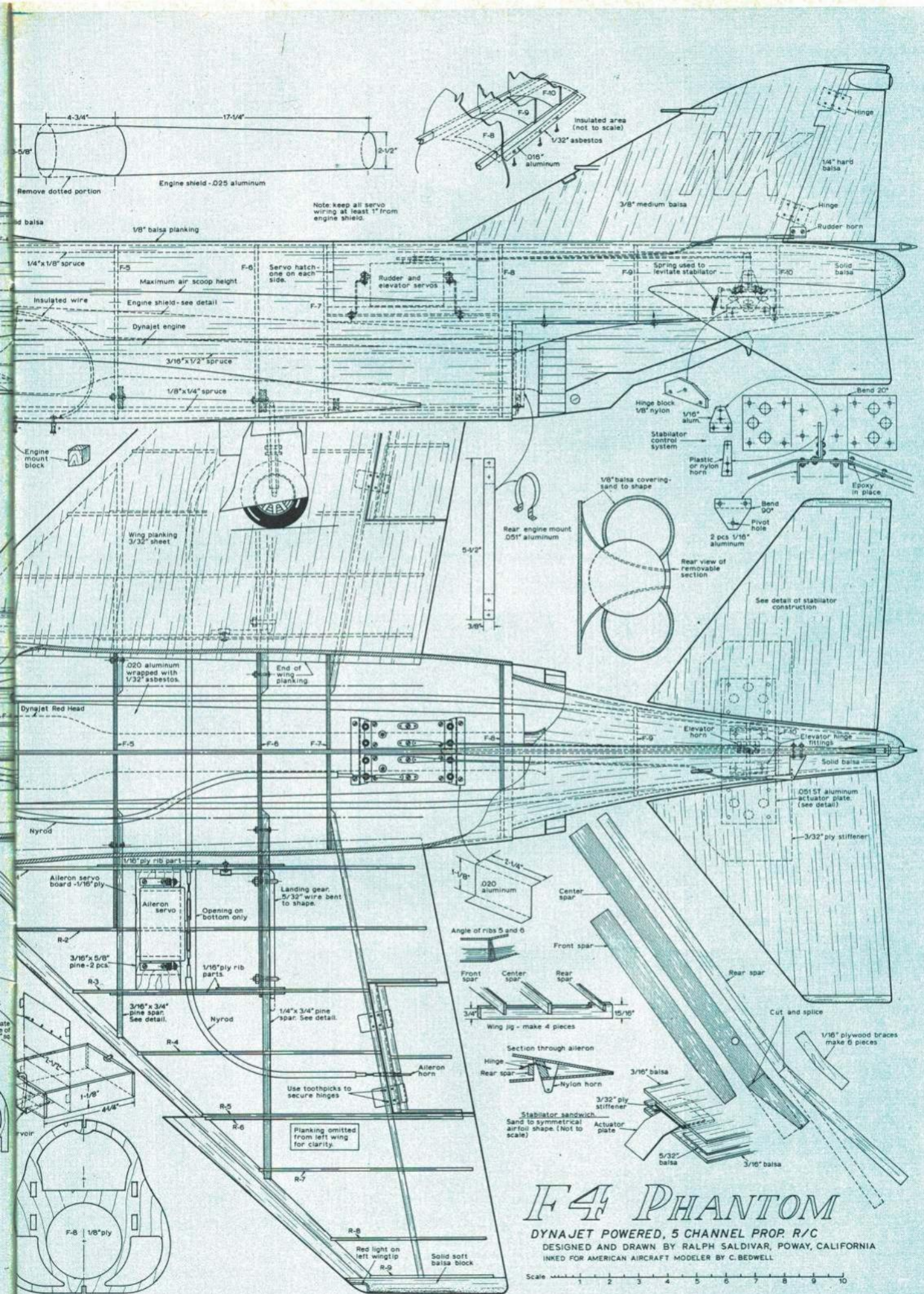
Most of the lettering has been expertly hand-painted. LetraSet can also be used. Small wheels are scale. A smooth runway is required.



With hatch removed for engine starting, heat/fire shield and tank are seen. Indirect scale air intakes are adequate.




R-6
R-5 & R-6
R-7
R-8
R-9
R-3
Dotted lines indicate 1/16" ply rib doublers
R-4
Cut and use for aileron
5-3/4" x 7"
Fuselage jig
All wood 3/4" pine
5 pcs. 5" x 7"
Solid balsa
Male mold
Female mold
Canopy mold forms
Canopy hinge
3/32" tubing scoped into 1/8" tubing for canopy lifts, front and rear
Aluminum trim
Sections through canopy
F-1
F-2
F-3
1/8" x 1/4"
Hollowed out battery compartment
1/4" sq. spruce
3/16" x 1/2" spruce
Fuel tank
Gussets
Balsa block
H-4 1/8" ply
1/8" x 1/4" spruce
Air scoop both sides
Nose wheel door right side only
Music wire strap
Bend up 90°
.051 aluminum front engine mount
F-1 1/8" ply
Aluminum stock machined to size
Washer
Solder
3/16" soft wire. Flatten as shown and solder axle after installation
5/32" wire axle
Main landing gear 5/32" wire
U-control stranded wire
Engine shut off mechanism (optional)
Extra servo
Dyna jet
3/32" alum. tubing
Fuel tank
Bend forward 2° - check position on drawing
1/16" ply
Solid balsa
Radio gear space
All wing ribs 3/32" medium hard balsa.
Note angle of spar relative to rib
R-1
Dotted lines indicate 1/16" ply rib doubler
Baffle - 1/16" soft balsa
R-2
Cut out for servo after installing rib
Fuel tank details
Construct tank from .008" tin (not heavier than .010"). Cut and bend to shape, install baffle and solder in place before soldering tank ends.
Reservoir pattern - full size
Cut away for hatch - both sides.
Parts to be used on hatch
F-3 1/8" ply
F-2 1/8" ply
F-4 1/8" ply
Baffle - 4 - 1/16" holes
1/8" inlet tubing bent to shape
Solder plate flush. Size of plate 3/4" sq.
F-6 1/8" ply
F-7 1/8" ply
F-5 1/8" ply
F-9 1/8" ply
F-10 1/8" ply



F4 PHANTOM

DYNAJET POWERED, 5 CHANNEL PROP. R/C

DESIGNED AND DRAWN BY RALPH SALDIVAR, POWAY, CALIFORNIA

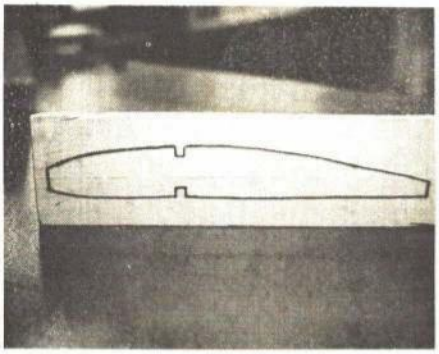
INKED FOR AMERICAN AIRCRAFT MODELER BY C. BEDWELL

Scale 1 2 3 4 5 6 7 8 9 10

FULL SIZE PLANS AVAILABLE — SEE PAGE 70

A "Dinking" Die

The ribs for constant chord wing are easily made with a razor-blade die like the kit makers use.



Photographs by the Author

Draw rib outline on knotless ¼" plywood.

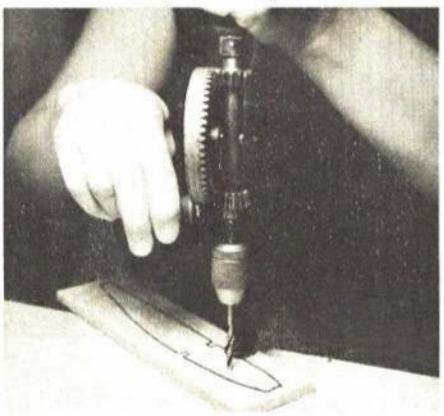
WALT WHIPPO

TOO OFTEN a modeler has worked up his enthusiasm over a glider with three or four yards of wing, or an equally glamorous Sopwith Tripe — until he counted the ribs! That is when he sighs and gives up at the prospect of all that razor-blading, sawing, chiseling, or whatever he has been doing.

If this has happened to him once, it was once too often, because the same technique used by manufacturers to produce an endless supply of identical ribs can be duplicated with this simple, home-made "dinking" die.

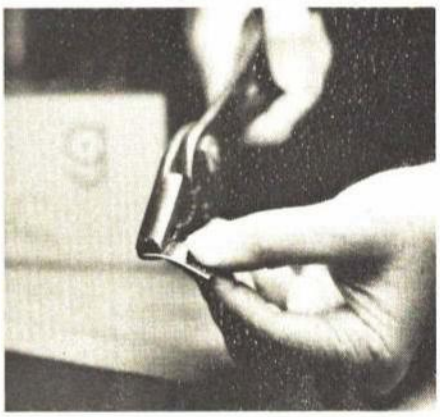
To make the die, trace the airfoil as in the first photo. Follow directions given with photos two through five. Then repeat steps six and seven.

By using this technique a large number of really identical ribs can be cut in a short time, and more are available when needed. With a ¼" thick plywood base and standard double-edged razor blades, enough cutting edge is exposed to cut through ⅛" balsa. Use and store the "dinking" die carefully.



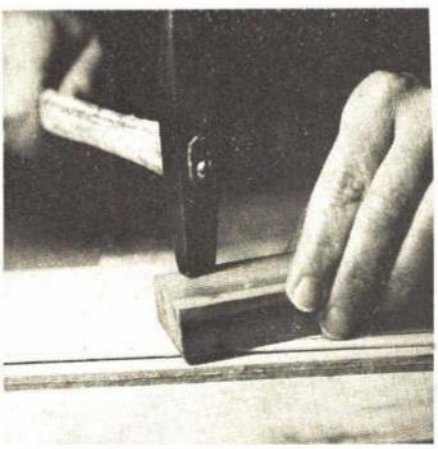
Drill ¼" diameter knockout holes inside rib outline in places, depending on pattern.

Saw cleanly with jig saw all around outline.

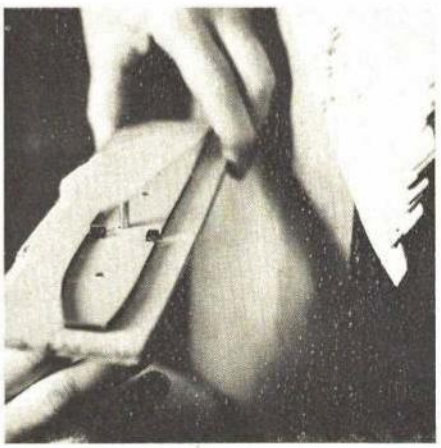


Break a double-edged razor blade (listen to the ads to decide which is best?) in half. Snap off ends to leave sharp corners.

Using thin ¼" hardwood strips as wedges, fit the blade sections around the airfoil.



Place die on flat board with blades up, and over it a sheet of balsa. Using hardwood block over balsa, tap block around the die to cut the ribs. Tap until blades show through.



With dowel, push ribs off the die. Repeat process as necessary to make wing.

SCALE TECHNIQUES FOR THE PLASTIC MODELER

HOMEMADE NIEUPORTS

HARRY WOODMAN

Polycard construction, based on kits, is inexpensive and versatile way to create any subject, from largest to most detailed.

CONVERSION OF PLASTIC kit models is all too common. However, new techniques and a new material, polystyrene card, are used to construct these Nieuport versions from a standard Hawk kit. Two important steps to be taken before beginning construction are studying pictures of the original aircraft and learning the properties and limitations of this new material.

Polystyrene card, or polycard, is sheet plastic normally supplied in a semi-matte finish. It can be folded, sanded and molded, and it will hold score lines and dimples. To become familiar with the material and methods, those who never have used this medium should make a mock-up with ordinary good quality card. The adhesive used is polystyrene cement (the thick type is suitable only for use with very thick polycard). The thin bottled variety, despite its tendency to evaporate quickly, is the only adhesive recommended for this project. Cement bonds plastic by dissolving it, so always use the absolute minimum with the thinner polycards. The most common error in polycard modeling occurs because modelers do not realize that thick stringy plastic cement will soften card, sometimes several hours after application.

Polycard is available in several thicknesses, such as 6/100 inch—usually referred to as 6 thou. It is available also in 40, 30, 20, 10 and 5 thou thicknesses—the last being similar to the texture and weight of this magazine cover.

For the Nieuport, 10 thou card is used for everything except the cowling struts and tail skid support. These require 20 thou, as well as a small quantity of 5 thou. Polycard always should be cut with a very sharp blade. Scissors can be used only for rough cutting, since the scissor action tends to curl the edges of the thinner polycards. The tools required are those which the plastic modeler ordinarily has: blades, fine wet-and-dry emery paper, and a fine drill (this item is not essential). Required for polycard are a steel rule, a set square, engineering drawing dividers, and a selection of small modeling files.

Construction

The fuselage for all three Nieuport versions (24, 24bis and 27) is virtually that of the earlier type 17, filled out and streamlined by adding formers and stringers. In modeling, a similar procedure is followed, except that the sides and top of the fuselage are preformed single units. The Hawk kit fuselage halves should be shorn of the tail skid and rudder, and the headrest and the area immediately surrounding the cockpit carefully cut away.

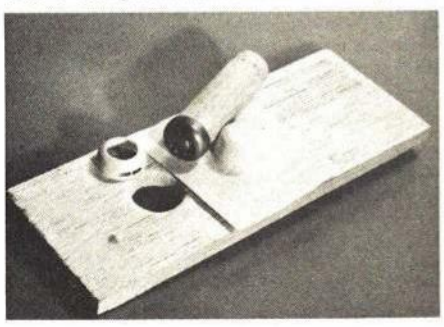
Before the halves can be joined, the interior of the cockpit area must be furnished. The technique for furnishing cockpits in quarter scale is one of suggestion rather than detailed presentation. Don't waste time on work which will not be seen. The Nieuport Scouts had a rather small cockpit opening. There was no dashboard, and instruments were attached to any convenient member. The arrangement was by no means standardized, as can be seen in the many photos of pilots in these cockpits. Since the usual focus of attention, the instrument panel, is missing, I installed a map board, as was carried by many pilots. It consisted of a plywood board mounted in front of the cockpit, rather like a drawing board, to which the map was attached, often by elastic bands. More refined map boards had rollers.

Modelers frequently forget that the interior sides of the fuselage can be clearly seen and deserve some attempt at detail or simulation of detail. In the later models, the shape of the Nieuport side walls was concave (apart from the main vertical members). Since the inside of the Hawk kit fuselage halves is flat, the appearance of concavity can be achieved by a little careful deception. Flat panels (Drawing M), cut from 10 thou card, are painted medium grey. While the paint is still wet, some darker grey is added to the top and worked gradually into the lighter shade.

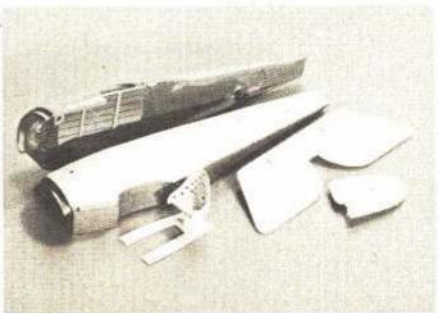
The vertical members are pieces of sprue painted pale brown, as are the dummy longerons. The cross wires are merely lines drawn with a hard pencil. Stringer lines are drawn with a softer pencil. After the cockpit has been fitted out, the halves are joined. When the joint is firm, the fuselage is sanded all over to reduce slightly the thickness of the original plastic and to provide a better holding surface for the skinning which is to follow.

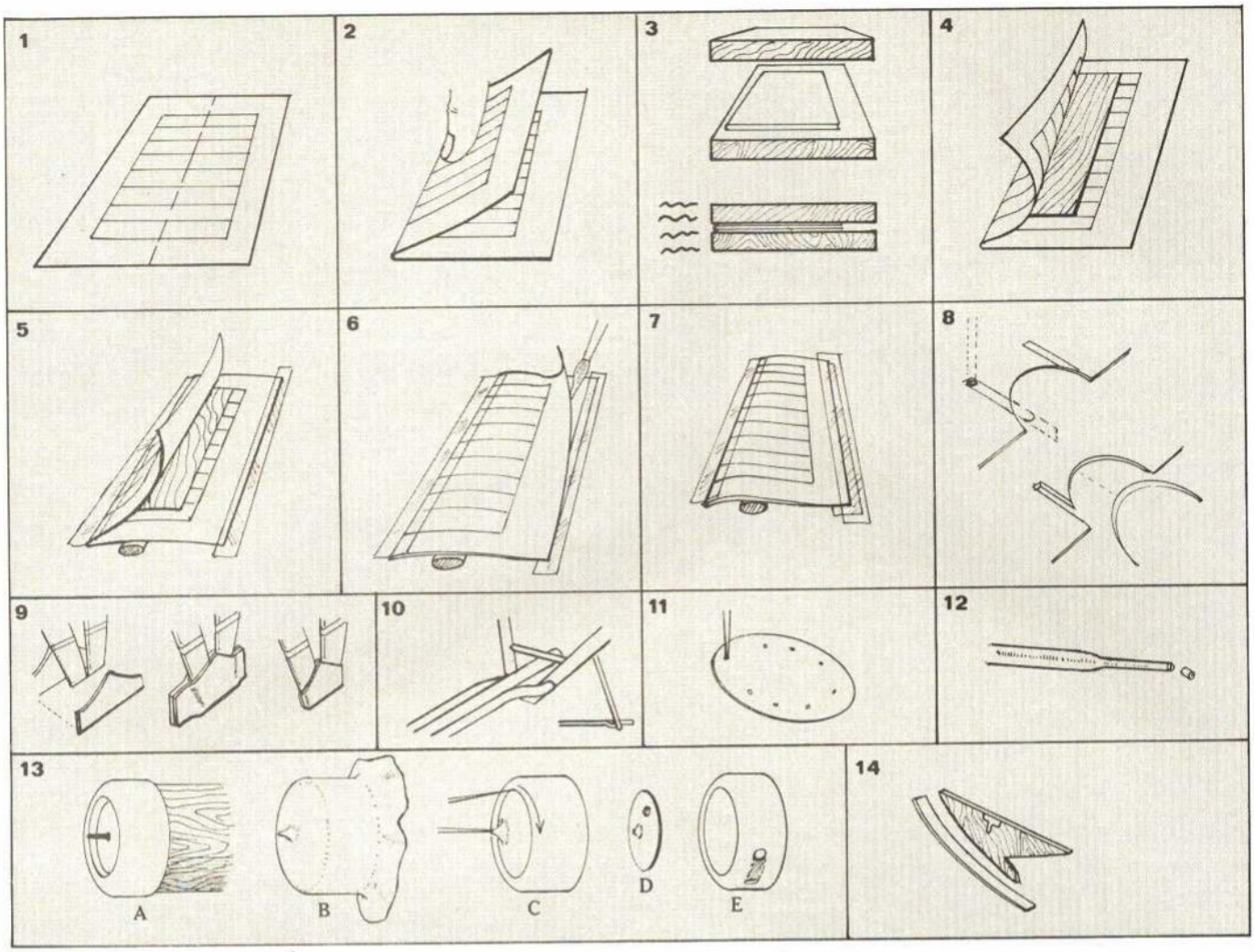
Drawing H is a full-size template for the fuselage side skins. It is traced carefully onto 10 thou card. Reverse the template for the opposite fuselage side. Before the sides are cut out, score the dotted lines lightly, using a steel rule and set square and a suitable scoring instrument (I use the back edge of an old modeling knife). These lines represent the stringers, while the front unscored portion represents the plywood side paneling. The panels then are cut out, and the front unscored portion is cut away from the rear part. The side panels are fastened to the "core" fuselage by

Cowl from kit is mounted to balsa holder to form a new plasticard cowl for another plane.



Here again, original piece is used to make new one. Later alter plasticard part to suit.



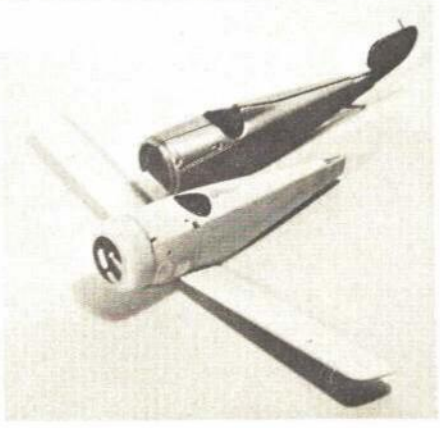


running a thin line of cement along the top and bottom edges only. When the sides are exactly placed, the area immediately in front of the stern post can be firmly attached to the core fuselage.

Note that the sides (and the top surfaces) are very slightly oversize so that they overlap. This is deliberate and allows material for trimming and sanding. (See photograph showing the left fuselage half with its side covering attached.) The top panels are attached in the same way—they join at the cockpit sides (Drawing I). The black rectangles are areas to be cut out to accommodate the center section struts. The two small dots are holes which permit the aileron rods to pass through. Note that the rear top surface has a dotted portion at the tail. If the 24bis is being built, this part should be cut off, because the tail assembly is identical to that of the type 17. For the other types, the tongue-shaped piece should remain. It represents an aluminum panel overlapping the leading edge of the horizontal tail surfaces. A new headrest should be made from 10 thou card and the inspection panels on the forepart of the fuselage are cut from 5 thou card (Drawing 11).

When all panels are in place, see that all joints are firm and then sand over them. Holes for the control wires can be made by heating a sewing needle and pressing it through the card. The needle must not be glowing. Test it on a piece of waste plastic card before making the actual holes. The small crater formed by this method represents the slightly reinforced aperture of the original. Stitched strips on either side of the upper fuselage ahead of the cockpit, typical of Nieuport Scouts, can be represented by placing a steel rule on a piece of aluminum foil and embossing a regular zigzag line with a sewing needle. Run the finger gently over the line to flatten it a little, and then cut out the strip with a very sharp razor blade. Paint the strip pale blue and put in place, using a small amount of clear varnish. (This should be done after painting fuselage.)

Author cautions not to detail unseen parts of the model—to avoid wasted work.



The padded cockpit coaming on the Nieuport covered only the front half of the edge. Coamings of this period were not balloon-type affairs, as some plastic kits suggest, but usually were a strip of leather padded with rags or horsehair and tacked in place. Its accurate wrinkled appearance can be achieved by painting the edge with thick dark-brown enamel, using a fine brush. When the first application has fully dried, paint it over again, and then a third time. With a mapping pen, dot in a few tack heads around the perimeter.

The cowl and engine in the original kit are unacceptable. The shape is correct, but the engine is molded integral with the cowl, which is extremely thick. A new cowl should be made and an engine from another kit fitted (such as rotaries from the Aurora Sopwith Triplane or Fokker Dr. 1, suitably refined and redetailed). Due to the small aperture of the cowl, little of the engine can be seen, but the cowl must appear to be made from thin metal and is not authentic without its cutouts and seams. To make a new cowl, use the original from the kit as a male mold. The procedure is detailed in Drawings 13A to 13E. The cowl is mounted onto a piece of doweling to ensure a firm fit. Holding the dowel in the right hand, revolve the cowl against a sheet of medium fine glasspaper in the left hand. This reduces the diameter slightly. Then sand with fine paper to restore the curve at the nose.

The female mold is a piece of ¼"

balsa sheet with a circular hole cut into it, slightly larger than the male mold. Note that the edges of the hole are rounded out a little. A piece of 20 thou polycard is then placed over the female mold and held in place with pins or large paper clips. Next, a small piece of wood (end of a wooden toothpick) is placed in the propeller hole of the kit engine. The male mold is smeared lightly with a fine oil, such as typewriter or castor oil, to ensure that the heat will not affect the kit cowling. If the oil is omitted, the kit cowl will melt and stick to the polycard.

The female mold is placed in front of or underneath a source of moderate heat (I use an electric grill on the kitchen stove). Knowing when to withdraw the mold from the heat comes only with practice, but it should be done when the polycard begins to soften enough to sag slightly into the hole. If left too long it will steam and become glossy in appearance. Then it is too soft and floppy for good results. The female mold is removed from the heat and the male mold inserted. (Note the pencil aiming circle.) Push the male mold through until the original cowl clears the edge. Do not push too far. After about five seconds or less, the plastic hardens into the formed shape.

Beginners should not expect to get this right the first or even the second time. Following are some of the commonest faults. The female mold (the hole) is too tight and causes the softened plastic to bunch during entry. The rear of the cowl is too thin because the entry side of the hole has not been rounded off. This allows the softened plastic to ride over the edge. The entire cowl molding is too thin because the male mold has been pushed through too far. Only practice can make perfect. However, this method of making thin realistic cowls, using the kit item as a male mold, has many uses. The purpose of the small piece of wood inserted in the old propeller hole now can be seen. When the molding is formed, a small nipple appears in the dead center of the front. This nipple is the center of the circle when the aperture in the front of the cowl is "cut" out. Use a pair of dividers to circumscribe an exact circle by gently revolving the cutting point over and over again until the center virtually falls out. Only a little cleaning up with light sanding is required.

The rear waste part of the cowl is now cut away. If the original cowl is replaced inside the molding, it acts as a guide for straightening out the rear edge. Do not throw away the circle cut out of the molding. It can be used to make a realistic wheel disk (after reduction). The second disk can be made from a spare molding, since this cowl shape can be used for models other than the Nieuport. Most cowls of the Nieuport 24 to 27 series had a pair of raised seams on either side, although some had seams at eleven and one o'clock. These seams can be represented by attaching pieces of fine sprue to the surface. Before this can be done, the characteristic cowl holes must be cut out. To support the thin plastic, place the cowl over the end of the dowel used to hold the male mold.

The method for cutting out these holes is shown in Drawing 13E. Two end holes are made for each slot, and are carefully widened to the right size by twirling a round section file in the holes. When the two pairs of holes are made, join them by cutting out the area between with a sharp razor blade. The final slot shape is created by using flat section files. This can be achieved neatly.

Making the wings is illustrated in Drawings 1 to 7. This method is by no means the easiest, but it is most effective for models in this scale. Since polycard retains scored lines, they are used to represent the rib spines. Again, it is advisable to make a mock-up first to become familiar with the method and the materials. Drawings 1 to 7 show the full procedure in diagrams for clarity, the captions provide the commentary. Note that in the later series of Nieuports, which are dealt with here, the leading edges of the wings were covered in plywood. Therefore, the scored lines do not go straight across the two surfaces but break in the center. To simulate the thicker ribs in the center (see plans), the lines should be scored quite lightly. Real fabric-covered wings did not have the deep valleys between the rib spines, as is so common in kits.

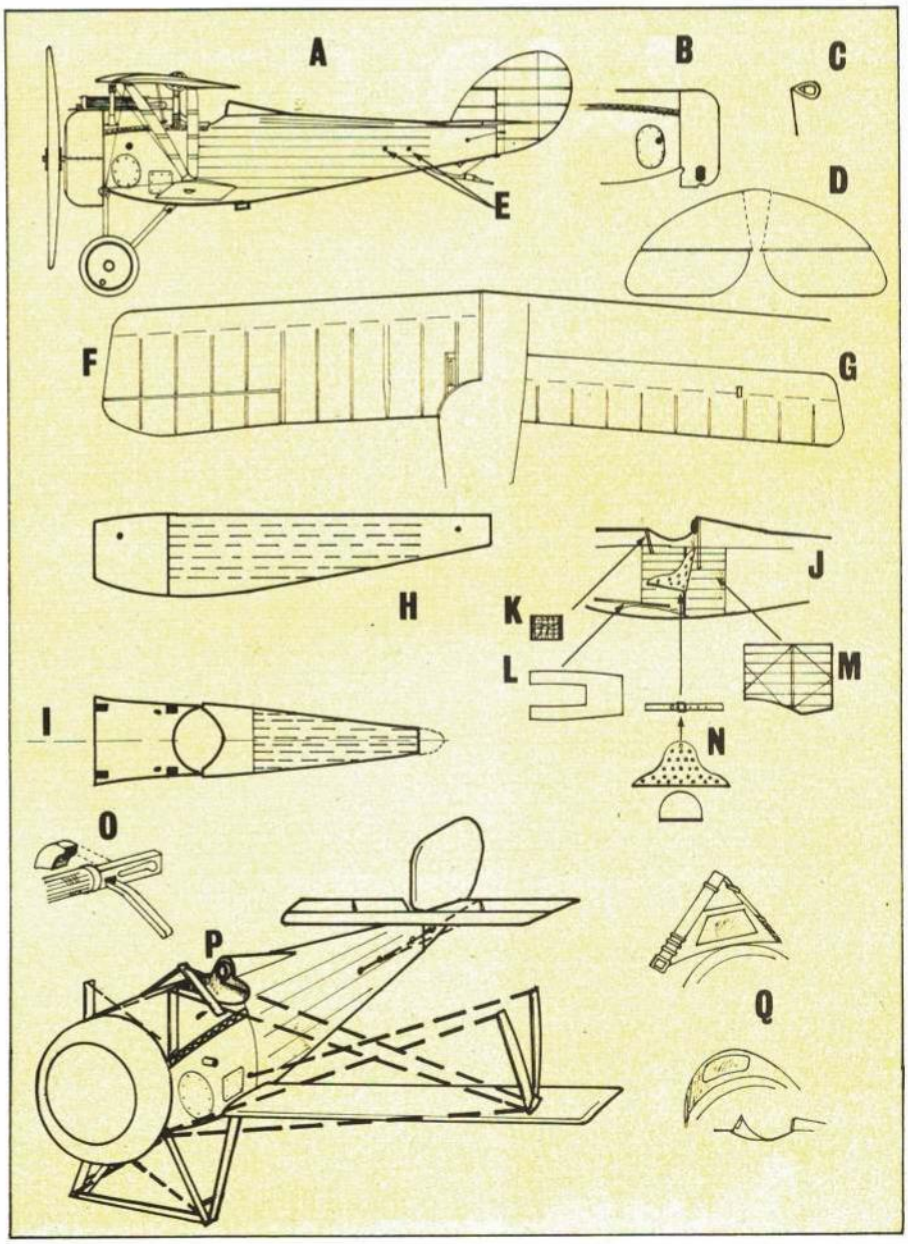
The sweepback of the Nieuport wings requires two units for the top and three (including the small center section to fit into the gap in the belly of the fuselage) for the lower wing. The chord of the lower wings at the tips is slightly greater than it is at the roots. Note that the trailing edges of the lower wings are parallel to the leading edges of the upper wings.

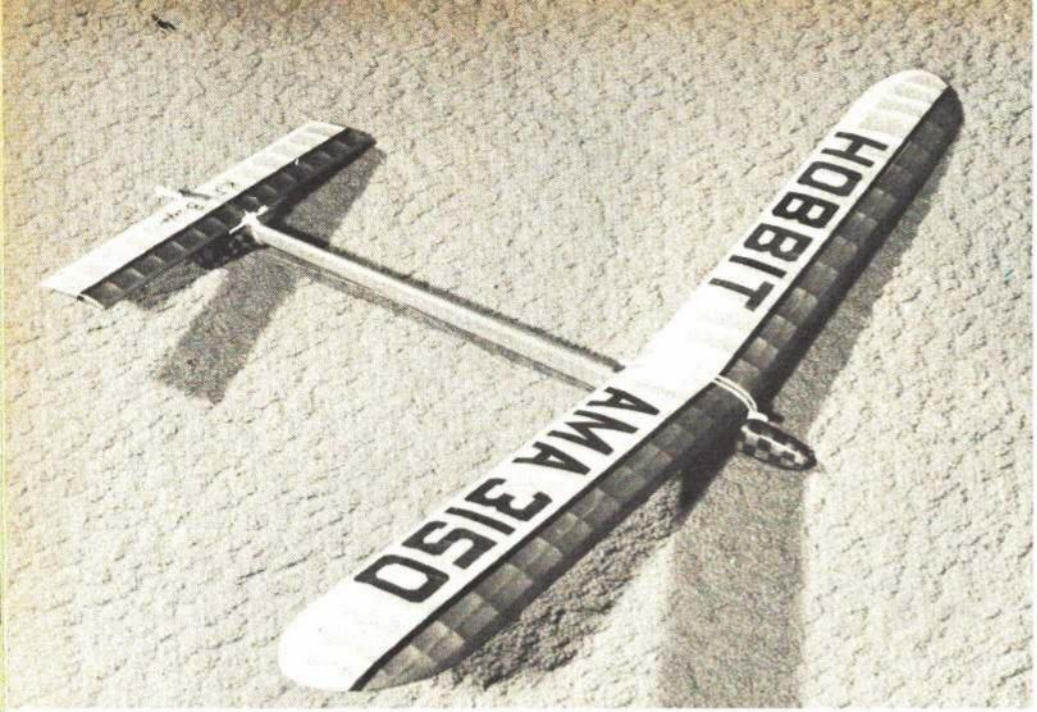
The tail assembly is made in the same way as the wings, but no balsa core is required. The rudder requires a piece of 20 thou card. The horizontal tail surfaces of the types 24 and 27 were skinned with plywood, so no scoring is required. They also can be made from 20 thou sheet. Kit users will think these are too thin, but this is not so. These surfaces were that thin. The giveaway of a kit plastic model, even when well-made, is the heaviness of components and the blunt trailing edges.

The struts supplied in the Hawk kit are

(Continued on page 62)

Letters coordinate to steps explained in text. Enlarge drawing for exact 1/72 scale.





HOBBIT

Simplified high-flying A-1 Nordic Towliner.

KIT BAYS

TIRED OF OILY models and high-decibel contest engines? Then try a quiet and clean A-1 towliner—quick to build, fun to fly, but still one of the most challenging types of competition.

The Hobbit was built partly as a break from the regime of numb eardrums and nicked fingers and partly as an experiment with several new ideas. A-1's typically use fairly conservative airfoil sections having less undercamber than the larger ships. The area restriction means that, to stretch the wing to a fairly high aspect ratio, the wing chord must shrink to an area of critically low Reynolds Numbers. A highly cambered section on a small chord tends to create excessive drag because of the inability of the airflow to "bend" within a small distance without creating turbulence. So why not sacrifice some aspect ratio to allow a slightly greater amount of undercamber? In addition, leading edge sheeting and cap strips are used on the bottom of the wing to keep the lower surface as smooth as possible.

Another somewhat unusual feature on an A-1 is the location of center of gravity at 75%—most ships balance at between 50% and 65% of the wing chord. While sacrificing some stability in extremely rough weather, the CG placement does allow the airfoil to operate at close to its most efficient angle of attack. Along with relatively high undercamber, the Hobbit has an extremely bouyant glide, which is especially effective during light dynamic conditions such as early morning ground lift.

The dihedral angle and rudder area are somewhat less than that used on most A-1's flying today. The idea here is to prevent the model from being too stable. Sound strange? Admittedly, excessive stability is not generally a concern of most designers. Since outdoor models fly in an extremely dynamic environment, the model must have sufficient innate stability to right itself after an upset. But a very stable ship often will react to light lift conditions by simply bouncing slightly as it sails past the thermal. It is rock stable all the way down—in about a minute and one-half. The problem, then, is to design a glider instable enough to work itself into lift, yet sufficiently stable to prevent its spiraling out of strong activity. Since these goals are not completely compatible, the Hobbit strikes a compromise by using a trimming technique of hand launch glider flyers—warping a slight amount of tip wash-in into the inside wing. This prevents it from dropping as a thermal tightens up the glide circle.

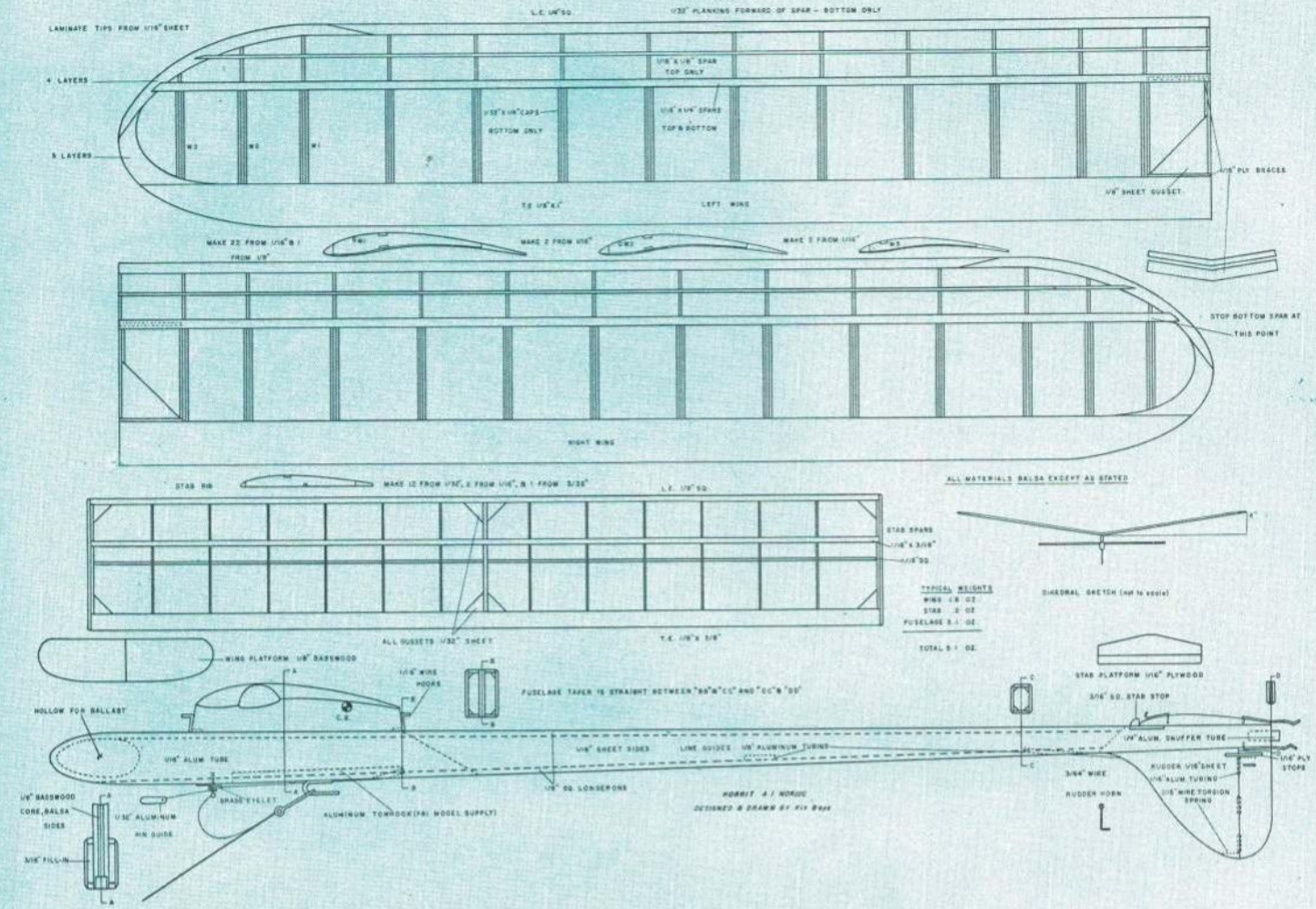
In the 1956 **Air Trails Annual,** Don Foote, one of yesterday's well-known theorists, argued that wash-in on the inside wing combined with a swept tip configuration would cause a model to automatically turn into thermals and away from down drafts! Frankly, the proposition sounded a bit dubious! When I returned to active modeling two years ago, my ships had swept tips simply because I liked their looks. However, both the Hobbit and my ½A seem to have the uncanny ability to follow a thermal. At first, what appeared to be an inconsistent glide pattern in these ships, i.e., normal glide turn, then wandering right or left, then normal turn, etc., was of some concern. But after a few contests, I realized that despite the strange glide behavior, the models were going up and seemed to hang lift more consistently than the old elliptical ships. The theory behind it still seems a little too pat, but apparently there is an important germ of truth in it.

Construction

Use quarter-sawn contest balsa (4-7 lb. density) for all but the hard center rib. The leading and trailing edges are medium weight straight-grained wood, and spars should be slightly harder stock. Light AB grain wood is best for the leading edge planking and cap strips. Using white glue, laminate the tips from light quarter-sawn balsa.

Begin the wing by cutting a tin or aluminum template for the main rib. The two tip ribs can be traced and transferred with carbon paper to the wood. Some Nordic builders prefer to cut the spar notches after attaching ribs to the leading and trailing edges to insure exact line-up. I still prefer the old lazy method of pinning the ribs together and sawing all the notches at once. If the ribs are exactly the same length and the leading edge is true, line-up is no problem.

Attach the planking and cap strips after cementing the wing panels together with 4" dihedral at each tip. Add the plywood dihedral braces and ⅛" sheet gussets. A thin coat of epoxy on the trailing edge at the dihedral break will prevent bending at that point under the



tension of the wing rubber bands.

The stabilizer construction is straightforward but lightness is especially important. The tips are simply scrap 1/16" contest balsa cut to the rib shape. Both stab and wing are covered with Japanese tissue; use four to five coats of plasticized nitrate on the wing and no more than three on the stab.

Start the fuselage by cutting the sides from medium quarter-sawn 1/16" sheet. The ⅛" square longerons are shaped to a triangular cross section from the pylon back and taper to a point at about midway of the rudder. The pylon and nose keel are cut from ⅛" basswood and sandwiched between two layers of ⅛" balsa. Although a fixed tow hook was used on the original, the adjustable aluminum unit from FAI Supply in Phoenix is preferable and weighs only ¼ oz. Notch the bottom of the pylon sandwich to accept the tow hook and epoxy in place. Install a ⅜" length of 1/16" OD aluminum tubing for the auto rudder release pin at the position shown and slightly to the right of the center line of the tow hook. Add the 3/16" balsa fill-in around the fuselage keel and cut out to receive lead ballast.

The rudder hinges and spring are one assembly. Bend the torsion spring at about a 20 degree angle and fasten the tubing to the rudder and fin with epoxy. Be certain to install the ⅛" OD aluminum guides and nylon auto rudder line before attaching the top and bottom of the fuselage. Sand to the indicated cross sections; add the wing and stab platforms and remaining hardware. Finish with Japanese tissue and four coats of nitrate.

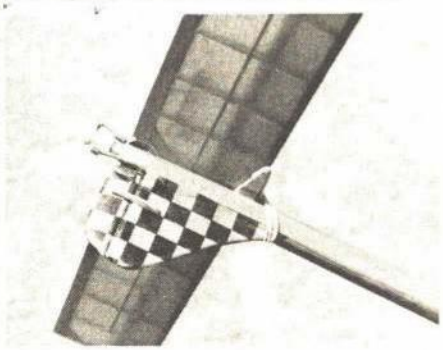
Since stress loads on a glider are much less than on a gas model, wing keys are not strictly necessary. A small strip of sandpaper cemented to the bottom of the wing in line with the wing saddle will prevent shifting in flight but still allow the wing to give in the event of a rough landing.

Flying

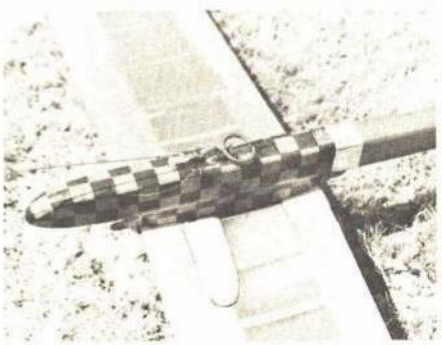
Correct any doping warps with steam at least a day or so before flying. Remember to warp a slight amount of wash-in in the tip which will be inside the circle. The exact amount will vary with the individual model but 3/32"

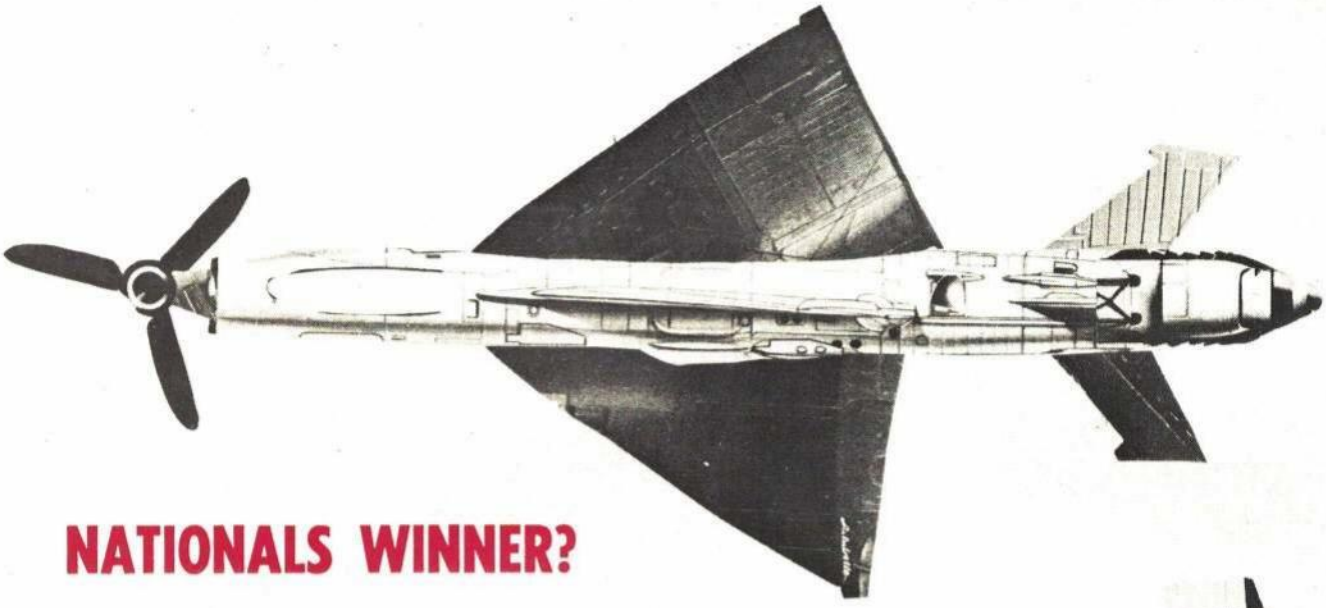
(Continued on page 66)

Rudder held straight under tow, then pops into right turn. Under-rudders tow better.



Wing is balanced by shaped basswood saddle. It fits into wing's undercambered airfoil.





NATIONALS WINNER?

Photo by Simon Dingle

INK PEN

Remarkable model offers the ultimate in performance and crash resistance. Too easy to build.

K. KANOVER AND J. FLIPS*

THIS IS NO MUNDANE, run-of-the-mill aircraft you are about to build, dear reader! The Ink-Pen is a triplane with unlimited capabilities, and you may add your own individual touches without destroying the esthetic basic lines.

We certainly do not promise you will win the Internats with this design, but it has placed very well in local and regional competition—in both control line and radio control categories. A note of caution is in order here: just don't enter it in a contest where many points are allotted to scale—this is not the Ink-Pen's forte.

As you get into the construction, you may notice that some parts are slightly irregular and do not always correspond in size and configuration to the equivalent part on the opposite side. Do not concern yourself with these minor details. Just follow instructions explicitly and everything will come out all right.

Construction techniques: The frame is easy. Just trace it onto your balsa sheet (percale will do nicely if you should run out), being very careful to transfer all markings. Insert stationary ribs first, molding them from 1/927" diam. sheared aluminum tubing and gluing in place with Sloppi-grip. Treat the retractable ribs accordingly and allow to dry thoroughly before the next stage.

Engine assembly: You should have virtually no problem with engine construction on this model. The fundamental structure follows traditional patterns for any engine you've ever built. The interlocking frame is assembled from leftover balsa scraps; the innards from copper tubing and Nutty Putty. Once the engine is functioning properly, you might want to add some personal touches: i.e., glow plugs, gaskets, crankcase, coils, condensers, throttle, combustion chamber, pistons, carburetor, sleeve or maybe other optionals you feel will contribute to effective engine performance.

Controls: You will have no trouble assembling and installing the controls. There aren't any.

Attachment of appendages: Attach wings to model at chassis midpoint. Preferably these go on opposite sides.

Attach tail to model. Me and Herman put ours on the rear end, but you may use your own discretion here. The Ink-Pen will balance perfectly no matter what you do; that is the beauty of this design.

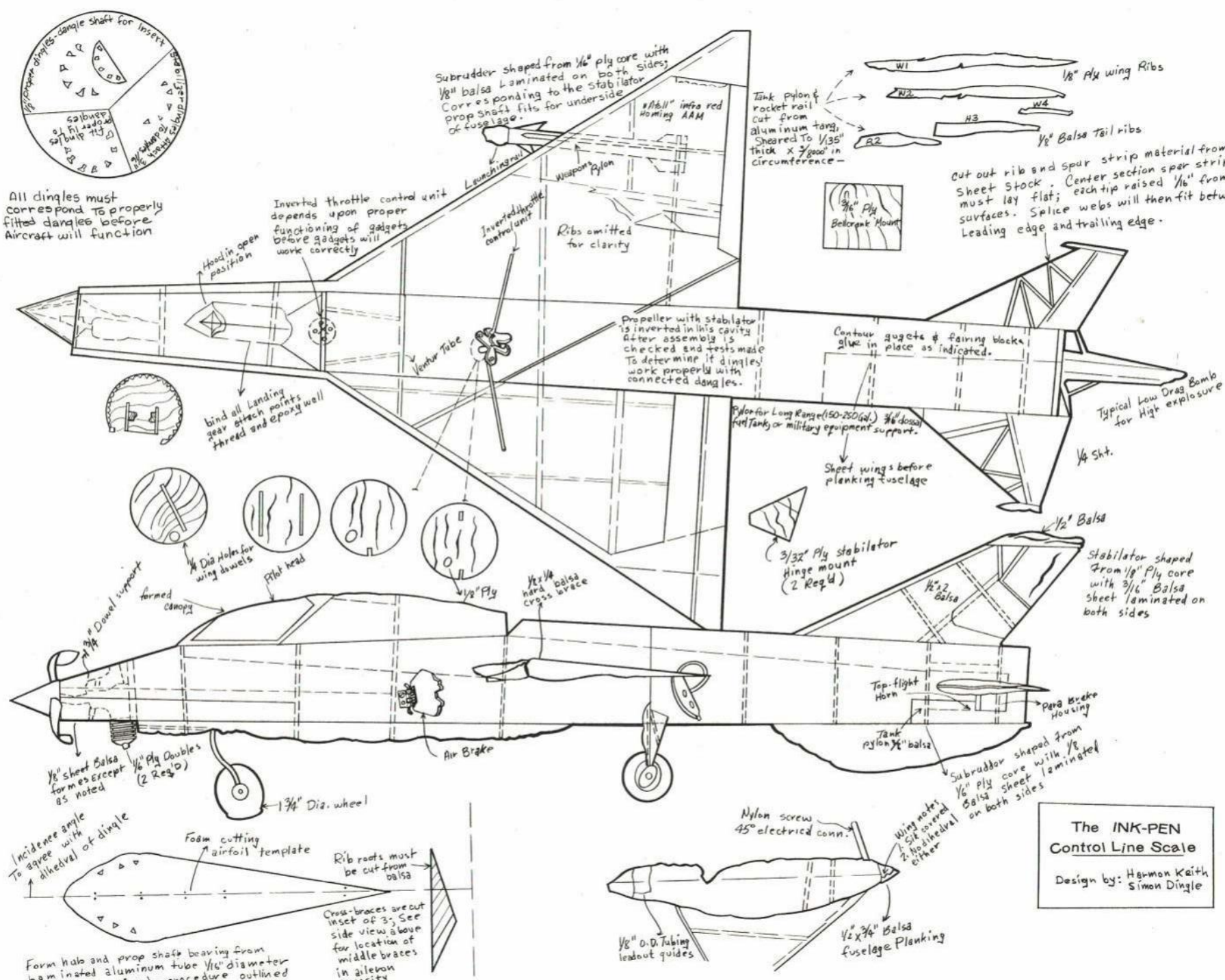
Fuselage: The sides are made from triple-strength Handi-Wrap (see Fig. 13). Then plank the nacelle and bottom of fuselage with 1/181 x 3/14" balsa and glue in place with Sloppi-grip. Install servos and pushrods before planking the top. Otherwise you can't get them in.

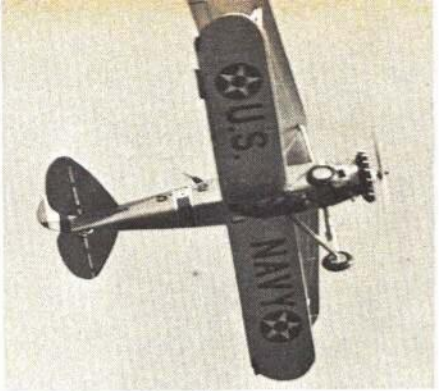
In order to maintain a good glide once your model is in the air, you must

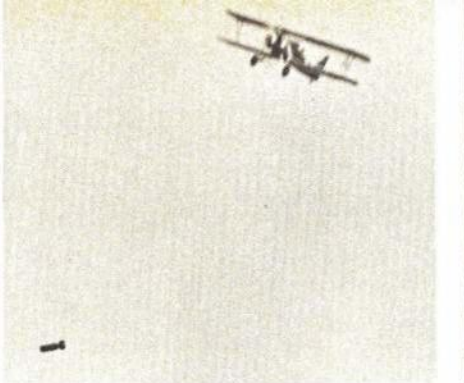
(Continued on page 89)

Editor's Note: AAM disclaims all responsibility for this fiendishly clever creation! However, we do not underestimate our readers' construction capabilities and will welcome photographs of the successfully completed craft.

*If nothing else, they are for real.


All dingles must correspond to properly fitted dangles before Aircraft will function
Subrudder shaped from 1/16" ply core with 1/8" balsa laminated on both sides; corresponding to the stabilator prop shaft fits for underside of fuselage.
Launching rail
Weapon Pylon
Ribs omitted for clarity
Inverted throttle control unit depends upon proper functioning of gadgets before gadgets will work correctly
Inverted throttle control unit
Hood in open position
Venturi Tube
bind all Landing gear attach points thread and epoxy well
Propeller with stabilator is inverted in this cavity after assembly is checked and tests made to determine if dingles work properly with connected dangles.
Tank pylon & rocket rail cut from aluminum tang, Sheared To 1/35" thick x 3/8000" in circumference
W1
W2
W4
H3
B2
1/8" Ply wing Ribs
1/8" Balsa tail ribs
3/16" Ply Bellcrank Mount
Cut out rib and spar strip material from sheet stock. Center section spar strips must lay flat; each tip raised 1/16" from tail surfaces. Splice webs will then fit between Leading edge and trailing edge.
Contour gusets & fairing blocks glue in place as indicated.
Typical Low Drag Bomb for High explosure
1/4 Sht.
Pylon for Long Range (150-250 Gal.) fuel Tanks or military equipment support.
3/16" dossal
Sheet wings before planking fuselage
3/32" Ply stabilator Hinge mount (2 Req'd)
1/2" Balsa
Stabilator shaped from 1/8" Ply core with 3/16" Balsa sheet laminated on both sides
1/2"x2 Balsa
1/4 Dia Holes for wing dowels
Pilot head
formed canopy
1/4" Dowel support
1/8" Ply
1/8"x1/4 hard balsa cross brace
Top flight Horn
Para Brake Housing
Tank pylon 1/4" balsa
Air Brake
1/8" sheet Balsa formers except as noted
1/16" Ply Doublers (2 Req'd)
1 3/4" Dia. wheel
Subrudder shaped from 1/16" ply core with 1/8 Balsa sheet laminated on both sides
Incidence angle To agree with dihedral of dingle
Foam cutting airfoil template
Rib roots must be cut from balsa
Cross-braces are cut inset of 3. See side view above for location of middle braces in aileron capacity
Form hub and prop shaft bearing from laminated aluminum tube 1/16" diameter proceed according to procedure outlined in accompanying article - then take .45 diameter music wire to attach prop shaft to prop shaft bearing.
Nylon screw 45° electrical conn.
Wing notes 1. Sit covered 2. No dihedral either
1/8" O.D. Tubing leadout guides
1/2"x3/4" Balsa fuselage Planking
The INK-PEN Control Line Scale
Design by: Harmon Keith Simon Dingle





An impossible happening—U.S. biplane shipboard fighter bombs German FW 190! Augie Buffalano dropped "1000-lb. bomb" during scale flight and accidentally planted it in Rich Graber's model. Adept photography by Bill Boss.

C/L BILL BOSS
General Correspondent
SPORT and SCALE

You'll Never Believe This One: Now that warm weather is here, contest activities are in high gear. The season's opener for New York-New Jersey area control line enthusiasts was held at Union, N. J., during the Memorial Day weekend, as has been customary for the past 16 years. Two happenings made this meet unique. One of these special events honored Mrs. Esther Egbert, Union's Superintendent of Recreation. Now in her seventies, she has been fostering model aviation for more than 25 years. Through her efforts, the city's Recreation Department has sponsored all 16 of the Union M.A.C. meets. For her dedication to model aviation, Frank De Cicco, club president, presented Mrs. Egbert with a plaque.

The second happening was a "believe it or not!" It was 4:30 in the afternoon and more than half of the 17 contestants in the scale event had put in their official flights. Rich Graber, with his excellent Focke-Wulf 190, was making his first attempt at an official flight. He got through the ten laps, throttled back and came in for a successful landing. Next was his attempt to taxi one lap. The grass was just a little too much and the plane nosed over, cutting the engine. Rich retired to the sidelines to await another try.

Meanwhile, Augie Buffalano, next to fly, smoothly lifted his U. S. Navy XTBM-1 Dive Bomber off the runway and carried aloft a thousand-lb. belly bomb. He indicated to the judges it would be released on the 14th lap. Yes, you guessed it — straight as an arrow, the bomb headed for Rich's Focke-Wulf 190 and imbedded itself in the 190's fuselage!

The crowd went wild over the precision and accuracy of the bombing, Augie walked off the field with a broad smile on his face, while Rich stood by his plane, stunned, saying, "I can't believe it — I just can't believe it." . . .

Improve Your Profile — Beauty or Strength: Now, with a little extra effort, the nose section of a Profile can be as sleek and neat as the rest of the plane. The usual method of cutting a sheet of balsa to the fuselage profile and applying ⅛" doublers for engine and landing gear support leaves a ⅛" step at the rear of the doubler. This is as sleek and neat as a combat boot! Then comes the problem of smoothing the hard plywood and soft balsa into a smoothly flowing line.

A much neater job can be obtained by using a thinner plywood doubler (a good grade of 1/16" should do) and recessing it in the fuselage slab. To recess the doubler, mark off nose section where it is to be mounted, trim away doubler thickness and glue doubler in place. The uniform thickness of the fuselage then can be finished in a neater and more professional manner.

To strengthen the Profile nose section, substitute sheet aluminum .020-.025" thick for the plywood doubler. To attach the aluminum, rough up the mating surface of the metal with very coarse sandpaper and apply epoxy. Clamp between two boards and let it set. The finished product is extremely strong, practically impervious to oil and acts like a heat sink (from the **Aero Angels Newsletter**, Glenview, Ill.). . . .

Dry Silkspan Faster: Mike Hartman has a method for reducing the drying time of doped silkspan. Instead of letting the dope air dry, which may take hours, Mike uses an electric hair dryer. Wonder how he gets past Mom with this one? . . .

Baloon Busting: Club contests almost always include one particular event — Balloon Busting! Although some of the clubs modify the AMA supplemental rules, the basic idea remains the same -- over the barrier pole and down to the target. The event is fast-growing because it can be flown with a minimum of equipment (any Profile plane), is good for all ages, presents a challenge (if you don't believe, try it), has great spectator appeal and is a real fun event. Reports of 35 to 40 entries at local contests are common and it usually draws more than the regular AMA competitive events. Can you imagine the response this event would get if it were to be flown at the NAT's one of these years? It certainly would be great for the Juniors.

P-51 Profile by John Condon is on course for Balloon Bust event. Dive bombing and strafing are fast becoming popular fun events.

Even several of our better Stunt flyers were overheard to say, "I didn't know it could be so challenging and so much fun," as they walked away from the circle — losers!

C/L JOHN SMITH
Specialist Correspondent
SPEED and RACING

Proposed Line Size Increases: Conversations lately have drifted toward the new proposed line size increases. A frequent comment is, "Get some safety into control line speed." I'm the first to ask for safe airplanes but, on looking at the event safety record, no accidents in sanctioned competition have been heard of in a long time. Free flight models bounce off houses, cars, and people, at almost every contest. Granted they don't do much damage, usually, but if they were control line. . . . Now another increase in line sizes has been proposed. With all due respect to Mr. Jean Pailet and others who have been working on this subject, here is a question.

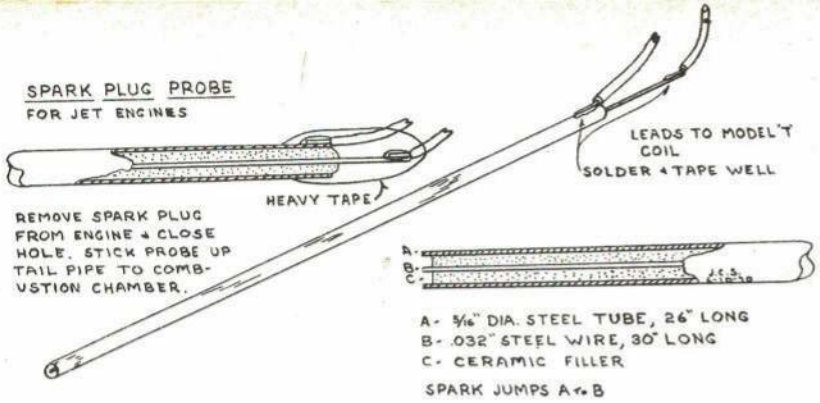
Since we are looking for new fliers for Speed events, why not leave the rules alone for the present? Thus, new builders and oldtimers alike can build models which will still qualify when finished and which still will be useable for at least two seasons of competition flying.

The same question applies to the "yes and no" pipe talk. Manufacturers, here and abroad, have spent tremendous amounts of time and money developing tuned exhaust systems. Now FAI has banned them for free flight. Is control line next? Are they to be classified as mufflers or silencers? Isn't it time for all people concerned — fliers, manufacturers and rules makers — to sit down and hash this problem out? CL Speed is a specialized event, and the sooner this point is conveyed to the non-Speed types the better.

Good equipment is available, provided the new speed flier wants to put forth effort. He can go fast if he uses this equipment, and he can be competitive. All it takes is common sense. If these same people want to "shake a box" and get results, Speed flying, Goodyear, or Rat racing is not for them. So let's not let these people who are building the equipment for us down. Common sense and good building practices are what will keep an airplane on the wire, not just an oversized wire!

Please send your comments on these subjects to me in care of AAM. I'll let you know the feeling of others. . . .

Jet Starter: As a follow-up to the fine article on Jet Speed (June, 1970 AAM) here's a jet starter I used a few years back. It's just a long spark plug. To use, insert it up the tail pipe, hit the switch, and as jet starts the starter is blown out of the tail pipe. Or, if a helper stands on the wire lead, the model



John Smith's spark plug probe provides continuous sparking at the tip and is thus inserted into the pipe of a pulse jet engine. Normal spark plug hole is smoothed over. Starting is now easier and faster. When jet starts, probe is blown automatically.

will slide off it on takeoff. It's also good for crowd control or for mad bulls in the flight circle. Just make sure the switch is in the off position when it's picked up! I used the starting probe because it seemed better combustion took place with the starting plug removed. The spark plug hole was plugged. When running a standard jet engine at night, a hot spot always appeared directly across and to the rear of the combustion chamber — right where the tube necked down to the tail-pipe diameter. With the plug removed, the combustion chamber heated more uniformly. The engine was run at night so that the red-hot chamber could be studied more closely. . . .

Equipment Suppliers: Many fliers, especially those who live some distance from large cities, are asking where specialized material, control line supplies, one-wire and two-wire equipment can be obtained. Some of these items, especially single-line units, are manufactured by individuals too small to advertise. (Such people will find classified ads convenient.) . . .

More Club Papers Needed: How about hearing from more club newspapers — especially those pertaining to racing events?

C/L JOHN BLUM

Specialist Correspondent
CARRIER and STUNT

Rules And More Rules: Rules proposals for Precision Acrobatics abound. Jim Silhavy's suggestions, supported by Tom Niebuhr's comments (June 1970 AAM), have received AMA's preliminary approval and move on for study. What is interesting is the variety of ideas as to what this event should be — everything from strictly a flying event, with workmanship secondary, to the opposite view. Other possibilities include splitting the event into classes; a "let's leave the event alone and streamline the judging" philosophy; and (perhaps as it should be) ideas from the grassroots level of fly and let-fly. Profound rules changes are coming about, and Precision Acrobatic enthusiasts had better keep informed for the best interests of the art.

Harold Price's suggestions on judging, which he feels is the most inconsistent aspect of the event, follow. Precision judges, secured by AMA and reimbursed for their services, would be under the jurisdiction of the Contest Board and would be chosen by AMA on the basis of reputation and written examination. These judges would be required to remain dignified and to refrain from discussions or arguments with contestants. Required to sit at least 45 degrees apart on the circle, the judges would score by marking only errors. A tabulating clerk would do the total scoring. Each judge would have a particular facet of the flight to watch and judge — shapes, tracking, height, angles, etc. Appearance judging would be handled the same way. . . . (A check with AMA headquarters has been submitted for official action — Ed).

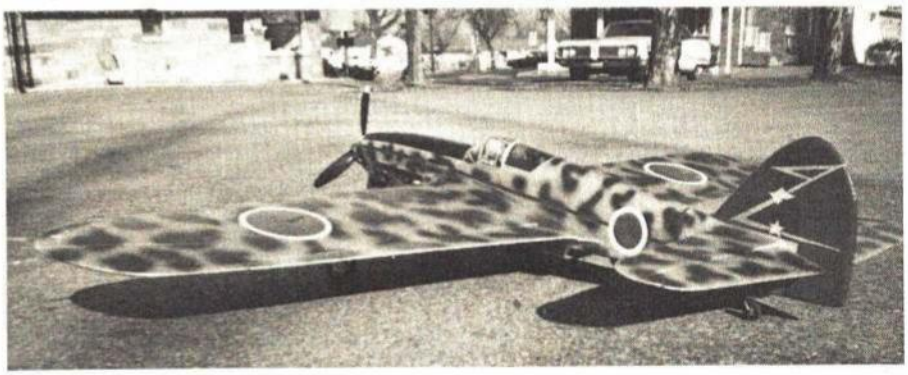
Wants Top Swap: Ken Wilson (2324 E. Florida St., Evansville, Ind. 47711) has 40 Monogram Wright Cyclone 9 plastic engines, in their original containers, but they are not for sale. However, he will swap for either Auto-Pitch prop blades, Champion VG2 glow plugs, color photos of the F8F-2D Bearcat in tow-target colors, or Oct. 1938 and Dec. 1940 prints of the Thompson Calendar series. The latter, painted by Charles Hubbell, depict Roscoe Turner and his 1938-39 Thompson Trophy race winner, the Turner Special. . . .

Semi-Scale Stunters: Phillip Rudd's semi-scale stunt model of the Kawasaki KI-61 Tony has a span of 50½", built from a modified Veco Hurricane kit, particulars are: fuselage length, 38¼"; stab span, 22"; wing root chord, 13"; stab chord, 6½". The rest of model is basically kit, but Phil has modified tip shapes and firewalls. The color scheme is that used by the 14-victory ace, Major Tembico Kobayoshi of the Japanese Air Force. Additional information can be obtained from **Profile Publication No. 118.** . . .

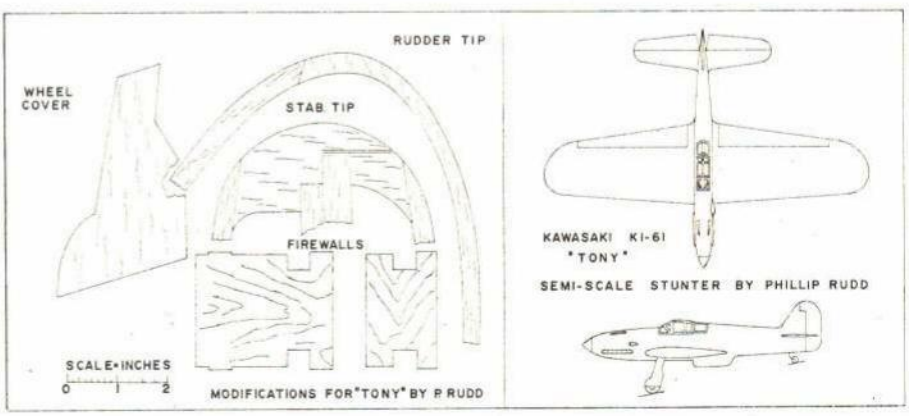
The Push-Button Start: Distributed by Patchogue Hobby Center (240 Medford, Patchogue, N. Y. 11772), a 12V battery-operated starter is available for the flier who keeps getting his hands in the prop. Weighing 40 ozs., it develops 3000 plus rpm and claims 250 starts on a single charge.

What's In A Trophy: Contest organizers, pushed by cost and popularity, are considering awards other than the traditional trophy. The **Mach News** (Model Airplane Club, Huntsville, Ala.) announces that the group will offer medals with ribbons — gold for first place, silver for second, and bronze for third. The Southern California Controline Association (Lawndale, Calif.) is considering awarding points which could be accumulated toward winning a SCCA Jacket. Midwest contests tend to award merchandise as something different from trophies. . . .

References For Tech Items: Navy Carrier: (1) retractable landing gear, Feb. 1967 **AM**; (2) dual-carb power, May 1968 **AAM**; (3) selecting the proper glow plug, 1963 **AM Annual.** Precision Acrobatics: (1) what every control line stunt flier should know about stunt model design, July 1960 **AM**; (2) P-40 Scale-like stunter, March-April 1963 **AM.** . . .



Many basic ships are more easily adaptable to scale appearance than to scratch building. Even a Nobler could become a FW 190 with some stretching. Here Phillip Rudd alters the Veco Hurricane kit to a Japanese Tony fighter. Basic changes may be scaled up from parts shown. Anyone else trying conversions? We would like to publish them, too.

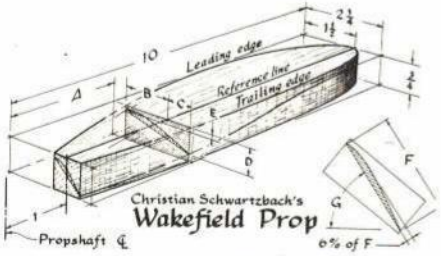


F/F BOB MEUSER
General Correspondent
SPORT

Danish Wakefield Prop: Christian Schwartzbach's prop design, used world-wide in increasing numbers, is unique by American standards. Its most distinguishing feature is the non-uniform pitch, which decreases severely from hub to tip. Other features include: very hard balsa and thin blades; flat-bottom airfoil and sharp leading edge (more like a hand-launched glider section than the highly arched sections usually used); a block layout method requiring only half the balsa of the usual method. In the report of the 1968 National Free Flight Society Symposium, Christian describes how he calculates the blade angle at each point to obtain the theoretically ideal blade load distribution.

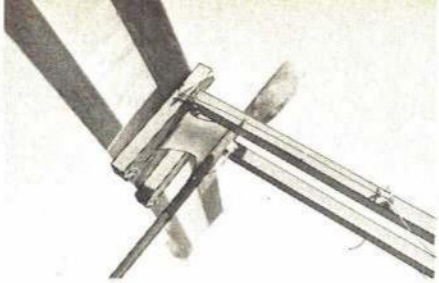
To save wear and tear on the slide rule, Christian has generously furnished a complete description of a 22" dia., 27.5" pitch prop, a favorite size in Denmark for 16 strands of ¼" Pirelli rubber. Select a block of very hard balsa, at least 15 lb. per cu. ft., measuring at least ¾ x 2¼ x 20", devoid of soft or extra hard spots, and preferably having the speckled appearance of quarter-sawn balsa to minimize warpage. Saw the block into two 10" pieces, mark the same end of each to designate it as the tip, and draw a reference line on the face 1½" from the leading edge. Mark off the distances A given in the table, and draw lines across the face. Mark off the distances B and C from the reference line, connect the points by a smooth curve, and saw the block to outline. Measure down from the front face the distance D on the trailing edge surface, and E on the leading edge surface, and connect the points by smooth curves. Turn the block backside-up and carve away to the lines. A good 5" hunting knife is ideal, and an oilstone should be used frequently. The flat bottom should be checked with a straightedge.

To ensure that the blade angles are as specified and that both blades are identical, Schwartzbach uses a gauge similar to the one shown previously in this column, except that a triangular template is cut to each angle G, and each template fits into a sawcut groove in the base, permitting it to slide sideways to contact the underside of the blade. Sand across the grain, using coarse sandpaper backed by a wood block to bring the surface to the proper contour — beginners often start using fine sandpaper too soon. Then carve and sandpaper the top of the airfoil to the correct shape, using calipers or a micrometer to check the thickness. Finally, cover the blades with tissue and bring to a mirror finish, using handlaunched glider finishing techniques.

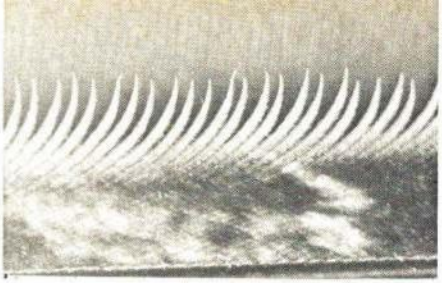


Christian Schwartzbach's
Wakefield Prop

A	B	C	D	E	F	G (deg.)
1	.49	.30	.58	.04	.95	71.0
2.5	.95	.45	.54	.11	1.50	50.7
4	1.20	.01	.45	.20	1.93	45.0
5.5	1.42	.71	.36	.47	2.13	35.5
7	1.34	.72	.20	.65	2.10	28.6
8.5	1.02	.57	.22	.67	1.67	23.5
9.5	0.63	.33	.27	.20	1.01	20.8



Two-handed version of Hank Cole's glider launcher is more stable in wind.



Owl, just like a Nordic or jetliner, has turbulators on leading edge to delay stall.

George Xenakis reports that props having washed out tips like Christian's turn faster than their constant-pitch counterparts. Compensate by using larger diameter to obtain same motor run. George emphasizes that it is just as important to use a good low-speed airfoil on the prop as on the wing, and suggests that the flat-bottom sections now becoming popular might be inviting prop-blade stall if the pitch is too high.

To make laminated blades like those described in a previous issue, use a pine block, carve away the front surface instead of the back, and use it as a molding form. Send me a stamped, self-addressed envelope for a full-size layout of Christian's prop.

Turbulators Are For The Birds: Modelers induce turbulent flow over the top surface of the wing by using a sharp leading edge, gluing strips of balsa or thread along the top surface parallel to the leading edge, placing a string or rubber strip just ahead of the leading edge, or simply by using multiple top-

(Continued on page 80)

F/F BUD TENNY
Specialist Correspondent
INDOOR

Accent on Youth: Romanian indoor fliers have set an example for the world the past few years, by holding special events for their young people. The resulting upswing in activity gave them the experience to hold the 1970 World Championships. The program is effective, as 18-year-old Aurel Popa, who took third place proved. Five years ago Aurel was a star pupil in the youth program. One week after the Champs, 90 future Romanian champions in the 9 to 15 age bracket demonstrated their skills in a smaller salt mine at Praid. The Junior Indoor National Championship entrants flew 45 cm (about 18 in.) microfilm models under a 45 m (148 ft.) ceiling. Their top times ranged up to 20 minutes for one flight — not bad for that size model! It is interesting to note that the AMA Nats has only one-tenth as many Juniors flying microfilm models! . . .

School Modeling Program: Indoor fliers in Uruguay are planning a program for the Montevideo schools, in hopes of building a strong base of youth participation. At present, older fliers dominate activities, which also are hindered by a shortage of good supplies. . . .

British Activity Increasing: Great Britain's rapidly growing indoor participation includes a fair number of young people, but the real news is that one of the blimp hangers at Cardington has been opened for regular sessions. It was there that Germany's Max Hacklinger shook the indoor world with a flight of 44:20, after the end of the 1961 Indoor World Championship. The following year, Karleheinz Rieke (Germany), Carl Red-

(Continued on page 80)

F/F CHUCK BROADHURST
Specialist Correspondent
POWER

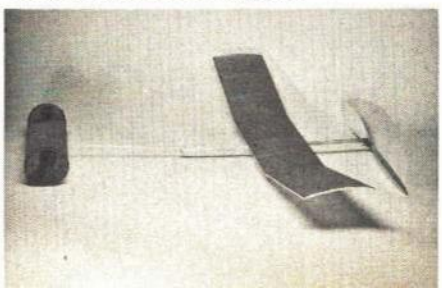
West Coast Nationals: Considerable sentiment developed after the 1970 West Coast FF Championships at Taft, Calif., to convert this big AAA meet into a three-day contest and move it to the Memorial Day weekend each year. Modelers from both Northern and Southern California spoke for the idea, pointing out that, since the Navy has settled on Chicago for the Nationals for the next few years, the Far West was left without any major meet longer than two days.

Beyond this is the exciting prospect that each FF club in the state could be invited to join in as a co-sponsor, taking responsibility for running one or more of the events. They would be under the supervision of an overall planning committee composed of representatives of the individual clubs. Such a contest might lend itself to national sponsorship by major aeromodeling firms.

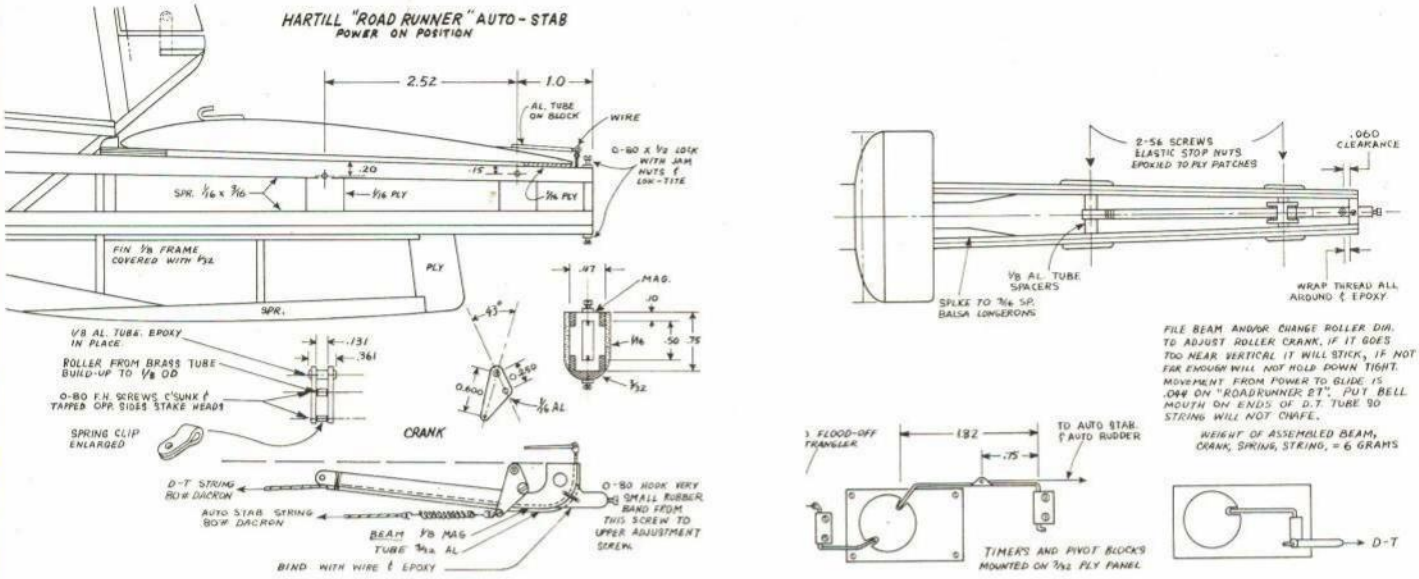
It seems to be a splendid idea so long as it doesn't interfere with the Navy-AMA Nationals each July. This idea will be closely followed and developments reported. . . .

NFFS Design Competition: About this time, AMA will be hosting a horde of youngsters at the Glenview, Ill., Nationals in the annual "build and fly" Delta Dart program. A few of the kids will build the winning entries in the National Free Flight Society's Design Competition. Objective of this joint NFFS-AMA effort is to produce some new sport rubber-powered designs, which will be easy for a Junior to build and trim and which will generate the excitement and satisfaction needed to motivate beginning modelers. Ed Whitten, NFFS Design Competition Chairman, reports

Look closely, a Lincoln-head penny is drawn on right stab. A true Pennyplane.



Considering the rpm's and climb speeds, modern FAI jobs are carefully streamlined.



29 entries from 23 contestants. "All of the designs are good, and most of them worth publication," he said. The winning designs are to be demonstrated by the kids to modelers, magazine editors and kit manufacturers during Nats week. . . .

SYMPO '70: Here's great news for all who want to know more about FF. Houston's George Xenakis, USA FF Team Veteran and editor-in-chief of the **1970 NFFS Symposium Report**, announces that this year's edition con-

(Continued on page 80)

F/F BOB STALICK
Specialist Correspondent
GLIDER and RUBBER

Nordic Designs: **The Satellite** (San Valeers newsletter) discusses early-rounds calm-air Nordics. A number of the A-2 semifinalists at the 1969 Tacoma Semi's favor a design similar to Tom Hutchinson's for the first several rounds, when both wind and thermal activity are light. This model would be a pure glide machine, capable of as near a dead-air three minutes as possible. Such a model would have a high aspect ratio wing in excess of 15:1, a highly undercambered wing airfoil section such as the Benedek B-6356b or the Hacklinger HA-12; and would have the lightest extremities possible, with most weight concentrated at the relatively rearward center of gravity of 65-75%. Such models also would have comparatively low dihedral angles and a small fin to take advantage of any life activity that happened along.

Obviously, a calm-air design is not ideal for all contest conditions, so a well-prepared Nordic competitor would have in his stable a more moderately proportioned A-2. Designs in the good-all-around category include the majority of models available in kit or from magazine plans. They would have a wing aspect ratio of 12:1 to 15:1; a more moderately undercambered wing section with a more rounded leading edge entry, such as the Benedek B-7457d/2; and stronger and probably heavier extremities with the CG located around 55-60%. Models within these specifications are trimmed to take advantage of thermal activity and are flown with an eye toward tactical flying. In still air, they usually are not capable of exceeding two and a half minutes. Such models usually feature

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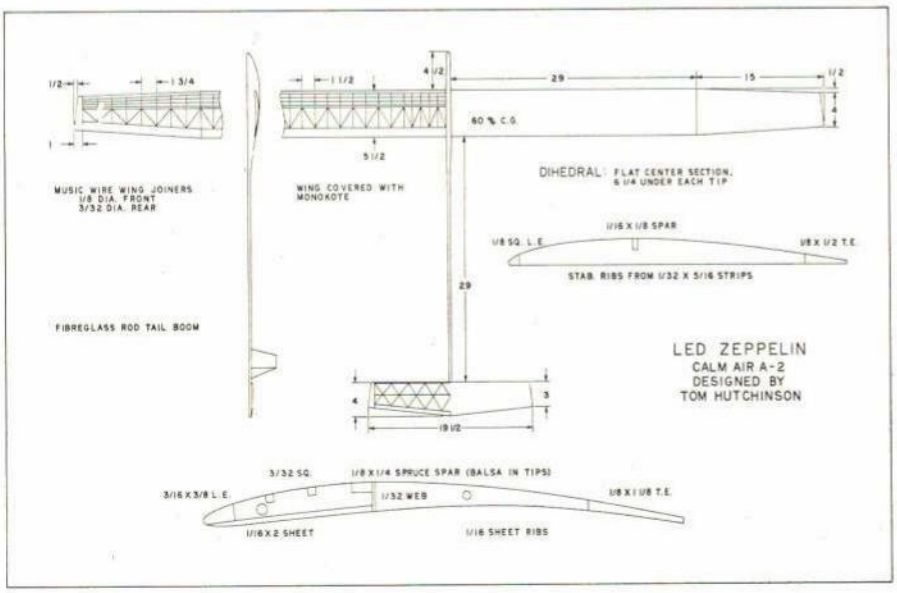

F/F WALT MOONEY
Specialist Correspondent
SCALE

All-Wet Event: The North American Flightmasters were all wet on the 14th of June. Their Scale ROW contest at Lake Elsinore, Calif., went off without a hitch, but the contestants had their problems. The event was great fun for spectators, photographers, passers-by, waders — and the fliers! Some people even managed to combine all of those activities into one wet, wonderful morning.

Perseverance was the name of the game, especially for the contestants flying Scale Rubber ROW. It was apparent that most of the models were completely untested and obvious that not many of the entrants ever had tried to fly a seaplane model before. As a consequence, plenty of model dunking went on throughout the morning. One spectacular characteristic of a rubber-powered seaplane is the tenacity with which the propeller keeps turning, even when the model is 90% submerged. A plane would almost get off, catch a wing tip in the water, flip over on its back, and then make like a sidewheel steamer cruising up the Mississippi.

Elsinore Lake, with its shallow shoreline

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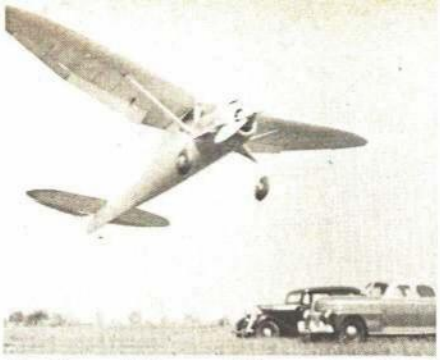
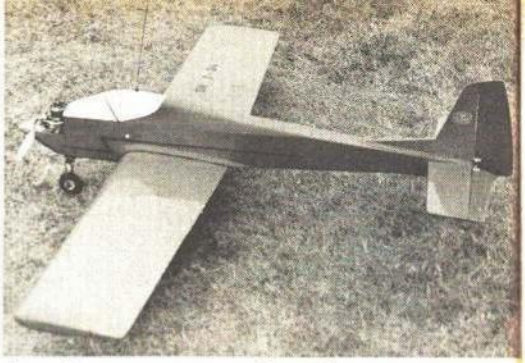
Scale entries lined up at Wright Patterson AFB indoor contest. All types and sizes.

R/C DON LOWE
General Correspondent
SPORT and PATTERN



Would you believe a full-house free flight? And note the year of autos in background!



From Germany, a stunt ship with computer-designed Eppler 475 airfoil wing. Small stab.

Contest Planning: Those who have been involved in organizing or running contests can sympathize with me and my fellow WORKS members as we wind up preparations for the 8th Wright Brothers Memorial RC Championships (Now past as you read this). The job should be easier each year, but somehow enough variables affect the plans and problems are never the same. It's difficult to know why we or others continue contest work. Each club member will have a little different reason when asked but, basically, it's because of the association with others involved in this nutty hobby and the satisfaction from a job well-done.

Probably the most difficult responsibility is acquiring financial support and prize donations. This year's downturn in business has had quite an effect. Clubs use a variety of fund-raising techniques — donations from local industry, raffles, club funds, etc. We use these too. In addition, our yearly "flying circus" raises several hundred dollars from admittance charges. Getting the necessary publicity requires a lot of work, but the event itself is pure fun, since members put on the show and do their own thing. Eight years ago, when we first decided to put on a championship contest, we assumed the aviation industry would jump at the chance to support it. After all, Dayton is the hub of military aviation. Boy, were we disappointed! One contribution came from scores of contacts — from Ling-Temco-Vought.

Many contests offer trophies as prizes and let it go at that. This investment can usually be accommodated by the gate receipts. I'd prefer to see large prize awards to as many contestants as possible. It would be nice to have a sponsor such as the Mint Hotel in Las Vegas was for the Pylon racing event in September.

How about pooling your ideas on this subject? Do you have any sure-fire techniques, guaranteed to make the loot roll in? Let's share them with others and make all our labors (of love) a little easier. . . .

Contest Judging Innovation: At the Seventh Annual Mid-South Contest (Nashville, Tennessee, June 6 & 7) an interesting innovation was employed by Contest Director Bob Reuther and his cohorts. To ease the judges' burden and keep them out of the hot sun, Bob placed them on a flat-bed trailer with a canvas awning. The three flight circles were located 100 feet away. This way the judges had an unobstructed view, and all judged maneuvers were performed right out front. Anything overhead was strictly a no-no as far as scoring was concerned. Communication between the flyer and judges was provided by the helper's raising and dropping his arm when a maneuver was to begin and end. Simple and effective.

This was a tough pattern contest with names like Jim Martin, Cliff Weirick, Jim Whitley, Jim Kirkland, Jim (Doc) Edwards, Don Coleman, Tony Bonnetti, George Hill, Ron Chidgey, etc. Jim Whitley finished first in Class D Expert. Why do guys like Whitley win so often? First of all, he is good! Second, he is consistent. Consistency in all pattern flights is what pays off. You've got to keep plugging away, flight after flight. . . .

Foreign Intrigue: Walt Good reports on a model design of the FAG (Flight Study Group) from Kaltenkirchen, Germany. This design, which appears to be a somewhat typical European FAI pattern, employs the Eppler Airfoil, discussed in the Feb. 1970 AAM. The ship also employs a smaller than normal stab area because the Eppler wing section #475 is used. Clean flight is claimed, without large speed build-up in the dive but not too much slow-down in maneuvers. It seems the FAG is striving for flight characteristics. Ed Kazmirski, Phil Kraft and others have designed for. Constant speed through maneuvers certainly makes

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Cliff Weirick, Tony Bonnetti, and Kraft Dragon Fli at Nashville meet.

R/C BOB MORSE
Specialist Correspondent
PYLON RACING

1970 Racing Season Begins — Madera: Northern California's first race was hosted by CD Alex Chisolm and the Fresno Radio Modelers. Preregistration was utilized to permit a full day of racing Formula I's. Five rounds and 65 heat races resulted in a three-way tie for first place, and all were national champions: Joe Foster, 1968 Nats Winner; Larry Leonard, 1969 Nats Winner, and Whit Stockwell, 1969 NMPRA Champion. Two fly-off heats were necessary.

Joe Foster took first with a Francis Products Shoshonik, Whit Stockwell was second, and Larry Leonard third with Stafford Minnow. Foster's point total was 28 in seven heats, adding up to a perfect day for him. Joe's fastest time was 1:48. Best time of the day was young Bob Smith's 1:42.2.

Next at Turlock: The following week, the Pioneer RC Club of Sunnyvale hosted a two-day race at Turlock. Somebody wasn't watching at this one — the weather had been stable at 70 degrees for weeks, then suddenly zoomed to 112 degrees on race day! But the intrepid NMPRA pilots had at it, and Bob Smith of the B-S racing team gave an outstanding performance. He posted a string of

Open Pylon was never meant to be this sort of thing! Rules? Prather/Schauer team plane.

This flying field in Japan is not the best. Note all the little rocks to upset smooth landings. Pix from Ted Schreyer on a recent visit. Flying is more hectic than here.

five heats at 1:41 to take first place going away in Formula I. Cliff Love, of the EBRC Club, was a study in determination as he took second place with a best time of 2:08. Cliff was in there, finishing every race, and he made his point total stick.

This race used the one-minute start system, which caused mixed feelings. While it tended to speed things up to some extent, it also left quite a few ships at the starting line. (Two- and three-plane races are not the most exciting competition.)

The FAI event at Turlock was a total loss, nine of the eleven entries showing up on 72.4 MHz. The "best" time in this event was scored by Whit Stockwell at 2 min., 27 sec.

Bob Smith posted the best time of the meet with his K&B 40-powered Open ship, turning in a 1:37.0 and taking first place. (Bob had posted a 1:31.9 previously at Whittier Narrows.) Terry Prather, nipping at Bob's heels with his new "Ukie" machine, took second with times of 1:40. . . .

On to Bakersfield: Two weeks later, the combatants were at it again at Bakerfield's Famosa field. Bob Smith once more snapped up first place with a best heat time of 1:39. Bob was followed by George Killeen, second, and Larry Leonard, third. . . .

Meanwhile, in Buffalo: The United Pylon Racing Circuit of the Buffalo, Rochester and Jamestown areas staged the first race in its series, May 31, at the Buffalo field. Three events were flown. Harold deBolt took first in Formula I at 2:03 with his deKnight Special; Howard Dart, second at 2:36; and Bill Underkafler, third at 2:15. In Formula II it was Harold again, at 2:03 with his P-51. In Open, it was Dave Keats with an original and Earnie Nikoden second with a Quick-Fli.

Racing Aerodynamics: Again we've seen a Formula I pilot attempting to stretch a landing approach by pulling the nose of his ship up, and up, and up. You guessed it — his ship suddenly just fell out of the sky. It's difficult to learn to push the nose down a bit to increase airspeed and lengthen the approach, but this is the only way to get in safely. Practice with some altitude under you and you'll see what we mean.

R/C GEORGE SIPOSS
Specialist Correspondent
R/C CAR RACING

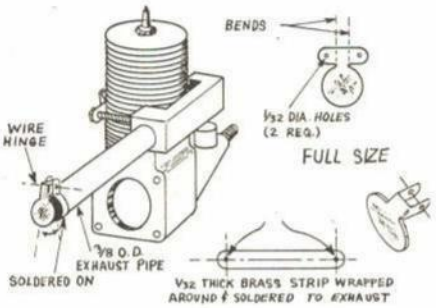
Things Are Happening: The car fraternity is a veritable beehive of activity. Sponge rubber tires are appearing more and more frequently. Special car radios are being marketed. Prices are going down. RC car modelers are getting better organized. ROAR is offering a larger newsletter. A new insurance policy is being developed. By the way, AMA members have nothing to worry about should their cars damage someone's property or person. AMA insurance covers them. . . .

RC Car Frequencies: The FCC is about ready to announce its final decision on frequencies for cars and boats. The latest word is that four more channels will be available for cars. Our prediction is that there will be no interference problem because cars are run in built-up areas, whereas planes are out in the open; and most car radios will be operating on less than 100mW, where a license is unnecessary and range is limited. . . .

Clubs to Join: Many new clubs are forming. In the Philadelphia area, contact Larry Robbins, P. O. Box 37, Warminster, Pa. 18974, to see cars in action. In Chicago, it's Gene Filus, 975 Webster Lane, Des Plaines, Ill. 60016. In the Lone Star state, it's Northlake Speedway, 210 Lake Highlands Village, Dallas, Tex. 75218. . . .

Helpful Ideas: As races and activities become better attended, we see more and more ideas, shop hints and shortcuts worth mentioning. Let me pass some of these on to you.

To conduct exhaust gases out of the car body and away from expensive radio equipment, most modelers make up a straight-through exhaust pipe. This works fine at high speeds, but it is sometimes hard to keep the engine idling, due to lack of back pressure. Here is what one modeler did. A small metal plate was mounted by means of a simple hinge at the end of the exhaust pipe. At low speeds the weight of the plate keeps it fairly tight over the end of the pipe, while at high speeds the gas pressure opens the pipe.



Hinged flap at end of exhaust stack is spring-loaded for back-pressure at idle.

Most tracks may appear to be quite clean to the uninitiated. But run a car for a half hour or so, and the dirt becomes quite evident. Wherever engine oil makes the chassis wet, gravel and dust kicked up by the tires is deposited on the surfaces. To clean off this dirt, spray the car with GUNK and simply wash it off with a garden hose. This is done with the body removed from the chassis and with delicate components (radio, engine intake, etc.) covered with thin plastic such as a dry cleaner's bag.

Many methods to prevent dirt from getting into the works have been tried. The best solution is to cover the radio equipment with a plastic sheet or plastic box. Also, any dirt that comes in should be allowed to go right out again. This means that even in a sports car a narrow chassis, rather than a flat pan, should be used. The empty space between the wheels lets the dirt fall out. If a pan chassis is absolutely necessary, make wheel wells from fiberglass or cheap plastic bowls cut to shape and fastened to the chassis.

The ROAR racing rules specify in detail car construction limitations, racing rules, and track specifications. Those who are building from scratch should have these rules to be sure their cars will be allowed to race. When buying a car it also is important that it is

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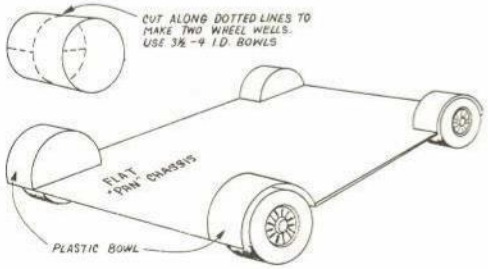
If a full-chassis pan is used, be sure to cover the wheels. Sections of bowls work fine.



R/C CLAUDE McCULLOUGH
Specialist Correspondent
SCALE

British Nats Try New Rules: Twenty-four RC Scales from an entry of 30 flew at Hullavington May 24-25 in great weather. Terry Melleney and his fine Miles Hawk Speed Six came out on top, scoring 894.6 out of a possible 1240. 1969 World meet champ Roy Yates (Percival Proctor) placed second, followed by "Radio Modeller" editor, Norman Butcher (Fokker D-8), Robin Lehman (Nieuport), and 1969 Scale Team member, Dennis Bryant (Rollason Condor). Other interesting types — Miles Master and M-20, Ryan PT-20, Hawker Hind, Gloster Air Tourer. Contest organization was rated excellent by participants and included a 180-ft. tent with tables for model display and a refreshment bar.

England pioneered the use of international Scale rules, competing with them even before final adoption by the FAI. Recent world regulation modifications have been received there with reservations, and the SMAE Scale Committee produced a revised set for use at the Nationals to test feasibility before submitting proposals for changes to the annual CIAM meeting next fall. The present formula of awarding an entrant only a percentage of his flight points based on his scale fidelity score was replaced with a 50-50 division of possible static and flying points, added together. The 1970 FAI standardized K factor of 6 for all optional maneuvers was cut to 3. This de-emphasis might seem to be particularly hard on aerobatic types and a comedown from their favorable status but Roy Yates is of the opinion that aerobatic airplanes are at no disadvantage. In fact, the non-stunt options seem to be harder to perform in a manner pleasing to the judges, are more time-consuming and tend to get lower marks.

Major change was replacement of the special ingenuity category of the scale fidelity section with a Complexity K factor for each of all the other categories. Because of the larger number of features that can be critically marked, complex models fare badly under FAI compared to simpler types which are much easier to get to a high percentage of scale perfection with less total work. Introduction of the Complexity factor is seen as encouraging selection of a wide variety of prototypes and seemed to work well. In addition to the more usual intricate features, such things as extra wings, rigging wires, spoked wheels and aluminum covering received credit.

The new rules will also be used at the SMAE All-Scale Meeting and other contests, but the Team Trials will revert to exact FAI to insure selection of models best fitting World Champ specs. . . .

'69 German Team Repeats: Herbert Reger,

Takes four ST 23's to fly Jim Bonnano's Douglas C-124. It weighs 13 lb.

Robin Lehman's Nieuport placed fourth at British Scale Nats earlier this year. Huge masterpiece.

Bruno Klupp and Walter Reger, flying the Zlin, Fokker D-7 and Yak used at last year's Bremen Internationals, headed the list at the 1970 Team Eliminations, and will represent West Germany in England. They expect to have new airplanes completed for the World meet.

Short Course For Authors: AMA rule calling for a written presentation is widely misunderstood by scale contestants. Wording is ". . . brief description of unusual details, features, markings, finish, etc., of the model." The judge needs something relevant, does not have time to read, and should not award points for a lengthy history of the prototype aircraft. Material on the full-scale ship should be used in the text only where it relates directly to the model. This is the place to point out things the judge might miss or explain an item open to question.

Books for Scale Modelers: **USAF Camouflage, 1933-1969,** by Ross Whistler ($1.75, WW-1 Aero Bookshop, Box 142, West Roxbury, Mass. 02132), is a slim and specialized collection of information culled from official directives and archives and is a must for the

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R/C FRED MARKS
Specialist Correspondent
TECHNICAL ITEMS AERODYNAMICS

RC Plane Performance Comparison Chart: Jack Burns (Aero Telemechanics Radio Control Flying Club, Riverside, Ill.) has developed empirical data for guidance in determining why models fly (or don't fly) as they do.

Various methods are used to define airplane performance: range, endurance, service ceiling, rate of climb, maneuverability, and maximum speed. For the purpose of this evaluation, maximum speed is the best one to use, since range is not of interest. Ceiling, endurance, and rate of climb go along with the power that makes a plane fast or slow.

It just so happens there is a simple formula for estimating top speed. Aerodynamicists can go through all the long calculations for power required versus power available, charting the curves and picking off the intersection as Vmax. That's the hard way. The estimated method comes within a few mph of their results.

The two numbers in the formula are constants to convert hp and air density factors. What this formula really says is that at maximum speed, the horsepower required and horsepower available are equal. This full-size plane formula can be adapted to models by selecting factors such as inches, cubic inches, ratios of engine size to power (thanks to Mr. Chinn for his many engine charts). By developing conversion factors, a formula for models has evolved. To make things even easier, a chart has been plotted. This chart goes up to 1000 square inches and 70 engines. The lines are straight because of a cube root function.

Those who say this chart is no good, because their planes are much faster, could be right, especially for racers which are very clean (aerodynamically) and use much more powerful engines than most RC models. An explanation of all the variables in the formula and chart is in order.

BHP: Obviously, there are good (average), hot, and old, worn-out engines, so power is quite variable. A ratio of 1.47 hp per cubic inch is used as an average. A racing 40 on hot fuel may have a ratio of 2.50, or even 3.00 hp/cu. in. Doubling the power will not double speed. Because of the cube root in the formula, doubling speed takes eight times the power — $2^3=8$.

Prop. Efficiency: From what could be extrapolated from full-size prop charts, 72% efficiency is obtained from model props. (Sid Axelrod or the Tornado boys could reveal some trade secrets by giving true propeller efficiency factors.) A full-size prop does well to give 85% max efficiency; the rest is what absorbs the engine power.

Muffler: A muffler loss factor of 10% is included in the formula.

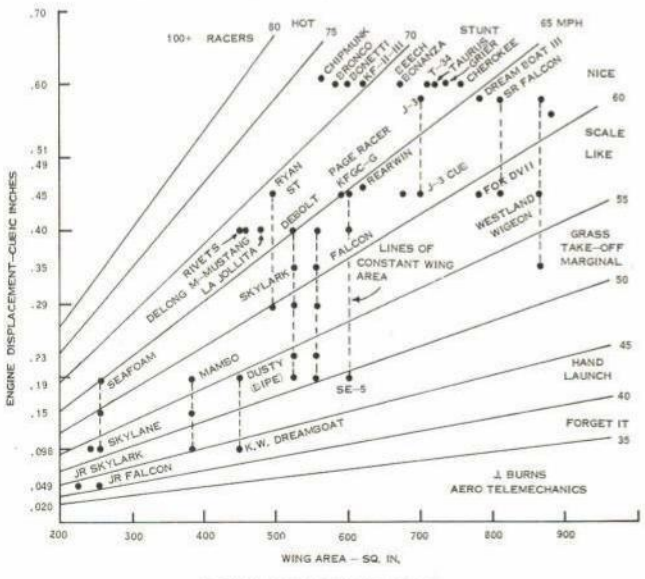
Cdt: Coefficient of drag is highly variable. The .0600 used may be a good approximation for scale models. In fact, it was developed from data on a J-3 Cub. Cdt would be lower for stunt ships, and notably lower for racers.

Other factors which could affect an exact reading from the chart are the use of hot fuel, thick or thin airfoils, struts, pants, biplane factors, and other power and aerodynamic variables.

Along the upper and right hand borders are adjective ratings: hot, stunt, scale, etc. Placing of these ratings is a matter of choice, but my observations of plane performance and the location of several well-known planes

(Continued on page 81)

Straight lines result from cube-root functions; lines show relationship of wing area/power/and speed to fly.



R C PLANE PERFORMANCE COMPARISON

R/C HOWARD McENTEE
Specialist Correspondent
GLIDERS and FAI

Successful Eastern Glider Meet: Thirty-four entrants (from nine states, six from the Midwest) flew at the June 7th meet sponsored by the DC/RC near Clarksville, Maryland. With perfect weather for this "flat-country" meet, many maxes were scored. It included the two popular East Coast Soaring Society events — straight FAI glider rules and modified FAI. The latter differs mainly in longer flight time and longer towline length (approximately double the FAI limits for both). Many winches were available, as well as several Hi-Starts and a couple of energetic hand towers. The latter seemed ideal to get the best altitude with restricted FAI line length. Most popular winch was a simple electric job brought from Detroit by the Pell brothers. In continuous operation, it performed flawlessly.

Top winners were: FAI event, (1) William

(Continued on page 84)

By using formulas below, probable flying characteristics of that next RC project can easily be determined.

$$V_{MAX\ (MPH)} = \sqrt[3]{\frac{BHP \times PROP.\ EFFICIENCY \times .375}{.00256 \times C_{DT} \times A}} \qquad EQ\ 1$$

WHERE:

BHP = BRAKE HORSEPOWER

C_{DT} = COEFFICIENT OF DRAG AT V_{MAX}

A = WING AREA

$$V_{MAX\ (MPH)} \approx \sqrt[3]{\frac{ENGINE\ DISPLACEMENT\ (CUBIC\ INCHES) \times 712}{WING\ AREA\ (SQUARE\ INCHES)}} \qquad EQ\ 2$$

ASSUMPTIONS: PROP EFFICIENCY = 72 PERCENT
C_{DT} = 0.060
BHP/CUBIC INCH = 1.47
10 PERCENT POWER LOSS FOR MUFFLER

OBSERVATIONS: HOTTER ENGINE OR HOTTER FUEL = HIGHER SPEED
THINNER AIRFOIL = HIGHER SPEED
AERODYNAMICALLY CLEAN PLANE (PYLON, STUNT)
FASTER THAN DETAILED (BIPLANE, SCALE)

THIRTY-FOURTH

IN A SERIES

HOWARD McENTEE

Getting Started in RC

Radio control offers wide variety of planes, boats, and cars.

MUCH OF THE information presented in this series applies not only to RC planes but also to boats and cars. While some specialized equipment has been developed for them, most are operated by exactly the same equipment utilized in planes. However, the requirements of all these RC model types may be unfamiliar to the novice.

First, a wide variety of planes comprise the model field. Most are sport planes—that is, they are seldom or never flown in competition. Large numbers of competition designs also are flown strictly for sport. Competition flying is a field in itself, and most experienced modelers agree that it has forced the development of much of today's advanced equipment, not only in radio gear, but also in engines, fuels, plane designs and materials and accessories. Competition is not for the RC beginner—although he may go into it after acquiring more experience.

The most widely-flown sport planes are what might broadly be termed stunters. Even the simplest rudder-only craft can usually perform some stunt maneuvers in the hands of a capable pilot—although many such planes, and even multi-control types, are flown in a most sedate manner by novices. Sport planes can be those capable of extensive stunting, or they can be Scale craft, Pylon racers, gliders, etc.

Stunt-type planes can be almost any size, have any number of controls, and use any size engine (maximum allowed in competition is .65 cu. in.). Virtually all stunt competition planes have at least rudder, aileron, elevator and throttle controls. All the specialized plane types mentioned here and below are for sport—Pylon planes probably less than others, since the real thrills of Pylon flying come in racing against competing planes around a well-marked course.

Scale planes are a specialized category, in which top competition models are fantastically exact replicas of full-sized planes. But even some of these models are built and flown for sport only. In competition (builder must submit proof of scale in the form of full-size plane plans, photos, etc.) scores are based on fidelity to scale, craftsmanship, finish, markings and so on. Such static judging is time-consuming and takes place either before or after the plane has made its official flights. All Scale events require that a plane **must** fly successfully to receive any points at all—no matter how exact it is in fidelity. Static judging points are multiplied by flying points for the final score.

Flying includes a set pattern of routine maneuvers, plus options such as a demonstration of the model's equipment (bomb drop, operating lights, working flaps, operable crop-spray arrangements), as well as stunt maneuvers. Multi-engines earn extra points, but they must work and contribute to flight. Because judging is so involved, some Scale plane events using much simpler and faster judging procedures have been held. RC Scale has now been recognized as an FAI World Championship event, with the first competition scheduled for the summer of 1970 in England.

In Pylon racing, two or more specialized planes fly a set number of laps around a measured course. Scoring is based on accurately measured flight times. Three main categories are as follows. Formula I includes rather small planes (450 sq. in. minimum wing area) which can hit speeds well over 100 mph. Strictly for the experts, they are tricky and often cranky to handle. Four are usually raced together; and the standard course is ten laps around three pylons for a total of two and one-half miles. Times for these hot planes average around one and one-half minutes for the course.

Formula II was developed for the less accomplished flyers. These planes, which must have at least 600 sq. in. wing area, are somewhat more docile to fly. Maximum engine size in either category is .40 cu. in. Formula I planes must be close copies of full-sized craft in what used to be called the Goodyear Racer class. Formula II planes resemble such racers, but scale requirements are much less strict. FAI has established a set of rules for Pylon racing, and World Championship events probably will come soon.

Open Pylon racing requires regular sport or stunt planes. At least that was the intention but, since some exceptionally fast and specialized planes have been developed for it, the rules may be in for revision.

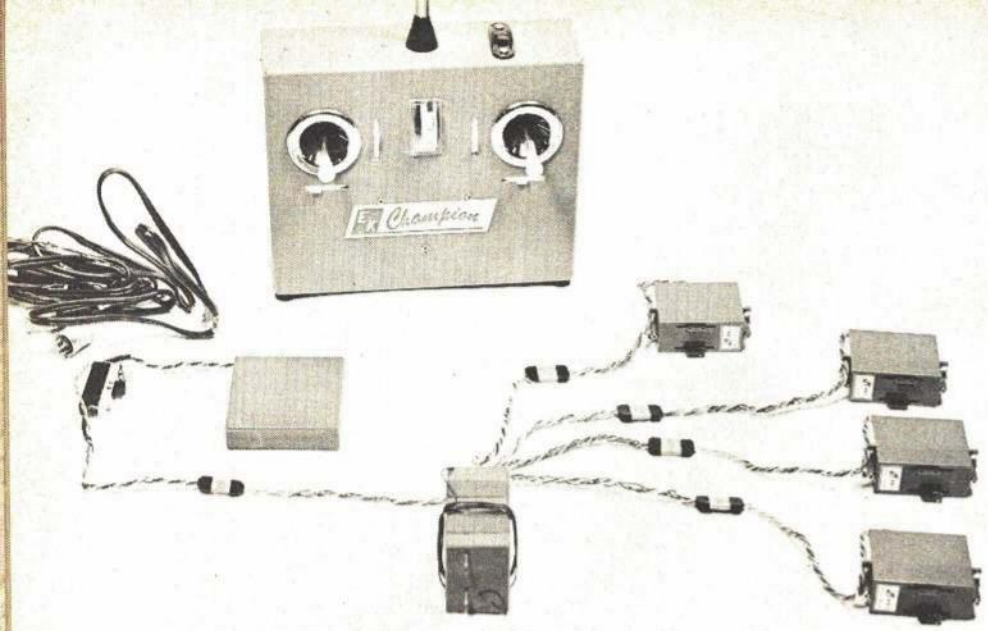
RC gliders are rapidly gaining favor in the U.S. Long popular in Europe, they did not catch on here (except for the lower California coast) until a year or two ago. The two main types of RC gliding, thermal soaring and slope soaring, require quite different planes for maximum performance. Slope soaring utilizes rising air currents formed by wind impinging upon hill and cliff surfaces. Lift is usually quite high, and gliders with short wings can stay aloft for hours, provided the wind holds out. The Pacific coast offers steady onshore winds and wonderful cliffs, hence slope soaring is far-advanced in the West. Competition often includes racing around pylons, stunting, etc.

Thermal soaring takes place over flat country, where light, rising, updrafts are produced when the sun heats certain surfaces. Because thermal lift is often very light, these gliders have long and efficient wings. Thermal soarers are usually poor stunters. Gliders require only simple gear, and most flying is handled adequately with just rudder and elevator. A few have such additions as ailerons, flaps, etc.

Because of its relatively simple and low-cost equipment requirements, as well as rather slow flight and control reactions, RC gliding is considered by many to be an ideal field for the RC beginner. On slopes, gliders simply are tossed out into the rising currents. Thermal soarers are launched by any of three methods. An electric-motor- or gas-engine-driven winch will tow the plane aloft at the end of a strong cord as long as 1000 ft. The glider goes up like a kite, then the cord is dropped at the highest point. A Hi-Start will do somewhat the same job, but costs much less. It consists of a length of heavy rubber band tied to a longer length of cord; the ratio of rubber to cord usually is around one to five. Again, the glider goes up like a kite and drops the tow line at the high point. Small engines are fitted to many gliders, where no other means of getting them aloft is available. These engines run only a few minutes and throttle control is never fitted. Flight length is limited by the amount of fuel carried. FAI glider rules have been set up and World Championship competition may come soon.

Much RC apparatus is utilized in model boats (see part 23 of this series, Sept. 1969 AAM). Briefly, both sail and power boats are quite popular, particularly the latter (probably because the operating techniques are less demanding). In power, both electric and glow

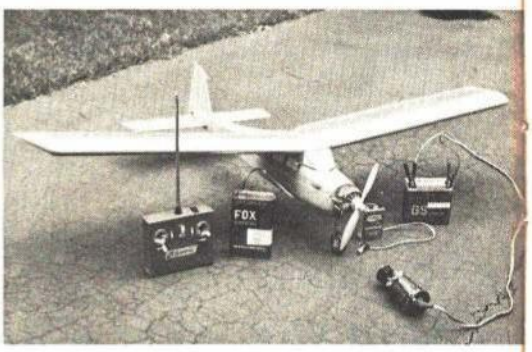
(Continued on page 79)



Electronically, the Champion system is identical to the higher-priced Logictrol series. The reason for the price difference is that it is easier to make by installing all the servo electronics in the receiver case. A three-channel set is also available.

Blue Ribbon Review

RC Technical Feature



This review tested a new radio; a new beginner plane, the Cale Kits T1; and the German/Japanese Wankel engine.

E.K.Champion 4 Channel

HOWARD McENTEE

THE RADIO SYSTEM chosen to control a Wankel and T-1 Trainer is the newest from Logictrol—their EK Champion outfit. Lowest cost system in the line, it has many features found in the middle-of-line Logictrol, and even some from the top Pro-Series. Control sticks are similar to those in all Log 2-stick transmitters, have a nice feel and easy adjustment of spring tension. The encoder board has many blank spaces to handle components required for up to six controls. The on-off switch is on top of the case, next to the new-style antenna mount (now used in all EK transmitters). The switch has a plate to prevent accidental turn-on, but no lock. No on-off indications are given but the meter indicates whether the switch is on. The meter reads battery voltage and seems quite a luxury item for an economy transmitter.

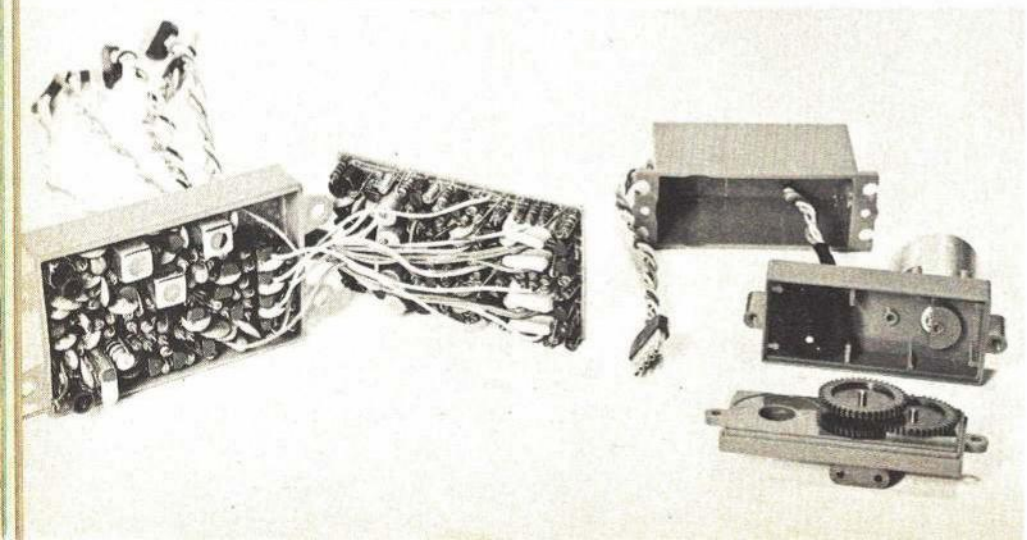
The transmitter draws about 100 ma when the antenna is fully extended and the case held in both hands, in normal flying position. With antenna collapsed, current rose to 135 ma; it was a bit lower with the antenna completely removed. At these higher currents the output transistor runs rather warm and could overheat under extensive testing, but a few minutes should do no harm. At the 100 ma figure, the RF output transistor runs quite cool. A safe four hours of operation should be obtained from the 9.6V 500 maH battery pack, at this current.

An "Assembled in Mexico" sticker appears on the Champion transmitter (and on the charging cords), but workmanship, soldering, etc., in this transmitter appear to be exactly the same as in other Logictrol equipment, including the most expensive. Our feeling is that if the work is as good as that done in the States (and it is) and if inspection and testing are thorough, assembly done out of the U.S. is no disadvantage and quite likely results in lower final cost. People sometimes worry needlessly.

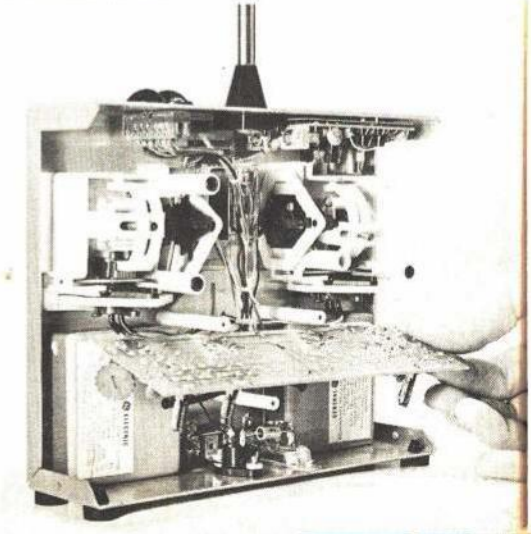
The Champion receiver has two decks and is in a case the length and width of other Log receivers, but 1¼" thick. Less end mounting lugs, the case is 2½ x 1⅝ x 1¼"; weight is 3¼ oz. The big difference in the Champion system is that all four servo amplifiers are on

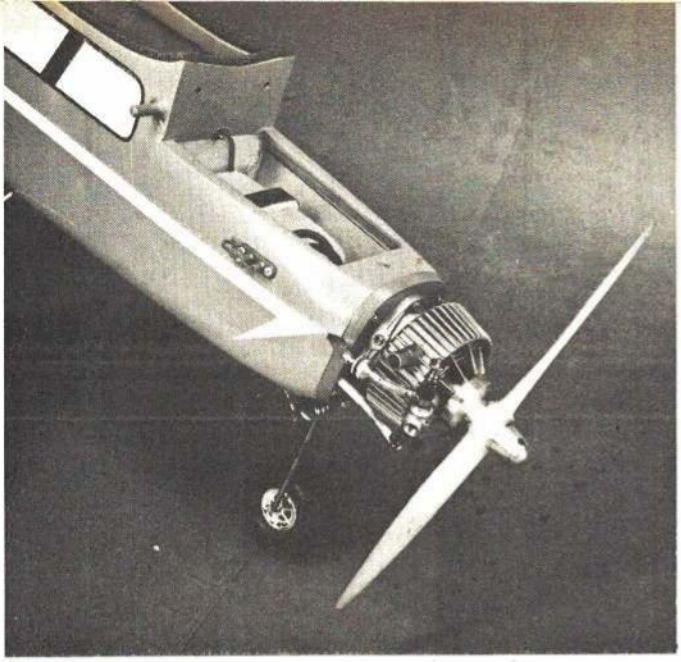
(Continued on page 68)

Most startling sight is the empty servo. All four servo amps are in the receiver case, yet the receiver package is not that much larger. Five wires go to each servo; gold-plated plugs used throughout. Servo pot wipes through an 180-degree arc and is accurate.

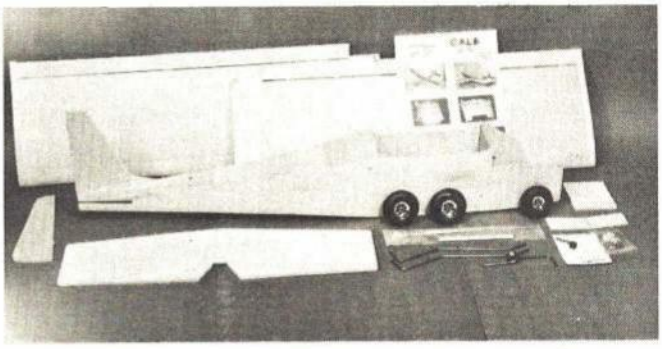


The 9.6V battery gives a strong signal output. Note adjustable sticks are featured. On-off switch, on tip of transmitter, has an accident-preventing guard.





Nose of the Trainer was modified for the unusual engine. The sides were shaped to blend with the roundness of the motor. Full-house RC was used; ailerons were pleasantly effective.



It all started with this deluxe made-by-hand kit. Note wheels and most hardware are included. All-balsa construction with foam wings, all controls are hinged. Must be painted or MonoKoted.

Graupner Wankel Engine and Cale Kits ARF Trainer

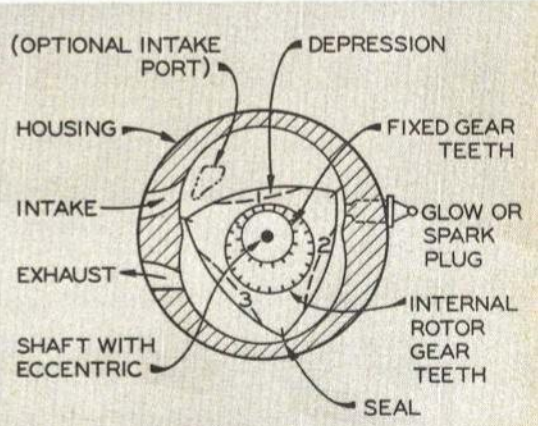
THE GRAUPNER WANKEL rotary-combustion engine is a radically new powerplant, measuring about 2¾" diameter over the cooling fins. It is rated at .30 cu. in. displacement. While it might be characterized as a three-cylinder, four-cycle style unit, it actually has no cylinders (nor pistons, nor connecting rods) in the usual sense. The crankshaft turns a triangular piece about a half inch thick; each outer edge of the triangle (these edges are slightly rounded lengthwise) has a slight depression in it and acts like a piston — thus the three-cylinder appellation. The triangle is not turned directly by the crankshaft, but rides on an eccentric inside a roughly figure-eight-shaped housing. Furthermore, by internal gearing, the triangle rotates at only one third the rate of the shaft. The fuel mixture is drawn directly into the "cylinders" via an intake port and departs through an exhaust port—about the only similarity to the usual model engine.

The Wankel, which was developed into a practical model powerplant by the German Graupner firm and will be marketed by them, is manufactured in Japan by the well-known O.S. firm. "There's a Wankel in Your Future," (June 1968 AAM, p. 22) contains a complete description of the ideas involved and information on earlier Graupner Wankel developments.

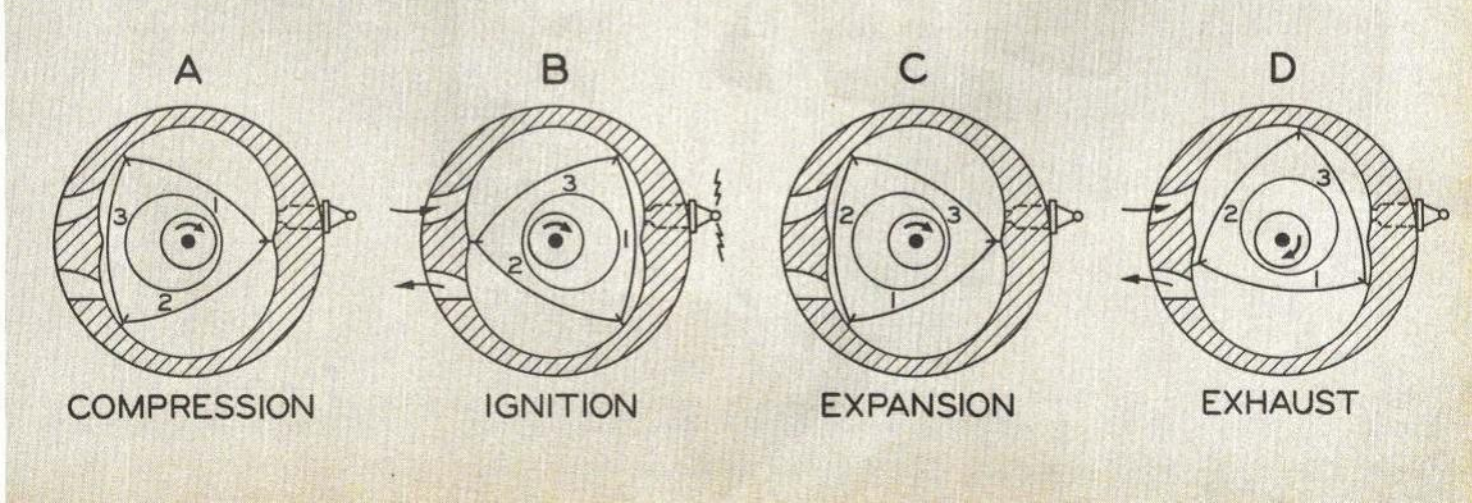
The present engine is heavier than current standard engines of around .30 displacement (which averages 8.5 oz. in the RC versions). It totals 13.65 oz. with mounting plate, cooling fin ring and spinner. The ring is a separate removable casting, and the engine may be run without it. The short exhaust stack is part of this ring, which weighs almost an ounce. Present list price in Germany is about $50, including this ring, the mounting plate and, of course, glow plug.

With its greater weight, higher cost and unfamiliar principle of operation, why use the engine at all? First and foremost, the engine has no reciprocating parts and can be almost perfectly balanced; therefore, it is exceptionally smooth in action. That inner triangle is balanced by opposing weights fore and aft on the crankshaft (the forward

(Continued on page 68)



Typical Wankel principles are shown. Note there are three faces to the rotary lobe. Each is an ignition surface so power strokes are almost continuous; as one face passes the plug, the next one is ready for firing. Vibration is minimal; rpm can be quite high.



Stinson Taperwing

Over 500 of the taperwing Reliants were built between 1936 and 1941, another 500 for the British in 1942 and 43.

DON BERLINER

ONE OF THE REALLY enjoyable things about aviation is that everyone who is involved in it has the right to exaggerate. Take the matter of airplane names: Lockheed's P-38 was called Lightning, but obviously wasn't; the McDonnell Douglas F4 really isn't a Phantom, but calling it one gives it an aura of mystery.

But when the Stinson people decided to name their hefty high-wing "Reliant," they meant every syllable of it. It was (and is) dependable, steady, trustworthy and everything else that "reliant" implies. Most of all, the beefy monoplane is as sturdy an airplane as one could want.

The Reliant series began in 1933 with the "SR" model, an improvement on the Model R series, in one of which company founder Eddie Stinson had been killed. The "R" had been the outgrowth of the Stinson Junior, a roomy, comfortable three- to four-passenger machine of 1928-32.

But it wasn't until 1936 that the public got its first look at what is now considered the classic big Stinson: the "Taperwing." The SR-5 of 1934 and the SR-6 of 1935 had the typical Reliant fuselage and tail, but had a straight wing. This was changed to a big wing, artistically tapered both in plan view and in thickness, starting with the SR-7. Despite its size and generally hefty appearance, the Reliants from the SR-7 through the final V-77 of the late 1940's are marvelously balanced and among the most graceful of airplanes.

Like some other airplanes in this series—notably the Fairchild 24 and the Great Lakes Trainer—the Reliant was a child of the Great Depression, which was just about the worst possible time for anyone to try to make a living by building and selling airplanes. While the Taperwings came into existence in 1936 when the Depression was beginning to ease up, times were still tough, and most people felt they could get along without a new airplane, no matter how pretty it might be. Even the successes of this period weren't much by today's standards.

Still, the Stinson Co. apparently was about as hardy as its pet flying machine, for it persevered. During 1936 and 1937, more than 200 SR-7's and SR-8's were built and sold (in those days, not necessarily the same thing). With powerful radial engines, they could lift large loads from quite small airports (which was about all that could be found, that many years ago). Struggling charter pilots and freight haulers found it well-suited to their needs.

In addition to its tricky-looking wing, this Stinson was marked by single wing and gear struts.

In 1937, the SR-9 was introduced, featuring a clean, molded windshield in place of the flat glass panels used on all the earlier models. While the SR-9 looked better for the windshield change, it suffered from reduced visibility while on the ground, and slightly increased drag. Almost 200 were built during 1937-38, despite the fact that prices ranged from just under $10,000 for the 225-hp Lycoming-powered SR-9A to more than $18,000 for a fully-equipped 450-hp P&W-powered SR-9F.

The final civilian version of the Reliant—the SR-10—made its debut in 1938. About 50 were built with the dished cowling which by then had become a Reliant trademark, before the smooth-cowl modification was introduced in 1939. Another 50-60 were delivered to customers before World War II stopped all civil production.

Once the war began, there was a different sort of demand for tough, utilitarian aircraft, and the Reliant filled the bill very neatly. Forty-five privately owned SR-8's, SR-9's and SR-10's were drafted by the Army Air Corps as UC-81's in 1942 and were assigned to all

Versions and Variants

SR-7A—225 hp Lycoming R-680-B4 or -4
SR-7B—245 hp Lycoming R-680-B6 or -6
SR-7C—260 hp Lycoming R-680-B5 or -5
SR-8A—225 hp Lycoming R-680-B4
SR-8B—245 hp Lycoming R-680-B6 or -D6
SR-8C—260 hp Lycoming R-680-B5 or -D5
SR-8D—285 hp Wright-R-760-E1
SR-8E—350 hp Wright R-760-E2
SR-9A—225 hp Lycoming R-680-B4
SR-9B—245 hp Lycoming R-680-B6 or -D6
SR-9C—260 hp Lycoming R-680-B5 or -D5
SR-9D—285 hp Wright R-760-E1
SR-9E—350 hp Wright R-760-E2
SR-9F—450 hp Pratt & Whitney Wasp Jr.
SR-10B—245 hp Lycoming R-680-D6
SR-10C—260 hp Lycoming R-680-D5
SR-10D—300 hp Wright R-760-E1
SR-10E—350 hp Wright R-760-E2
SR-10F—450 hp Pratt & Whitney Wasp Jr.
SR-10G—290 hp Lycoming R-680-E1
SR-10H—280 hp Lycoming R-680-E2
SR-10J—300 hp Lycoming R-680-E3
SR-10K—450 hp Wright R-975-E3

UC-81 —5 SR-8B for USAAF
UC-81A—2 SR-10G for USAAF
UC-81B—1 SR-8E for USAAF
US-81C—3 SR-9C for USAAF
XC-81D—SR-10F for USAAF glider pick-up tests
UC-81E—4 SR-9F for USAAF
UC-81F—8 SR-10F for USAAF
UC-81G—3 SR-9D for USAAF
UC-81H—1 SR-10E for USAAF
UC-81J—10 SR-9E for USAAF
UC-81K—5 SR-10C for USAAF
UC-81L—2 SR-8C for USAAF
UC-81M—1 SR-9C for USAAF
UC-81N—1 SR-9B for USAAF
AT-19—500 SR-10's for Fleet Air Arm
V-77—civilianized ex-military UC-81's and AT-19's

It was a classic, with classic outlines from any eye-point. Almost 100 such Stinsons still fly. The Smithsonian Institution

the various tasks encompassed by the designation UC, standing for Utility Cargo. They carried whatever anyone needed or wanted, from any little strip and under any conditions. Because of their unusual spaciousness and comfort, Reliants were especially prized by high ranking officers as their private transports. Luxury indeed.

Oddly enough, no Reliants were built specifically for any branch of the American armed forces, though 500 were produced for the Royal Navy's Fleet Air Arm under the U.S. Army Air Corps designation of AT-19. Many of these were returned to the U.S. when the war was over, and entered civilian life as the Stinson V-77, now the most common version to be seen at many fields.

Even before the SR-10 Reliant was halfway through its production run, a new Stinson—the Model 10 Voyager—was introduced. It carried but three people to the SR-10's five, and had a mere 90 hp to the SR-10's 225-450 hp, but it offered the combination of performance, ease of handling and low price that appealed to the kind of mass audience the Reliant had never tapped. In little more than a year, just before the war started, 1,000 Voyagers were sold: more than the entire history of the Reliant.

After the war, the Voyager went back into production and soon developed into the 150-hp and 165-hp four-seaters that established a fine reputation for their load-carrying ability. Piper bought out the Stinson firm late in 1948 and continued to build the Piper-Stinson 165 for a short time, until the line was phased out at the end of 1949 and the proud Stinson name became history.

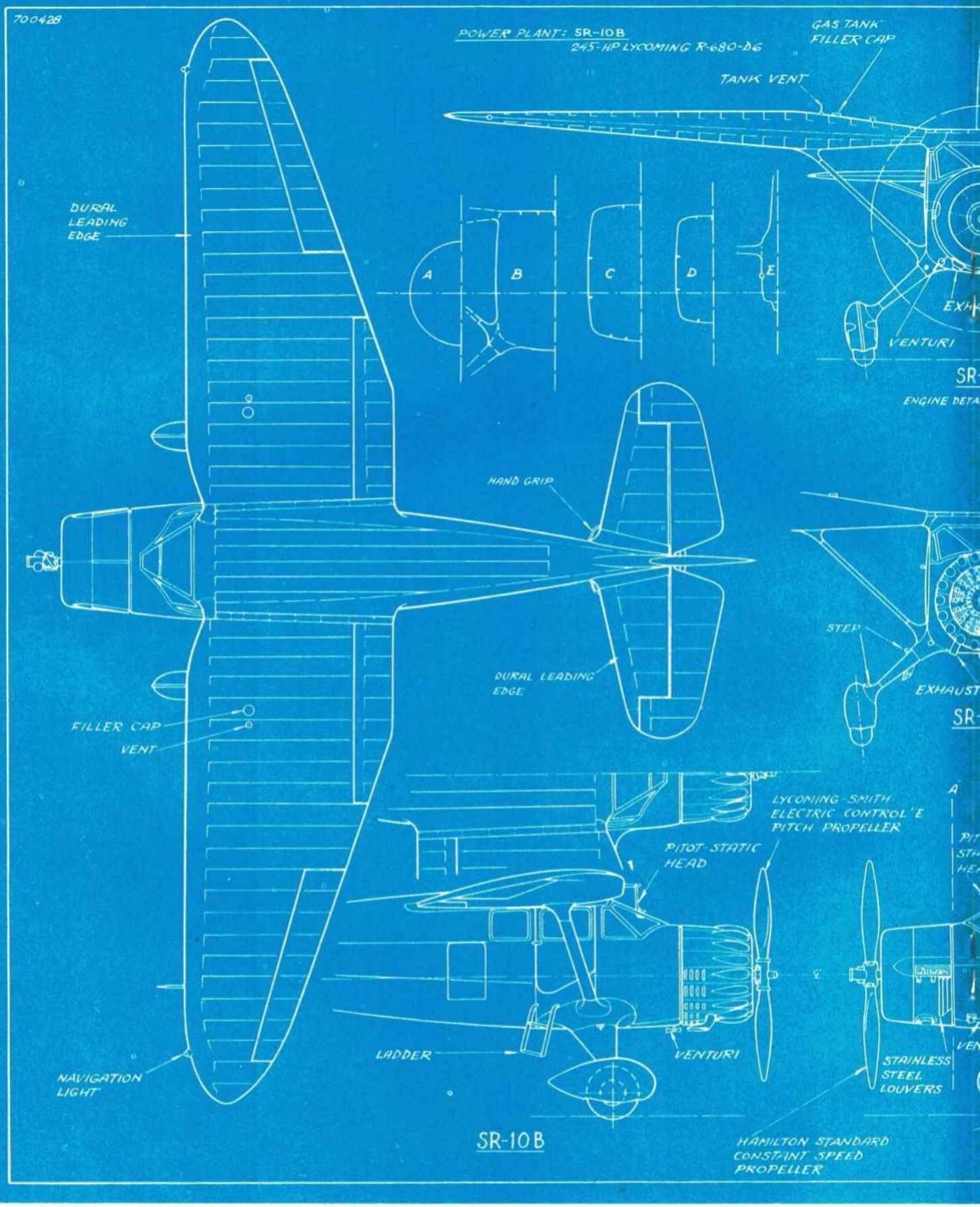
Just over 500 of the taperwing Reliants were built between 1936 and 1941, and another 500 for the British in 1942-43. Most of them are gone. Time and war and carelessness have taken their toll. Yet there must be close to a hundred remaining airplanes. And probably a half dozen dedicated admirers for each. Eddie Stinson would be proud.

Interested in Stinsons? Their best friends belong to the National Stinson Club, 4539 N. 49th Ave., Phoenix, Ariz.

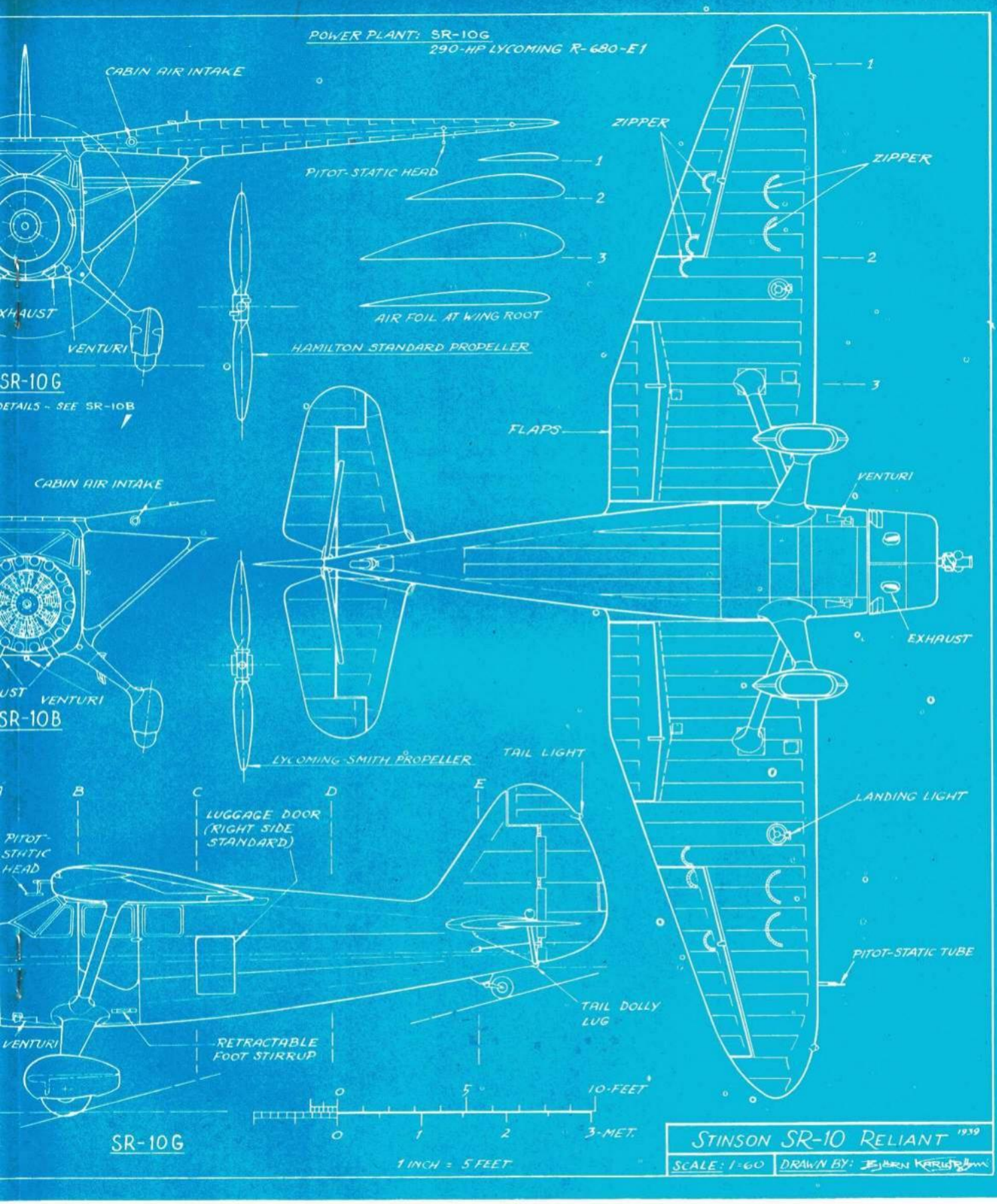
Dimensions:

Wingspan—41′ 10½″
Length—27′ 10¼″
Height—8′ 7″
Wing Area—258½ sq. ft.

	SR-10C	SR-10E	SR-10F	SR-10G	SR-10J	SR-10K
Empty Weight—	2,525 lbs.	2,730 lbs.	3,040 lbs.	2,605 lbs.	2,610 lbs.	3,045 lbs.
Gross Weight—	3,900 lbs.	4,150 lbs.	4,650 lbs.	4,000 lbs.	4,000 lbs.	4,650 lbs.
Performance:						
Cruising Speed	147 mph	153 mph	170 mph	147 mph	141 mph	168 mph
Landing Speed	58 mph	60 mph	62 mph	59 mph	59 mph	62 mph
Service Ceiling	15,000′	17,400′	21,000′	14,200′	15,000′	
Cruising Range	620 mi.	810 mi.	600 mi.	765 mi.	810 mi.	590 mi.



Stinson SR-10 Reliant



The rugged, dependable Stinson SR-10 came after the Depression which plagued its straight-winged predecessors, but soon enough to see war duty as an Army Air Corps draftee for a Utility Cargo Aircraft, and for Royal Navy's Fleet Air Arm, under U.S. designation AT-19. After the war many of the AT-19's were returned by the military for civilian use. Then called V-77; from this group come most of those still flying.

CHARGER

This 049 swept-wing stunter will fly on long lines because of relocated off-set engine. Does full AMA pattern.

JIM MAYFIELD

FOR THOSE who want something really different yet capable of doing the AMA precision aerobatic pattern, the Charger is it! Charger was developed as an experiment to test an unusual thrust arrangement in a competition, precision, stunt design. The thrust idea isn't original, but was borrowed from Charles Mackey and Bernard Ash, who tried it years ago. As a competition machine, the ship is not quite up to form, but for sport and fun flying it fills the bill. With the engine and tank mass near the CG, Charger turns instantly! As would be expected, there is no line tension problem.

Construction begins with the ribs. Using a new sharp blade, cut out all the ribs, making R-1, R-7 and R-13, jig ribs. On the jig ribs, cut the rib shape in a dashed fashion so the jigs may be trimmed off easily. Ribs 2A, 3A, and 4A, for the motor mount and center sheeting, should be self-explanatory. Cut the trailing edges, leading edges and spars to length. Cut out the combination motor, tank and bellcrank mount, and drill engine mounting holes, tank overflow hole, and bellcrank mounting hole.

For a true warp-free wing, jig-build it on a flat warp-free board and then stress-relieve it. The jigs are shown on the plan as past of certain ribs. Pin jig ribs over the plans, on the building board, and build as much of the wing as possible before removing it from the board.

Slip the leading edges and spars through the jig ribs and pin them in place. Starting at the tips, and working toward the center, slip the ribs in one at a time, horizontally between the spars. Twist ribs vertically, locking them into the spars, and slide toward the tip and into place. Pin the ribs to leading edge and spars. The top side is built first so the A ribs should be on the right or outside panel. Maneuver the motor mount into place at the same time R-2A and R-3A are installed.

The leading edge and spars are not cut at this time in the motor and tank area. Glue on the top trailing edges and pin. Using a glue gun, cement all the joints between ribs, leading edges, spars, and motor mounts that can be reached. Let this construction dry overnight and then stress-relieve by water spraying.

While waiting for the wing to dry, cut out the fuselage and tail parts. Glue the doublers to the body. Shape the rudder, stab and elevators with a sanding block. Trailing edges do not have to be sharp.

Turn the wing over and pin upside down. Remove the jigs now on top. Glue on the bottom trailing edges. Cut off part of R-3A where the filler block goes onto the bottom of the motor mount. Install blind nuts and glue on the filler block.

Meanwhile shape the body, keeping it heavy in the front and light in the tail. Do not round off the stab-perch; leave it flat on top. Carve the filler block to an airfoil shape and fit the center sheeting over it. The sheeting will butt against the spars and leading edge. After the glue dries, stress-relieve the entire wing and let dry overnight. Install the control horn in the elevators and hinge them to the stab.

When the wing is dry, remove it from the board and trim off remaining jigs. Cut away part of R-3A and the top spar so the engine and tank will fit. Hollow the filler block and leading edge to clear the engine. Drill a hole for the tank vent through the bottom sheeting. Glue the tank in place, attaching a piece of fuel line long enough to stick out through the bottom of the wing.

Glue in R-14 and R-15, adding scrap pieces behind the engine and in front of the tank. Cut a hole to get the bellcrank bolt through the bottom sheeting. Shape the leading edge in the area of the lead-out guides. Install the bellcrank, leadouts and pushrod. Cut a small notch in the trailing edge for the pushrod, which extends straight out. It is bent and cut to length later. Glue on the leadout guides. Sheet the center top of the wing. Cut out and glue on the wing tips.

Bend the landing gears. Drill holes for the nose gears to extend through and for sewing them in place. Sew the gears to body with heavy thread then glue.

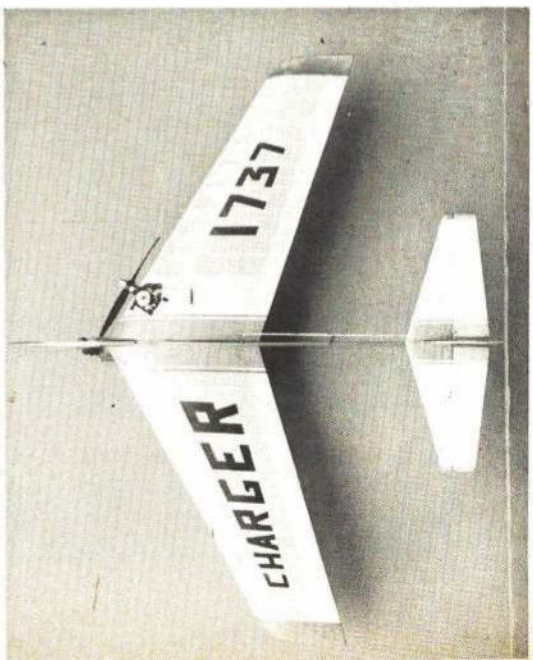
Sand the entire wing and trim to fit fuselage. Assemble the wing, body and stab without glue. Bend the pushrod so that it goes under the stab in the general area of the control horn. Find the extremes of its movement and make the bend for the control horn at the midway point. Cut off the excess.

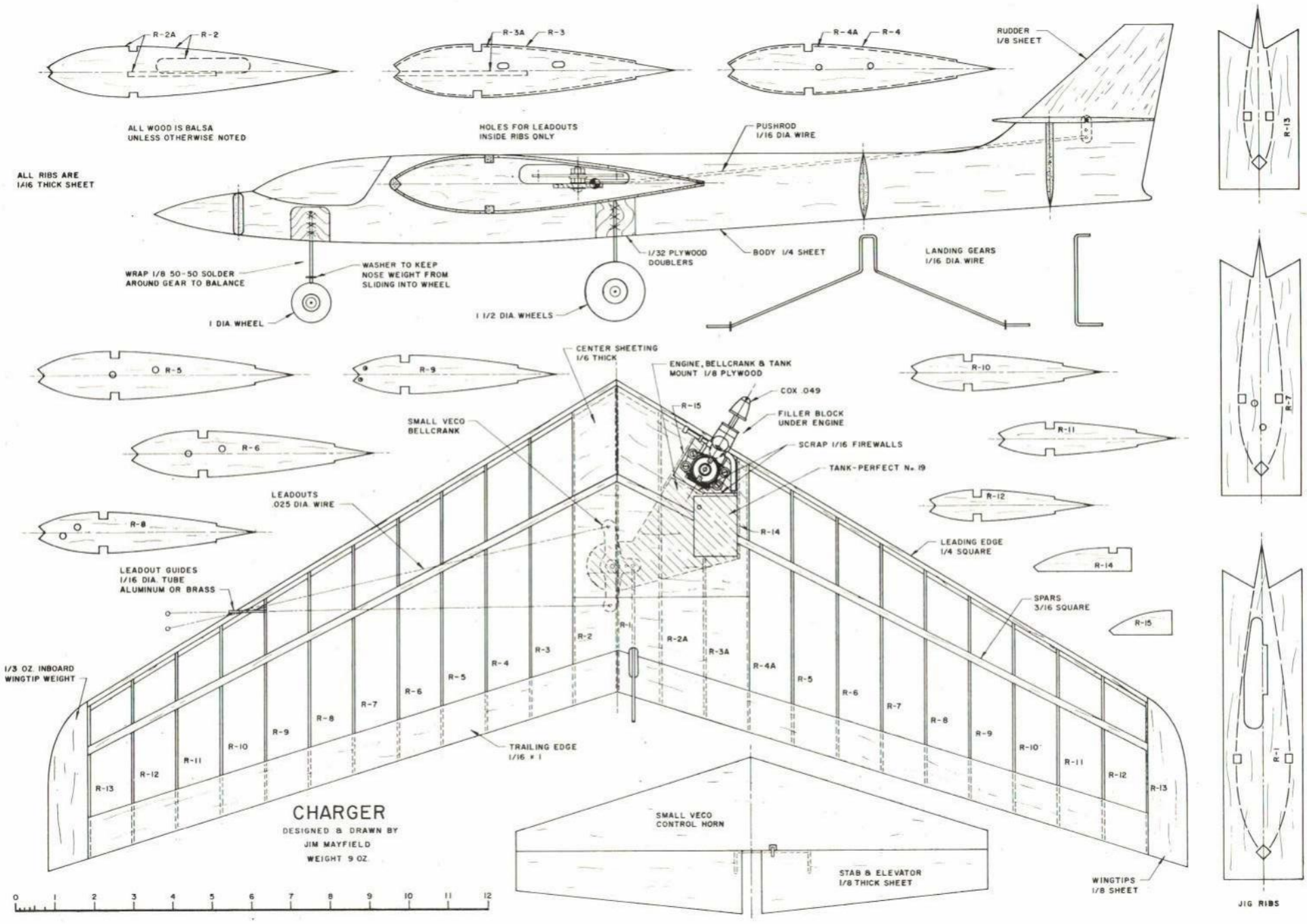
Now glue the whole assembly together, aligning the stab by measuring from the trailing edge of the wing, at R-6, to the hinge line at the tip of the stab. The stab must be parallel to the wing from behind; and the rudder, perpendicular. After the assembly dries, double-glue all joints. Solder washers to retain the pushrod on the control horn and the wheels on the gears. Washers also must be soldered on the inside of the main wheels.

Give the plane two coats of clear dope and sand lightly. The original was covered and trimmed in colored Jap tissue. Silkspan and colored dope may be used, if desired.

The inboard wing-tip weight and CG location shown on the plans are only approximate. Use modeling clay and trim to suit the model, since no two models trim out the same. I have built two Chargers and each had to be trimmed differently. Depending on the power, the plane can be flown on 25- to 42-ft. lines. I fly mine on 42-ft., .008 dia. single-strand lines. Fly cautiously at first.

Charger reacts right now and takes getting used to.




R-2A
R-2
R-3A
R-3
R-4A
R-4
RUDDER
1/8 SHEET
ALL WOOD IS BALSA
UNLESS OTHERWISE NOTED
HOLES FOR LEADOUTS
INSIDE RIBS ONLY
PUSHROD
1/16 DIA. WIRE
ALL RIBS ARE
1/16 THICK SHEET
WRAP 1/8 50-50 SOLDER
AROUND GEAR TO BALANCE
WASHER TO KEEP
NOSE WEIGHT FROM
SLIDING INTO WHEEL
1/32 PLYWOOD
DOUBLERS
BODY 1/4 SHEET
LANDING GEARS
1/16 DIA. WIRE
1 DIA. WHEEL
1 1/2 DIA. WHEELS
R-13
R-5
R-9
R-10
CENTER SHEETING
1/6 THICK
ENGINE, BELLCRANK & TANK
MOUNT 1/8 PLYWOOD
COX .049
R-15
FILLER BLOCK
UNDER ENGINE
SMALL VECO
BELLCRANK
SCRAP 1/16 FIREWALLS
R-11
R-6
TANK-PERFECT No. 19
R-7
LEADOUTS
.025 DIA. WIRE
R-12
R-8
R-14
LEADING EDGE
1/4 SQUARE
LEADOUT GUIDES
1/16 DIA. TUBE
ALUMINUM OR BRASS
SPARS
3/16 SQUARE
1/3 OZ. INBOARD
WINGTIP WEIGHT
R-1
R-2
R-2A
R-3
R-3A
R-4
R-4A
R-5
R-6
R-7
R-8
R-9
R-10
R-11
R-12
R-13
TRAILING EDGE
1/16 x 1
CHARGER
DESIGNED & DRAWN BY
JIM MAYFIELD
WEIGHT 9 OZ.
SMALL VECO
CONTROL HORN
STAB & ELEVATOR
1/8 THICK SHEET
WINGTIPS
1/8 SHEET
JIG RIBS
0 1 2 3 4 5 6 7 8 9 10 11 12

NEW PRODUCTS CHECK LIST

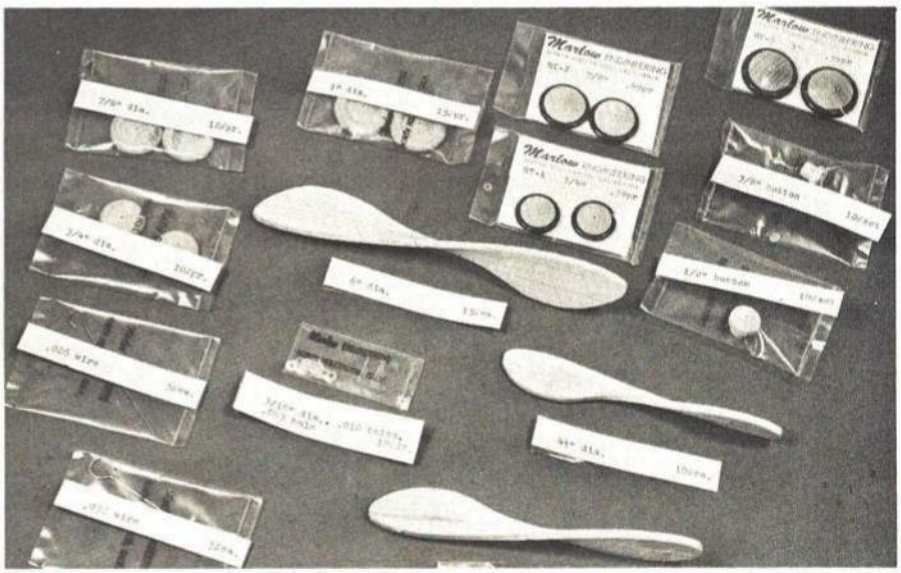
Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."

FRANK PIERCE

Stanley/Apollo insignia. "The Eagle has landed." Commemorative shoulder patches of insignia worn by Armstrong and Aldrin on first Lunar touchdown. Great as gift for astro-minded pre-teener. Also, patches from flights 12, 13, and yet-to-be-flown 14. Top quality, three-inch diameter. $1.25 each, 4 for $4. **Stanley,** Dept. AM, 17 Serpentine, Roslyn, N. Y. 11576

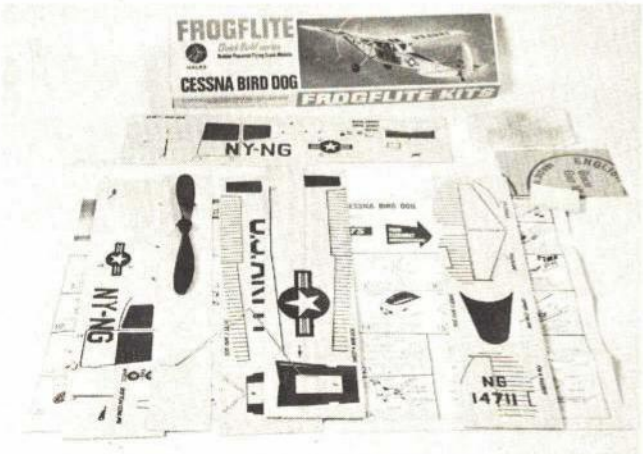
Aero Publishers/New Aero-Pictorial. 98 pages and 206 photos cover details of Royal Australian and New Zealand Air Forces during World War II. Full info on squadron nomenclature, aircraft identification numbers, etc. Invaluable for serious air historian. $3.95. **Aero Publishers, Inc.,** 329 Aviation Rd., Fallbrook, Calif. 92028

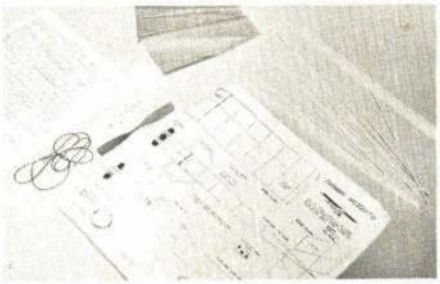
Marlow Engineering / Lite-weight accessories. Especially for light-weight rubber power, Marlow offers full line of wood wheels, thrust buttons, shafts, props, etc. Write for full details, prices. **Marlow Engineering,** 6850 Vineland Ave., North Hollywood, Calif. 91605

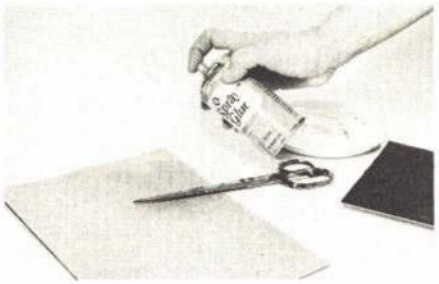


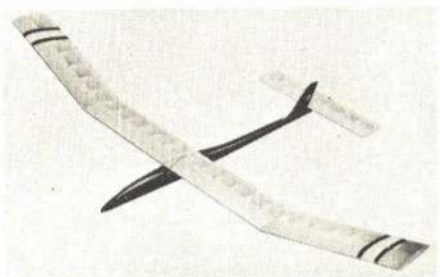
A. A. Hales Ltd./All-balsa free-flight Cessna. Built-up sheet balsa construction, **Frogflite** series **Cessna** gives realistic flight performance. All parts die-cut and color imprinted for easy quick assembly. Great for beginners. Detailed step-by-step plans. $1.95. Imported. **Boyd Models,** 810 E. 14th St., Los Angeles, Calif. 90021

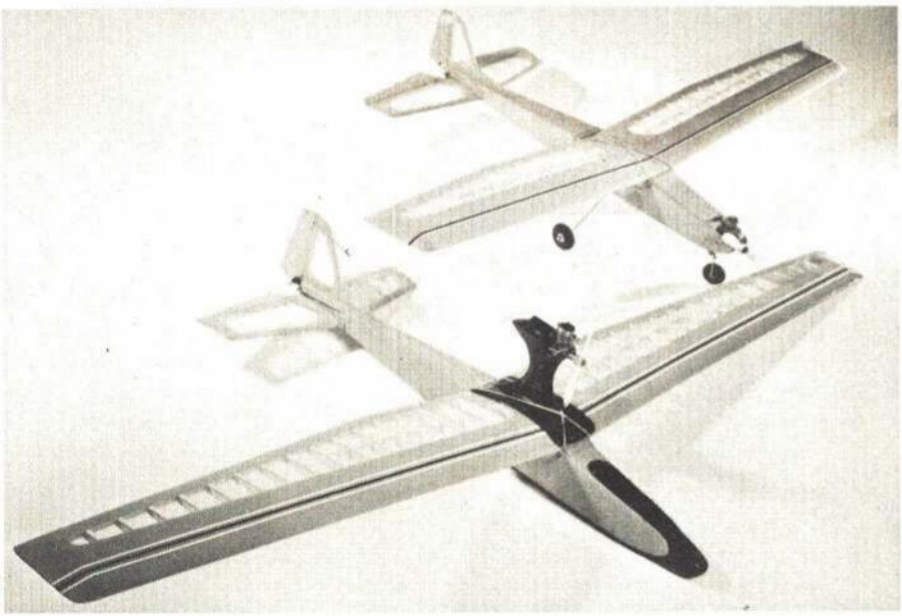
Kayeff, Inc./Krabbenkutter shrimp boat. Super-detailed 20" model of German shrimp boat features planked hardwood hull, brass fittings, all gear including dip nets. Imported from Denmark. Send $1 for color catalog. Kit with fittings, $37. **Kayeff, Inc.,** 511 Campesina Rd., Arcadia, Calif. 91006











Micro-Dyne/Ultra lite-weight kits. New line of semi-scale kits include all raw material required to build micro-weight rubber-powered endurance flyers. 1/32" stringers, 1/100" sheet, full info and tips for building included on plans. **Micro-Dyne,** Box 2338, Leucadia, Calif. 92042

USM Bostic/Aerosol glue. Pressure-sensitive glue can be used for permanent or temporary bonds. Dries smooth and clear, holds in 30 sec. Dozens of model uses. **USM Corp.,** Consumer Products Div., Box 1139, Reading, Pa. 19603

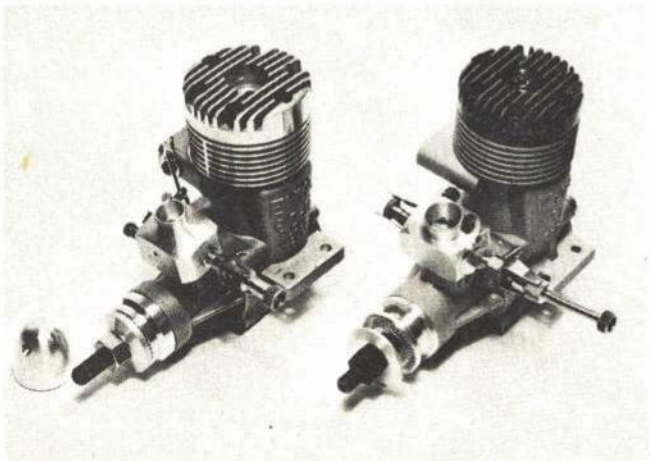
Midwest/Jetstream sailplane. Re-engineered version of former **Ambroid Jetstream,** tow-line glider has 48" span, 223 sq. in. area, meets A-1 Nordic class rules. Die-cut parts, all wire, tissue, etc., for $5.95. **Midwest Products Co.,** 400 S. Indiana St., Hobart, Ind. 46342

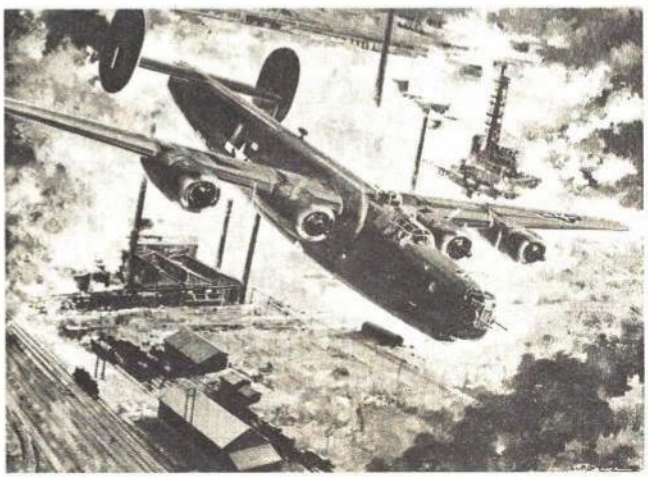
Heath/Spectre RC model car. High-impact plastic body styled after GT line of racing coupes, Spectre GD-101 comes complete except for RC gear. Recommended for 15 to 23 engines, 19 **Veco** with RC throttle comes as a factory-supplied extra. Operates on any proportional system with at least two channels. Quality throughout, including permanently mounted rear tires for best balance and traction. Scale speeds to 200 mph. Kit, less engine, RC, $49.95. **Heath Company,** Benton Harbor, Mich. 49022

Dumas/The Evolution. Totally new concept in a two-in-one model. Slow and rugged 75" span glider with power pod converts in minutes to 48" span sport plane by removing plug-in wing tip panels. Great for evolving novice RC fliers who want to start slow, work up. $19.95. **Dumas,** Box 6093, Tucson, Ariz. 85716

MRC Engines/Two new powerhouses. Both 60's, Enya MK III on left is from Japan and Webra Blackhead on right is West German. An excellent low-back-pressure muffler is available for each. Enya is $47.95; Webra, $77.95. **Model Rectifier Corporation,** 2500 Woodbridge Ave., Edison, N. J. 08817

Shore Hobby Supply/Aircraft pictures. Five beautiful lithographed full-color 16 x 20" prints from WW II — Ploesti (B-24) raid, B-17's, —25's, 26's and 29's in action. Accurately detailed. Heavyweight art paper. Artist: J. B. Deneen. All five, $7.49. **Shore Hobby Supply,** 62 White St., Red Bank, N. J. 07701





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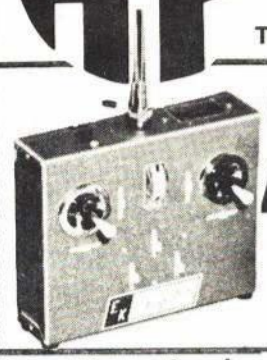

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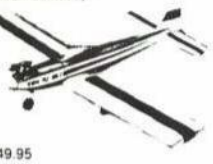

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OCTOBER 1970

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A.M.A. NEWS

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Second Hall of Fame Honors Three

The **Washington State Air National Guard** again this year, as in 1969, hosted model aviation's most prestigious event of the year—**the 1970 Hall of Fame awards**—in a grand ceremonial banquet at Spokane's Ridpath Inn on June 13th. **Dick Korda, Al Lewis** and **Bill Winter** were officially presented with Hall of Fame certificates signed by **Washington State Governor Daniel J. Evans** and **John Patton, president of the Academy of Model Aeronautics.**

Leading the hosts was **Major General Howard C. McGee,** Adjutant General of the Washington National Guard, representing the governor. Sharing the hosting honors were **Brigadier General Robert F. King,** the Assistant Adjutant General for Air, and **Colonel Lyle W. Scott,** commanding officer of the Spokane Air National Guard. Four of the first seven Hall of Famers, previously honored in 1969, shared the ceremonial head table as guest-hosts: **Willis Brown. Frank Zaic, Carl Goldberg** and **Walt Good.**

A total of 480 people filled the Ridpath's Empire Ballroom for the occasion, which included an impressive presentation of guests led by a Scottish bagpiper in full regalia. **Phil Kraft,** former National and World Radio Control Precision Aerobatics Aeromodeling Champion and the evening's featured speaker, told of the value of model aviation activity with emphasis on the benefits of youth participation. **John Patton** then outlined the achievements of the 1970 Hall of Famers and made the award presentations.

John Worth, AMA's executive director, accepted for **Dick Korda** who was unable to attend. Worth related the inspiration of being present as a teenager when Korda made a spectacular flight to win the 1939 Wakefield World Championship for rubber-powered models at Teterboro, N.J. Dick received worldwide acclaim for this performance, which influenced international areomodeling design for many years afterward. The performance, known as "the long flight," was the first flight of the contest and lasted over 43 minutes, with the landing at almost the same point as takeoff. Korda had previously gotten attention for an even longer flight, one of over 54 minutes made at the 1937 National Meet in Detroit.

With these two historical flights and many other impressive competition performances, Korda had tremendous influence over model design for years to come. His models had the great quality of being easily duplicated, so that many other modelers became contest winners using Korda designs which were kitted by several manufacturers. One of these is still well remembered—a 29¢ kit which, because of its fantastically low

Old-time photos show 1970 Model Aviation Hall of Famers in action way back when. Announcing a model airplane show in New England, above, is Al Lewis; below left with late thirties rubber-powered stick model is Dick Korda; below right with old-time pusher rubber model is Bill Winter.

Washington Air National Guard photo

Governor Daniel J. Evans, left, visited the Spokane Internats, thoughtfully brought his youngsters. Phil Kraft explains RC model to the group, including Colonel Lyle Scott, Air Guard Commanding Officer.

Phil Heller photo

Above: Bagpiper in full regalia led the seating of honored guests, headed by General and Mrs. Howard McGee. **Below:** Gen. Robert King received the Distinguished Service Award from AMA President Patton.

Wash. ANG photo

Above: Sandy Pimenoff, president of the FAI CIAM, travelled from Finland for the Internats—congratulates Olin Koger, Great Falls, Mont., for D Pattern win. **Below:** Ann Brooke, center, beat all in Delta Dart.

Phil Heller photo

Wash. ANG photo

price (even for the thirties), was flown by thousands of modelers.

Al Lewis, currently editor of AIR PROGRESS magazine and for many years editor of AMERICAN MODELER magazine, received his hall of fame award for editorial and administrative efforts prior to and after World War II. He was the first executive director of the Academy of Model Aeronautics, helping to get AMA established on its own as the national organization for aeromodelers. This followed a period of service with the predecessor organization, as secretary-treasurer of the Model Division of the National Aeronautic Association.

In accepting the award for Lewis, **Willis Brown** (AMA's first president) told of still earlier days when he and Al worked together on modeling projects in the Boston area. Lewis had edited a publication called Wing Overs that told of Boston modeling activities, then he became editor of MODEL AVIATION, AMA's publication. Lewis also followed Brown as the second AMA president.

Al's basic contributions which gained his Hall of Fame recognition were for communications and administration—both vital elements in AMA's transition from a weak offspring of NAA to a strong and vigorous voice of U.S. aeromodeling. His efforts laid the groundwork for the later orderly transfer of organizational leadership to other presidents and executive directors who succeeded him.

Bill Winter received his Hall of Fame award for many years of contributions relating to publications. He became well known as a designer of famous models of all types, an author of model and full scale aviation books, and the editor of many magazines.

During the early forties he was best known as editor of AIR TRAILS magazine, in the fifties he was editor of MODEL AIRPLANE NEWS, in the early sixties he was editor simultaneously of both GRID LEAKS (now a collector's item RC publication) and AMA's monthly, MODEL AVIATION. Since the mid-sixties he has been editor and publisher of AMERICAN AIRCRAFT MODELER magazine.

Winter has earned a reputation for writing editorials which stir the imagination and produce action. It was such editorials, for example, which indirectly led to the establishment of the Hall of Fame. Noting the need for increased emphasis on youth aspects of aeromodeling, Winter urged fresh thinking on how to achieve it. Out of this came a Washington State proposal for creation of an Academy for Aerospace Science and Modeling and also the annual Hall of Fame awards to draw attention to those who have contributed significantly to model aviation.

The 1970 Hall of Fame selections were made from among seventy-two names submitted by a special committee of twenty persons. On this committee are the eleven regional vice-presidents of the Academy of Model Aeronautics and the editors of the four major aeromodeling magazines: FLYING MODELS, MODEL AIRPLANE NEWS, RC MODELER, AMERICAN AIRCRAFT MODELER.

Governor Visits Spokane Internats

It's not often that a state governor visits a model meet. But **Governor Daniel J. Evans** did, last June. Not only that, but he brought his sons with him to see the model flying and talk with the contestants. He then held a press conference nearby and told of his great interest and enthusiasm for aeromodeling.

The occasion was the **Second Annual Spokane International Model Airplane Championships** in the State of Washington, held in conjunction with the 1970 Hall of Fame award ceremonies. The meet attracted over 150 entries from all over the U.S. and 27 from Canada. RC had 110 entrants, CL had 50 and FF had 25. This was probably the largest 1970 meet, second only to the Nats, in which all three basic modeling categories were flown.

Among the dignitaries attending was **Sandy Pimenoff,** president of the Federation Aeronautique Internationale's Committee for International Aero Modeling; also, **John Patton,** president of the Academy of Model Aeronautics and chairman of the CIAM's Radio Control Subcommittee. The meet was one of only two in the U.S. on the FAI's International Sporting Calendar (besides the

National Model Airplane Champs).

There were 31 events! Practically all of the big names of RC were there to fly in nine RC events. Scale fans had six events, plus RC Formula I and CL Scale Racing—more scale action than usually seen. A dozen CL events in all were held, plus five FF events, including two for Delta Dart. Delta Dart events for boys and girls produced a surprise—a girl, **Ann Brooke,** daughter of former RC World Champ **Ralph Brooke**, topped all D-D entries with a flight of 42 seconds.

Rainstorms plagued the meet by washing out several hours of flying, but there was other action to keep everyone occupied. A trade show in the Air Guard's nearby hangar provided shelter, refreshments and things to see, including model and trophy displays. The Spokane Internats was a major achievement of the year, bringing to the northwest the flavor of national and international meets.

Col. Lyle Scott, commanding officer of the 142nd Air Defense Wing of the Washington Air National Guard, and the 252nd Communications Group, was the meet host. His staff organized and supported all phases of the meet. It was a tremendously well organized operation involving officers and enlisted men at all levels in the command—all the military personnel involved were very competent, courteous and cooperative.

Lt. Col. Robert Hepker of the Spokane ANG staff was Contest Director, ably assisted by **Lt. Col. Dale Wainwright,** with further assistance from three civilian category directors: **Dick Carson** for RC, **Bruce Gale** for CL and **Jim Chittenden** for FF. Many other officials and assistance were provided by area clubs: the **Barons Model Club of Spokane,** the **Radio Aero Modelers of Seattle,** the **Portland Stardusters**, the **Mt. Rainier RC Society** of Tacoma, the **Seattle Radio Aero Club,** and the **RCFC** of Vancouver, British Columbia.

AMA Action Modifies FCC Proposal

The position of a government agency, once publicly taken, is extremely difficult to reverse. Thus, when the FCC proposed several months ago to extend use of the current five 72-76 MHz frequencies to models other than aircraft, it seemed to be only a matter of time before the proposal would become fact. But the latest word from the FCC is that AMA's vigorous objection has caused a significant modification of the proposal.

The FCC has now withdrawn its total sharing proposal and issued a further notice of Proposed Rule Making (Docket No. 18733, RM-1424, released June 12). In this revised proposal, three of the five 72 MHz frequencies are to remain exclusively for aircraft modeler use; two new frequencies will be made available for control of models other than aircraft (boats, cars); and the other two of the current five 72 MHz frequencies may be used for all types of modeler activity—planes, boats and cars.

AMA's position has, therefore, reduced the potential interference problems of the original FCC proposal to only two frequencies instead of five, has opened up those two frequencies so that AMA members may use their RC equipment for boats and cars as well as planes, and has produced two new frequencies to encourage boat and car operation away from the aircraft activity.

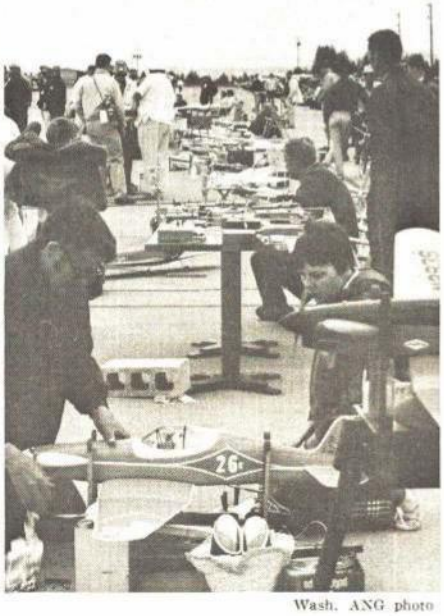
AMA's counsel has indicated that the FCC response to AMA's position is highly unusual, and that the AMA Frequency Committee has been instrumental in expanding the frequencies available to all modelers while minimizing the interference threat to model aircraft operations.

Possibly some AMA people may feel that the revised proposal remains unsatisfactory, legalizing interference on two frequencies. The new interference effect, however, is seen to be no worse than already exists in practice. The probability is that the non-aircraft modelers will concentrate their control activities on the two new frequencies to be allocated exclusively for such non-aircraft model purposes.

The most important overall result of the latest FCC action is the fact that modeling activities continue to be recognized by the government as important and deserving of expansion. This further emphasizes the essential role of the Academy of Model Aeronautics and its recognition by the FCC as an effective voice on behalf of all modelers, seeking to serve all interests in an equitable manner.

One of the beneficial side effects of the FCC's revised proposal is the stimulus accorded to radio equipment manufacturers, through the 40% increase in the 72-76 MHz frequency complement and the broader-based modeler market which may be expected.

Under the current proposal, 72.08, 72.24, and 75.64 are for aircraft only; 72.16 and 72.32 are for non-aircraft models only; 72.40 and 72.96 are for all types of models. The interference potential of these frequency assignments is one of the important areas of concern by the AMA Frequency Committee, which, when this was written, was studying the proposal with a view to formulating an official position. Initial reaction to the new proposal has basically been that non-aircraft activity is being offered more than it needs, and model aircraft operation needs the full protection of the present regulations. Comments were to be filed with the FCC by August 21.



Wash. ANG photo

Above: Radio Control events of the 2nd Spokane Internats were heavily contested, as Pylon Race pit area shot indicates. Top flyers came from all over the west and mid-west, among them Larry Leonard, right from Northridge, Calif., 1969 Nats RC Champion. Placed 3rd.

Wash. ANG photo

Above: Frank Stocker, Vancouver, Wash., looks up as he readies Formula I Racer—placed 4th. Dr. Ralph Brooke, upper R, captured Pattern 2nd; sleek model. Lower R: Ed Dreese, Broadview, Mont., won RC Scale; Pattern shown.

Wash. ANG photo

Wash. ANG photo

Wash. ANG photo

AMA News Bits

Who's Flying Now?

The "buddy box" is a great help in teaching the basics of flying, said **Charley Reed** in CONTACTS, newsletter of the **AMA chartered Kansas City RC Association.** "The only problem," he said, "is that the beginner does not fully realize when he no longer has control, so is not as aware of his every mistake."

How well this was emphasized when Charlie was having a little fun with **Fred Hulen,** KCRC publicity man, Charlie's contest Pattern model. Fred was doing real fine—loops, rolls, etc.—so Charlie put his inactive sticks into a snap roll configuration and, without warning, activated them. One quick yell from Fred: "What happened, I haven't got it!" In an instant Fred realized what had happened. "Boy, are you dirty!" he said.

Pardon Our Grammar, but

AMA totals look good **like** membership totals should! If that corny introduction doesn't grab you, maybe this will. AMA's 1970 membership roster consisted of 29,713 names as of July 13, well over last year's comparable figure **—an all-time record!** We at AMA HQ are pleased, and every AMA member ought to be. After all, AMA is you!

RC Judge Experiment

Curtis Brownlee, Contest Director of the **AMA sanctioned TORKS 10th American RC Annual** at Oklahoma City, reports that the contestants in the Class D Pattern event judged themselves—and there wasn't a single complaint. Each of the entrants passed through the three judging chairs before flying. In his report following the contest, Brownlee said that "One very experienced flyer had never judged before. He commented that he had never before appreciated the difficulty of judging." Some of the Class D flyers even volunteered to judge the C, B and A patterns!

FF at Sepulveda

By means of THE SATELLITE, newsletter of the **AMA chartered San Valeers MAC,** we can report that Free Flight model flying at California's **Sepulveda Dam Recreation Area** is still permitted, but new regulations have been prescribed to insure that models remain within the area at all times. Engine runs for powered models must be limited to 15 seconds, and all models having a wingspan greater than 20" must be equipped with a dethermalizer. The regulations require setting the dethermalizer for a maximum time of three minutes when the wind is between 0 and 5 knots, and one minute when the wind is 10 to 15 knots. Free Flight flying at the basin is prohibited when the wind velocity exceeds 15 knots.

Sport Pylon Divisions

The fun in RC Pylon Racing is when all the planes in a heat are competitive. Sometimes this doesn't happen in a Sport Pylon Race when the airplanes entered may not all be basically aerobatic types. That's why, in a recent contest of the **East Bay RC Club,** Calif., entries were broken into three separate contests, depending upon race times. Class I was for models with times from two to three minutes, Class II was three to four minutes, and Class III was for models with times over four minutes. This information came from a report by **Bud Phillips** in THE MODULATOR, newsletter of the **AMA chartered Pioneer RC Club.**

Mow for Dues

The **AMA chartered Sentral Illinois Radio Society** found that their flying field maintenance wasn't satisfactory when they divided the mowing task evenly among members. Problem was that members often had other obligations when their turns came. The solution agreed to by the club is to pay someone to mow the field weekly as needed (estimated at $10 per mowing), to be financed by an increase in SIRS dues to $24 per year. The club's newsletter, edited by **Gary Lenhardt,** suggests the possibility that some of the club members may want to pay their dues by mowing the grass—twice a year would nearly cover the new annual dues rate.

Try Low Wing RC

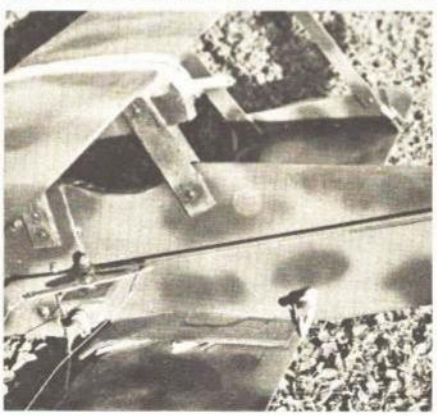
If you've gone through a season of flying with a shoulder wing model, you are ready to step up to an exciting low wing airplane, says **Shell Portnoy** of the **AMA chartered Middle Tennessee RC Society.** Assuming a fair competence with the high wing airplane, a pleasant surprise is in store for you with your first low-winger. Main thing is that they tend to fly where they are pointed. They're predictable and respond precisely to commands, according to Portnoy. These views were expressed in the club's GLOW PLUG newsletter, edited by **Frank Schwartz.**

Respect the Sun

That recent eclipse of the sun by the moon, and the repeated warnings not to look directly at the sun, reminded

Photo above taken following presentation of FAI record certificate (RC Helicopters, Duration, 5.6 seconds, May 18, 1969) to John Burkam, seated L, by Chuck Ellis, in shirt, Director of Engineering at Boeing-Vertol, where Burkam is a Structures Engineer. Record stood for a year. In progress below is a Dist. IX AMA meeting presided over by VP Stan Chilton last May at Dodge City, Kans. Most of the District IX officers were in attendance.

Submitted by Jim Mowrey



James Talbutt photos

WW I CL Combat is a big thing with the Chico Air Choppers in Calif. The pictured profile Halberstadt D-II by Jim Talbutt seems ideal; note rubber bands holding wings and struts.

Jim Clem photo

Above: Grady Turner, Longview, Tex., won spring Glue Dobber meet with Witch Doctor X in A FF. Below: Slightly modified CL Buster is fired up by Bob Frazier and group, Akron, O.

Ken Cunningham photo

Dan Rossman of the **AMA chartered Valley Forge Signal Seekers** to write in the club's paper, HEAR YE, of similar dangers to model flyers, particularly RC'ers. Here are the rules that Rossman follows. "Whenever the sun is visible, I wear good sunglasses. While flying, if I realize by the sudden increase in light intensity that my airplane is headed across the sun, I shut my eyes as I sweep across the sun, and then pick up the airplane on the other side. Even if I were willing to look directly into the sun," he said, "there is nothing to gain, since I know I would be blinded for a few seconds. At any rate, I would much rather risk an airplane than my eyesight."

We might add that it's a good idea to get a fix on the sun's location and avoid flying in that area of the sky.

Fair Turnabout?

If it's fair to schedule important competition programs in consideration of snow-bound modelers, it ought to be just as fair to take into account the 100 to 115 degree temperatures in July and August that some areas have, said **Alex Chisolm** in the WATTS NEW publication of the **AMA chartered Fresno Radio Modelers** (Calif.). Specifically, he is referring to the **RC Aerobatic Team Selection Program** (May 1-September 7) and the **NMPRA Championship Program** (May 1-September 30). Chisolm suggests that those in hot climes would favor eliminating July and August from the point season (except for the Nats), or extending the point season to October 31.

Quote Worth Mentioning

"The followup to the Delta Dart beginner's model should be another Delta Dart." That's the advice of **John Thornhill** of the **AMA chartered D.C. Maxecuters Club,** based upon experience with his own youngsters. He found that his son could put together the Delta Dart (or AMA Cub, AMA Racer) with very little assistance, but in so doing his son didn't become sufficiently adept at it to progress to a more complicated model; he could not cut, glue and handle the small pieces of balsa with ease. Thornhill suggested that a youngster should construct several Darts—until he hasn't the slightest difficulty.

U.S. Speed Team Change

John Newton and **Bill Wisniewski** have had to withdraw from the U.S. CL Speed Team for the World Championships in Belgium, due to time conflict problems. Replacing them are **Jim Nightingale** and **Glenn Lee** who placed fourth and fifth in the Team Finals in September, 1969.

The CL World Championships are taking place in Belgium about the time this issue reaches newsstands. All of us wish for good flying success for each of the three U.S. teams: **Stunt**—Gerald Phelps, Bob Gieske and Bill Werwage; **Speed**—Glenn Lee, Arnold Nelson and Jim Nightingale; **Team Race**—Albritton & Marvin, Barr & Theobald and Dunkin & Wright.

Join a Model Club

There are many reasons to join a model airplane club and participate in its activities. We won't try to list them all here, but we would like to reprint a short article that the president of the AMA chartered Lansing Flying Aces Club in Michigan, Milt Stevens, wrote for the club's newsletter.

Most AMA chartered clubs actively seek new members. See the listing of chartered clubs beginning on page 83 of the 1970 MODEL AIRCRAFT REGULATIONS for the club nearest you. If you are in a club that has not yet applied for AMA charter, write to AMA HQ for free charter information.

Any person joining our club with the idea of getting something for nothing had better think twice. Anything gained has to be earned. I don't mean in hours of hard labor and sweat but in being a good, kind and understanding human being. A type of person who is willing to share his knowledge with his fellow man and be willing to take advice that is offered.

Belonging to a club does have advantages. You can be with a group that talks your language. Problems can be solved, and new ways of doing things can be learned. A great many things have been tried and proved just from being part of a "bull" session.

Being part of a club puts you with experience. If you don't know how to fly, there is someone there to teach you. This alone is worth a great deal. Many young and old model builders have given up model building because of smashing too many models. This does not have to be. Learn how to fly and you save yourself a lot of money, and you gain confidence.

A club will offer a flying site. We all know that finding a good place to fly is becoming more difficult every day. An established club generally has a flying field for its members. Our club has the CL circles at the airport, and the RC group has its field on Ballentine road. The FF group does not have a permanent field, but they seem to make out all right.

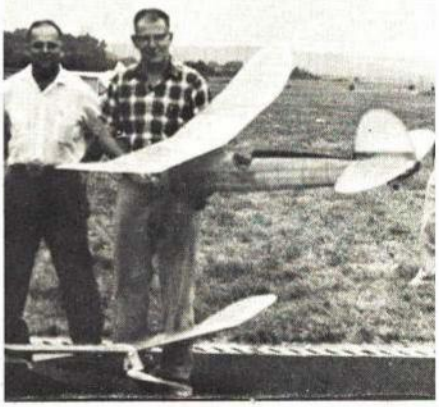
Our club can only be what we make it. If it is to grow, we need new ideas and people who can train and teach others. Remember, any club can be only as good as its membership.

Harry Fullas photo

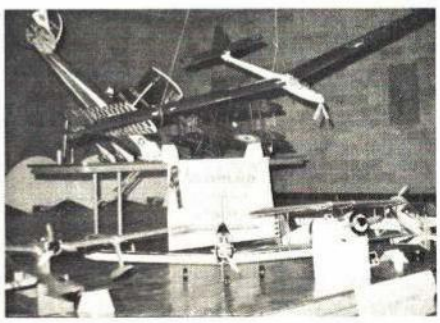
Left: Tauri recommended by Harry Fullas, Allentown, Pa., before trying a low-winger, weighs 4½ lbs. **Below:** 2nd Annual Bong Clean-Up brought out 80 FF'ers last May to show appreciation for use of the field near Brighton, Wisc. Some of those who helped shown. **Right:** FF Old-Timer by the creator, Henry Struck, plaid shirt, with Anderson Spitfire-powered New Ruler. Al Bailey, left, with Cyke-powered Bombshell. **Bottom Right:** Westchester, Ill., Hobby/Crafts Show grand winner —exhibit by the Aero Telemechanics RC Club.

Submitted by Pete Sotich

Jack Burns photo



Submitted by John Pond



Next Best Thing to Being at FF Symposium

Yeah, we know some of you couldn't go to the National Contest because it was just too far, or you couldn't take the time, or maybe it was some other reason. You've really missed the biggest modeling event going!

You'll be able to capture the flavor of the competition through reports, results and photographs which will appear in these pages next month, but some of the Nats happenings can't be given their due justice by means of such reporting.

Such is the case with **Sympo '70,** the Free Flight Symposium organized by the **AMA affiliated National Free Flight Society.** All is not lost, however. To the contrary, modelers may obtain the bound volume of Sympo '70 Report papers—the next best thing to a front row seat. See if one or more of the papers in the report doesn't interest you:

Minimize Your Rate of Sink. By correlating test results of 21 Nordic gliders, **Peter Allnutt and Ken Kaczanowski** have developed a relationship between basic airfoil parameters, aspect ratio, and rate of sink. Use it to get the best wing design for your next model. **John Krouse** helps by presenting the effect of undercamber on endurance. **Hank Cole** rounds it out by determining the effects of Reynolds Number on rate of sink and by presentng a simple test for determining whether your aspect ratio is the optimum one for your Reynolds Number. Finally, **Hewitt Phillips** discusses experimental methods for determining Lift/Drag of models and presents some test results obtained with RC gliders and with FF models.

Maximize Your Rate of Climb. A paper on choosing the best Wakefield propeller that is a classic is presented by **Bob Meuser.** It answers virtually all of the questions you've had on P/D, diameter, number of strands vs motor run, etc. **Dave Mendel's** paper makes it easy to find the best prop for your power model, be it FF FAI Power or RC. All you have to do is use his graphs with their illustrated examples. He also shows how much altitude suffers if the climb path is not vertical.

How Tight a Turn and How Big a Vertical Tail. What happens to your rate of sink as a function of bank angle in a coordinated turn is shown by **Peter Soule.** Also, he tells how to minimize your altitude loss during a turn when you are heading the wrong way and have run out of altitude. **Bill Bogart** correlates the vertical tail volumes and dihedral of Nordics, Wakefields and FAI Power models—shows how to use the data for designs, and explains what happens to a model in a steady state turn and why.

Wing Strength and Stability in Pitch. What's the best structure: D-box, sheet on bottom, multi-spar? What happens to torsional and bending stiffness as wood size and type of structure is varied on a Wakefield wing? **Don Goldberg** has the answers for you. **Hal Crane** comes up with a simple approach for locating the neutral point and fixing your center of gravity.

The Optimum Indoor Model. A computer is used by **Walter Erbach** to evaluate the effects of tail size, wing position, and C.G. position on power required. There is an optimum C.G. position for each tail size. **Bob Platt** developed an equation for the power required as a function of average chord, and using it he calculated the optimum chord for an FAI Indoor model. His latest model, based on these results, has already broken two low-ceiling records.

Order your copy of the Sympo '70 Report today, from Annie Gieskieng, NFFS, 1333 So. Franklin St., Denver, Colo. 80210. Priced at $3.50 ($4.50 for non-AMA members), it contains 12 outstanding papers, plus the Ten Free Flight Models of the Year as selected by NFFS, including three-views and background data.

Bill Conkling photos

The uppermost photo shows the start of a Sport Pylon Race, one of three fun events organized by the Tidewater RC Club of Norfolk, Va. Paul Byrum won the event with a semi-scale Cobra, middle pic. Spot Landing try, above, but looks like it must have missed.

Warren Baker photo

Above: Scratch-built BE2C by Warren Baker, Baltimore, Md., single channel radio, 4½ ft. span. Below: RC activity galore! Photo during Fun Fly of the Spirits RC Club, St. Louis.

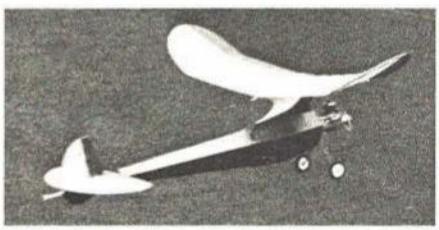
Ed Walker photo

Right: R.O.G. takeoff in the old style. Carl Hatrak's Aerbo, spark ignition engine for power. Below: Members of the Cherry Point, N.C., Model Air Wing encompass all interests and ages. Note variety of models shown.

James Shields photo

Jerry Day photo

The young lady is posing with a Touchdown RC model built by Jerry Day of Sheffield, Ala. Day praises this design by Bryce Peterson.



Submitted by John Pond

David Klein photo

Tense moment during Form. I heat at the Cleveland Radio Controlaires "500" last May. L to R: Austin Leftwich, Vern Smith, Lou Somrak.

AMA News Extra .....

EXTRA-EXTRA: Subject to FAI approval, the RC Aerobatic World Championship for 1971 will be in the U.S.A. The Society of Model Aeronautical Engineers in England has withdrawn its previous offer to be sponsor in favor of sponsorship by AMA. Pending the outcome of the FAI meeting in December, the outlook is for the RC World Champs to be in this country next year.

WHO WON THE NATS?

One thousand, one hundred and forty-nine AMA members entered the 39th National Model Airplane Championships at Glenview Naval Air Station, near Chicago, July 27-Aug. 2. This, the world's largest model air meet, had as its host the U.S. Navy; members of the Academy of Model Aeronautics provided the technical supervision, and events were sponsored by members of the hobby inddstry. The principal winners are listed here. A full report is planned next month.

Grand and Open National Champion--Bucky Servaites
Senior National Champion--Brian Webster
Junior National Champion--Marty Thompson
Club Team Champion--Chicago Aeronuts

Nats Team Champion--U.S. Air Force Champions
Radio Control Champion--Larry Leonard
Indoor Champion--James Richmond
Free Flight Champion--Bucky Servaites
Control Line Champion--Danny Bartley

CONTROL LINE

½A Speed	MPH
J-B. Pardue	94.01
S-T. Herron	94.60
O-Finn/Morton	106.72

A Speed	MPH
J-D. McGraw	138.83
S-M. Brown	151.20
O-C. Vassallo	162.24

B Speed	MPH
J-No Official Flights	
S-D. Bartley	163.27
O-Roselle/Frye	169.42

C Speed	MPH
J-M. Hainen	138.51
S-D. Bartley	186.07
O-Roselle/Frye	189.40

Jet Speed	MPH
JSO-M. Olson	170.87

FAI Speed	KPH
J-M. Hainen	164
S-D. Bartley	179
O-L. Jackson	214

½A Profile Proto	MPH
J-B. Pailet	74.23

½A Proto	MPH
J-R. Legg	81.97
S-D. Bartley	90.14
O-Bartley/Garner	95.91

Scale Racing	Time
JS-M. Hainen	8:16
O-J. Barnhart	7:36

Rat Race	Time
J-T. Tuma	6:09.3
S-T. Zimmer	5:31.2
O-S. Simpson III	5:30.5

B Proto	MPH
J-M. Hainen	115.04
S-D. Bartley	146.40
O-J. Delaney	148.09

Stunt	Points
J-M. Jackson	439
S-T. Morgan	504
O-K. Trostle	489

FAI Team Race	Time
JSO-Dunkin/Wright	9:48.0

Combat
J-J. Davis
S-J. Drake
O-H. Rush

Profile Carrier	Points
J-M. Willmann	235.51
S-D. Engel	209.90
O-P. Smith	289.62

Carrier I	Points
J-R. Sawicki	416.35
S-D. Tomayo	467.08
O-R. Willmann	559.98

Carrier II	Points
J-R. Sawicki	423.75
S-D. Tomayko	505.47
O-R. Willmann	590.86

INDOOR

Stick	Time
J-T. Sova	18:26.1
S-J. Servaites	14:45.0
O-J. Richmond	34:33.8

Paper Stick	Time
J-B. Pailet	10:37.1
S-J. Servaites	16:45.6
O-J. Richmond	21:34.2

Cabin	Time
J-T. Sova	11:23.4
S-R. Ganser	13:51.7
O-J. Richmond	20:25.2

HL Glider	Sec.
J-M. Thompson	118.2
S-R. Hixon	116.0
O-D. Bronco	128.6

OUTDOOR FREE FLIGHT

HL Glider	Sec.
J-D. Uthoff	294
S-R. Ganser	287
O-D. Chancey	407

A-1 Towline	Sec.
J-J. Petchler	552

A-2 Towline	Sec.
J-M. Thompson	767
S-D. Mackenzie	773
O-P. Allnutt	900

Helicopter	Points
JSO-G. Lee	149.09

Unlimited Rubber	Sec.
J-M. Taibi	487
S-M. Bailey	684
O-W. Smitz	2160

Wakefield	Sec.
J-J. Petchler	302
S-J. Servaites	561
O-F. Heeb	790

Coupe D'Hiver	Sec.
JS-J. Petchler	492
O-J. Macay	539

½A Gas	Sec.
J-S. Klause	540
S-G. Turner	720
O-D. Kargol	1080

A Gas	Sec.
J-M. Thompson	1027
S-B. Webster	1014
O-A. DeMello	1260

B Gas	Sec.
J-M. Thompson	1080
S-G. Myers	720
O-L. Miller	900

C Gas	Sec.
J-M. Thompson	1024
S-G. Turner	496
B. Webster	496
O-F. Wolff	1031

FAI Power	Sec.
J-J. Haught	751
S-P. Andrade	791
O-R. Watson	900

Rocket	Sec.
J-C. Krickel	264
S-D. Dock	302
O-D. Chancey	410

RADIO CONTROL

D Pattern Finals	Points
JSO-J. Kirkland	14140

A Pattern	Points
JSO-H. Clark	320

B Pattern	Points
JSO-S. Buck	482

Pylon Form. I	Points
JSO-Bertken/Smith	19

Pylon Form. II	Points
JSO-L. Leonard	20

SCALE

Radio Control	Points
JSO-E. Ellis	15236
Best Jr.--J. Hiller	
Best Sr.--Whit Stockwell	
Flt. Ach'mt--K. Drummond	

Indoor	Points
J-M. Kuehne	105.0
S-D. Domina	115.5
O-R. Martelet	172.5

Free Flight	Points
JS-M. Kuehne	311.0
O-F. Stark	550.5

Control Line	Points
J-C. Burnstine	253
S-J. Glab	219
O-L. Keith, Jr.	495

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Which officers live in your district? Select correct address when writing officers.

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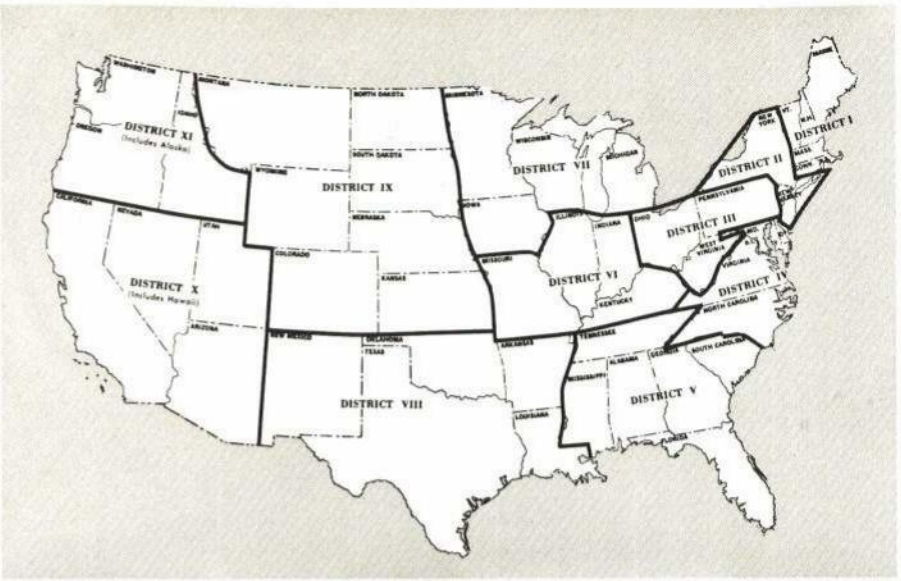

HOW TO USE THIS AMA DIRECTORY

Over 150 AMA members serve as volunteers on various committees which determine operating policies of Academy activities — many are listed here. Members are invited to communicate their comments, suggestions, proposals, or complaints by writing to the appropriate committee at any time. Note that the Executive Council and Associate Vice Presidents represent area interests for general AMA policy matters. Wherever district numbers are shown, write to the nearest address for your area. It is recommended that a copy of any correspondence be sent also to AMA Headquarters.

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J. Phelps, 1 Foxberry Ln., Liverpool, N. Y. 13088
P. Runge, 1107 Main St., Higginsville, Mo. 64037

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Sept. 5-6—St. Joseph, Mich. (A) Whirlwinds 1st Annual RC Contest. Site: Whirlwinds Alt. Field. C. Ellis CD, 3383 Valley View Dr., St. Joseph, Mich. 49085. Sponsor: **Whirlwinds of Southwestern Michigan.**

Sept. 5-6—Dallas, Tex. (AAA) Southwest FF, CL & RC Model Airplane Championships. Site: Samuel East Park (FF), Hobby Park (CL & RC). R. Tenny CD, 432 Lynn St., Richardson, Tex. 75080.

Sept. 5-6—Denver, Colo. (AA) Mile Hi RC Pylon Races. Site: Lowry AFB. H. Geller CD, 6920 E. Exposition, Denver, Colo. 80222. Sponsor: **Mile Hi Radio Control Club.**

Sept. 5-6-7—Anville, Penn. KRCS Invitation Fly for Fun Meet. Site: Muir Field. K. Reber CD, RD #2, Shippensburg, Penn. 17257. Sponsor: **Keystone RC Society.**

Sept. 5-6-7—Las Vegas, Nev. (AA) Las Vegas RC International Air Races. Site: Las Vegas Raceway. E. Shipe CD, 616 Burtis, Santa Barbara, Calif. 93105.

Sept. 5-6-7—Memphis, Tenn. (AA) Memphis RC Club RC Meet. Site: Club Field. L. Hord, Jr. CD, 5050 Poplar, Memphis, Tenn. 38117. Sponsor: **Memphis RC Club.**

Sept. 5-6-7—Nedrow, N.Y. "ARCS" RC Jamboree. Site: "ARCS" Field. E. Izzo CD, 3950 Highland Ave., Skaneateles, N. Y. 13152. Sponsor: **Aero Radio Club of Syracuse.**

Sept. 5-6-7—Albuquerque, N.M. FAI FF Team Selection Finals. Site: Boy's Academy. J. Bicknell CD, 12329 Princess Jean, N.E., Albuquerque, N.M. 87112. Sponsor: **South West Aero Team.**

Sept. 6—Chicago, Ill. (AAA) IIAA Annual CL Meet. Site: Forest Preserve. E. Schmidt CD, 4934 W. Winnemac, Chicago, Ill. 60630.

Sept. 6—Pettyville, W.V. (AA) Sky Sharks RC Fun Fly. Site: Skysharks RC Field. S. Sturm CD, Box 5234, Vienna, W.V. 26101. Sponsor: **Vienna Sky Sharks.**

Sept. 6—Cahokia, Ill. (AA) McDonnell Fall FF Contest. Site: Parks Air College. J. Gremel CD, 8618 Jo Ct., Berkeley, Mo. 63134. Sponsor: **McDonnell FF Club.**

Sept. 6—Lexington, Ky. (AAA) Mid-America FF & CL Championships. Site: Lexington Model Airport. L. McFarland CD, P.O. Box 8177, Lexington, Ky. 40503. Sponsor: **Lexington Model Airplane Club.**

Sept. 7—Middlesex, N.J. (AA) M.M. Inc. Second Annual CL Contest. Site: Mountain View Park. A. Koenig CD, 1613 Frase St., So. Plainfield, N.J. 07080.

Sept. 7—Salem, Oh. RC Short Circuits Annual RC Contest. Site: Quaker City Drag Strip. J. Marshall CD, RD #5, Lisbon, Oh. 44432. Sponsor: **RC Short Circuits Club, Inc.**

Sept. 12-13—Rhinebeck, N.Y. (AA) World War I RC Jamboree. Site: Olde Rhinebeck Aerodome. G. Buso CD, 11 Maple Ln., Hyde Park, N.Y. 12538. Sponsor: **IBM RC Club.**

Sept. 12-13—Boise, Idaho (AA) Second Annual BMAA CL Contest. Site: Boise State College. G. Prouty CD, 3117 Redway Rd., Boise, Idaho 83704. Sponsor: **Boise Model Airplane Assn.**

Sept. 12-13—Dayton, Oh. (AA) Dayton Buzzin' Buzzards CL Jamboree. Site: Municipal Flying Circles. J. Martin CD, 551 Aberdeen, Dayton, Oh. 45419. Sponsor: **Dayton Buzzin' Buzzards.**

Sept. 12-13—Shreveport, La. (AA) SHARKS Annual RC Meet. Site: SHARKS International. J. Monk CD, 574 Janet Ln., Shreveport, La. 71106. Sponsor: **Shreveport Area Radio Kontrollers, Inc.**

Sept. 12-13—Atlanta, Ga. (AA) Atlanta RC Air

(Continued on page 88)

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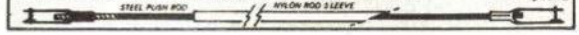

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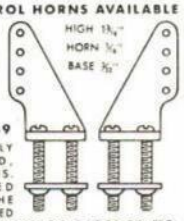

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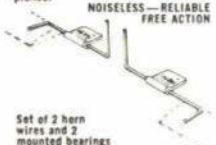

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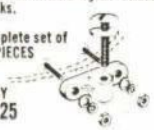

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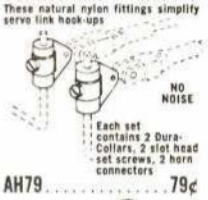

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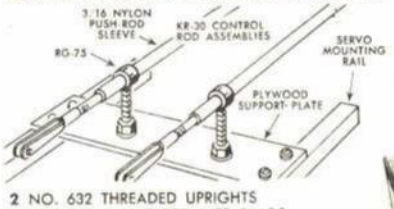

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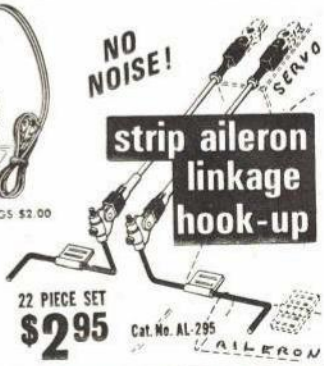

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On the Scene

(Continued from page 14)

the water was no more than knee-deep.

The difficulties presented by a water takeoff and landing quickly made themselves apparent. It was discovered that a typical model builder can move through the water at an amazing 11 mph to retrieve his model, while it slowly absorbs the lake. Experience was gained rapidly, however; and many of the newcomers to ROW should be able to correct any handling problems after the first day out.

Although a competitive event, the meet was also a fun day, for many came simply to watch, ask questions, and take pictures. Besides the planes, model boats, hydroplanes, hydrofoils, and hovercraft were being run just for the heck of it. Other added attractions were mass parachute drops (full-scale people) and sailplanes towed aloft by light planes. Interest was such that the Flightmasters are discussing making this an annual meet.

Islander

(Continued from page 17)

a natural wood finish with a red line running the length of the fuselage under the windows, and on the top of the engines. The trim on the fin is red with a white I in a circle. The word "Loganair" (the firm operating Islander G-ATWU) is white on a black rectangle. Remaining trim and registration lettering is black. Control surface lines were put in with a ballpoint pen.

Before any flying tests, carefully balance the model. Tie a length of thread to a pin, and push the pin into the balance point as shown. To get the model to hang level (correct balance), use a little weight (empty, folded cement tube or sheet lead) in the weight recess provided.

To construct a catapult, cut a 6-in. length of 1/4" dia. hardwood dowel and sharpen one end. Cut a shallow groove in the other end and tie a 10-ft. length of 1/8" flat strip rubber in place. Tie a 20-ft. length of thread to the other end of the rubber, then tie a large paper clip or, preferably, a small curtain ring to the other end of the thread. This completes the catapult-towline. The ship is ready for the flying field.

Because of their thickness, the flying surfaces are not likely to warp easily, but to be on the safe side check them before test flying. Obtain correct trim by testing gliding into wind over long grass from shoulder height. If the model stalls, add a little nose weight; if it dives, remove some. When trimmed to the best gliding angle, the model should touch down about 30 ft. from the point of launch.

Gently twist up one of the wing front edges to obtain a wide turn. Leave the tailplane and fin strictly alone. Quite long flights can be obtained by hand launching with the wings banked to obtain a circular flight path. For maximum duration use the catapult towline. Note: use the correct side of nose wheel for towline to avoid fouling it (see sketch).

Push the sharpened end of the dowel into the ground and lay out the rubber and thread downwind. Place the tow ring in the fuselage notch and stretch until the model is 40 ft. from the dowel anchor. Hold the model on a level keel at a height of two ft. above the ground, then release. The model most probably will loop, and then go into a circling flight. Note the direction of the turn, and bank the wings (tilt them to the ground) slightly in the opposite direction for the next flight. This will give an S-shaped flight pattern, with the Islander leveling out at a considerable height.

If the model does not turn too sharply, increase the stretch to 50 ft. from the dowel anchor. However, the wings must be banked only slightly, as the increased launching speed will tend to tighten up the turn too much.

The longest flights do not always result from pulling back the line to the maximum amount, so experiment. Good flights can be obtained by hand launching into wind from the top of a hill or rising ground.

Materials used include one sheet medium balsa, 1/4 x 3 x 18"; one sheet medium balsa, 1/8 x 3 x 24"; one sheet medium balsa, 3/32 x 3 x 10"; one piece medium balsa, 1/16 x 3 x 2"; one length 6" piano wire, 032" dia.; and one 6-in. length of 1/4" dia. hardwood dowel.

Also needed are a tube of balsa cement; a small bottle of clear dope; one piece of silk or nylon, 1 x 3"; 10 ft. of 1/8" wide flat rubber strip; 20 ft. of strong thread; and one small curtain ring or large paper clip.

Miscellaneous items used are 1/2 in. length of 1/8" dia. hardwood dowel; 1-in. length of neoprene tubing; short length of 1/16" dia. hardwood dowel; tracing paper, pencil, ruler, modeling pins, paint or enamel, trim strip, and soft dope brush.

Homemade Nieuports

(Continued from page 29)

a good example. It is far easier to make new items than to painfully sand down the original. Struts are cut from strips of 20 thou card and then sanded to a flattened ellipse on cross section. It is difficult to handle 20 thou strip without some assistance, which can be supplied by a fret or coping saw. The strip of card is fitted to the saw in the same way as a blade would be, but the idea is merely to hold the strip while sanding, not to stretch it. Therefore, no attempt should be made to obtain tension as one would if fitting a saw blade. The undercarriage struts are made from sprue, details are shown in Drawing 10.

On either side of the forward fuselage is a breathing pipe for the engine, which can be made from a piece of sprue. A better pipe can be obtained by heating an empty inner tube from a ballpoint pen. It will soften like sprue and can be stretched a little, thus forming a fine hollow tube. Not all inner tubes will do this, it depends on the type of plastic used in their manufacture. Drawing 14 shows the tail skid, which consists of a hardwood base (20 thou card) and a steel leaf spring (10 thou card).

Windshields on Nieuport types varied. Drawing Q shows the two commonest ones. For either, cut a piece of transparent polycard to shape and place a piece of paper over the clear portion as a mask. Paint it all over. When dry, remove the masking paper.

The gun supplied with the Hawk kit is a puny affair (Vickers). A more substantial barrel casing can be provided by scoring a series of parallel lines onto a piece of 5 thou card and then rolling it around the existing barrel. The Vickers

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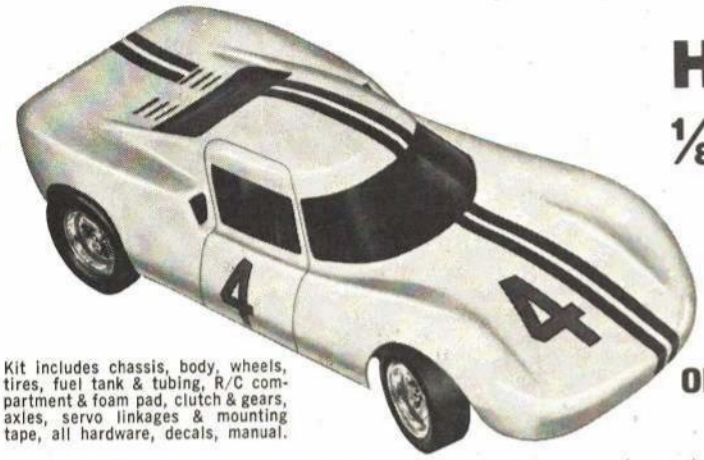

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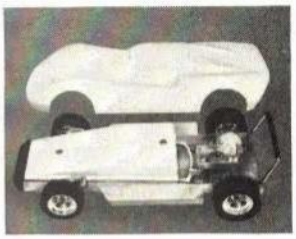

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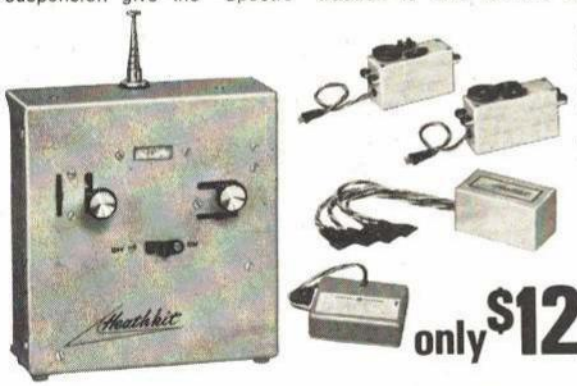

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should be painted a deep dark gray, and placed to left of center (looking at the nose of the aircraft from the front). Fit it with a feed chamber on its right side and a runway for the empty cartridge belt on its left. The later series of Nieuports seldom used the overhead Lewis guns on the wing center section, except for those planes flown by British pilots who preferred the top Lewis instead of the fixed Vickers.

The propeller supplied with the kit is only just acceptable, since it is too curved. I used the propeller from the Inpact Deperdussin kit, which, after a little reshaping, was exact.

Coloring: Nieuports Type 24 and 24 bis usually are doped in dull silver (aluminum), but some were in service long enough to be seen in the later French camouflage scheme seen in Bjorn Karlstrom's recent SPAD 13 painting. An interim scheme applied to some Nieuports, including the earlier type 17's, was a combination of dull mid-green and medium brown. Most of the type 27's were in the later camouflage scheme, although some machines supplied to the AEF for training purposes were completely clear doped. On Nieuports which sported the silver finish, the cowl was frequently painted rather than left in the natural metal finish, which in any case was a rather flat aluminum color, and not the "chromium-plated" finish seen on some models.

Detailed instructions to accompany the drawings follow. Drawings 1 to 7 illustrate the system for making wings. Read these instructions carefully.

(1) The wing is traced from the plan, allowing 1/32" increase in chord to make up for camber. The tracing is reversed and the wing drawn again immediately opposite the first drawing so that the wings are leading edge to leading edge, but with a gap of 1/16" left between the edges. The card should be held up to the light so that the drawing shows through the other side and the wing outline **only** drawn through onto the blank side. Place the card with the first traced drawing uppermost onto a firm surface with some give, such as a thick writing pad. This must include the rib lines. Using a set square and steel rule, lightly score the rib lines, observing that the center section on either side of the leading edges should be unscored to represent the plywood facing. It is vitally important that the ribs be scored parallel and accurately.

(2) The card is gently folded down the center, the fold becoming the leading edge of the wing. Bring the trailing edges together, making sure that they are square. Hold them together temporarily with a piece of adhesive tape.

(3) The fold made is not tight enough to provide the necessary sharp leading edge, and any attempt to make it tighter will result in the polycard's cracking. To obtain the sharp edge, the folded wing is sandwiched between two pieces of ¼" balsa, as shown, the leading edge just inside the edges of the planks. The edge is then heated gently. This softens the plastic, forming a very tight fold while being held firm by the balsa. Leave the card sandwiched for about 15 sec. before removing; this allows the plastic to harden completely.

(4) The core required for wing support is a piece of 1/32" balsa cut to the same shape as the wing, but only ⅞ of the span and ¾ of the chord (sufficient to overlap the aileron lines). Before insertion, the edges should be trimmed down to a fine edge and the tips flattened and rounded off. The core is then put into place, right up to the leading edge fold, and held there by a light touch of cement along the length of the balsa core.

(5) The wing now is placed on a good working surface and a length of adhesive tape is run along the leading edge. The trailing edge of the lower half also is fixed down with tape. A thin sliver of wood is inserted underneath, as shown, raising the wing to form a slight camber.

(6) The upper surface now is drawn down over the lower. Do this gradually by rolling over, and running a small amount of cement along each time to hold the surface in place. A final run of cement should be placed over the line representing the trailing edge; the rear waste portion is brought down and firmly stuck.

(7) Another length of adhesive tape is run over the trailing edge also. The wing is formed now and requires at least one hour to set firmly. Do the final trimming with a sharp blade and steel rule. Wings of biplanes usually can be made all in one piece, but the Nieuport wings must be made in sections, two pieces for the top and three for the lower. The lower wing is made in the same way as the top, but a short center section must be fitted to fill the gap on the underside. Wing halves can be joined at the centerline by inserting fine hardwood splints into the soft balsa core for support. A thin run of cement is made over the joint to seal it. However, before joining sections together, the final shaping of the wing must be carried out. This consists of first rounding off any angles left by the cutting blade and refining the trailing edge by sanding lightly at a shallow angle to produce a sharp edge. Ailerons should be cut out with a sharp blade (the constant emphasis on the sharpness of the blade is deliberate—a muffed cut can ruin several hours work). The edges of the aileron should be rounded off where they will be joined back onto the wings. They are reunited by using small pieces of fine fuse wire wedged into both parts of the balsa core. The joint is made firm by running cement over it.

(8) One of the most awkward things about the Nieuport wings is the way the slots are cut into the upper wing to accommodate the aileron lever mechanism. The simplest method is to paint this black and cement half hoops to represent the levers.

The following method is more difficult, but the results far more satisfying. A small hole is made at the top of each slot and enlarged by twirling a fine round section file. Finally make it into a square hole by using a triangular section file (it allows more room than the square file). The rear of the slot is cut away to the trailing edge and refined by filing. The rears of both slots are closed by sticking a strip of 10 thou card into the wing cutout. When firm, cut away the excess and sand smooth. Place a little filler into the rear of the slot to make the correct shape and sand it smooth with the surface of the wing.

The lower wings with their center section are cemented into place first, (See photograph) and a strip of 10 thou card is fixed to the bottom of fuselage to cover the joint. It is trimmed and sanded, as were the other surfaces. Any gaps should be filled and sanded.

(9) Method for making metal bases for the struts. A piece of suitably shaped 10 thou card is attached to each side of

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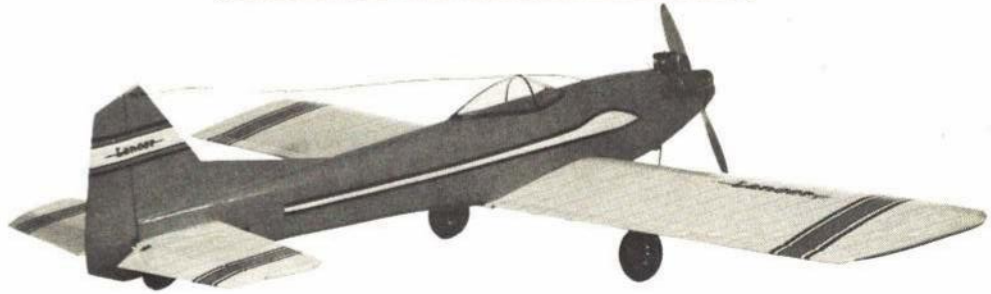

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the base of the strut. After some cement has been placed between them, use a pair of tweezers to nip the front and rear into the shape shown. When dry, trim and sand, paint dull silver with a touch of gray added. Struts are painted streaky brown (to imitate varnished wood); strut tops are pale blue.

(10) Undercarriage: The vees, which dip at the extremities, are joined by two crosspieces, as shown. The axle lies between them. On the original, it was held by elastic cord wound around the base of the vee.

(11) Inspection panels are cut from 5 thou card, dimpled by using a needle and very lightly cemented in place.

(12) Breathing tube made from heated and drawn inner tube of ballpoint pen.

(13) A-E illustrate process of cowl manufacture. Note center nipple.

(14) Tail skid detail.

(A) Side profile of Nieuport type 24 and 27 (24bis is identical except for type 17 tail assembly.)

(B) Right side of cowl. Note different shape and size of inspection panel.

(C) Full-size drawing of aileron control rod and lever.

(D) Horizontal tail surface of type 24 and 27.

(E) Position of holes for control cables on type 24 bis.

(F) Left-hand panel upper wing.

(G) Right-hand panel lower wing.

(H) Fuselage side panels, full size.

(I) Fuselage top panels, full size.

(J) Interior of fuselage.

(K) Map board, full size.

(L) Floor runners (paint dull silver). For simplicity, both runners are made into one unit.

(M) Internal dummy side panels, full size. See text for coloring.

(N) Seat made from 10 thou card. Perforations can be made by careful use of warm needle or can be painted on. Paint in streaky pale browns to simulate plywood. Note seat belt, gray webbing material, brass buckle.

(O) Vickers gun showing intake chamber and runway (make latter from 10 thou card scored to ease folding). Gun dark gray, almost back, components mentioned are dull silver.

(P) Rigging diagram. This shows type 24bis tail assembly.

(Q) Two types of windshield. Type 24 bis usually had flat type, with wooden surround. Wrap-around type had metal frame.

Hobbit

(Continued from page 31)

for the last six inches of the tip seems like a good starting point.

Adjust the glide for a fairly wide circle, 100-120′ in diameter, with the model gliding on the verge of a stall. When it enters a thermal, the turn will tighten. Using the trimming method described, the original has shown no tendency to spin even in violent lift.

Assuming the ship is flown with left glide rudder and wash-in on the left tip, a right rudder correction will be necessary for a straight tow. Although the tip warp causes the left wing to lift more in the glide, under tow this wash-in becomes a source of extra drag since the model is essentially in a stalled condition. Because the relative effectiveness of rudder and wing warps vary with speed and altitude changes, it will be necessary to find the combination suited to the individual's normal towing pace. If the ship is flown initially on a calm day, trim for a straight climb while towing at a fairly brisk speed so that under more windy conditions the same airspeed can be maintained by towing slowly or even moving toward the model.

If the glider pulls excessively under tow, even in a light breeze, move the tow hook forward; if it weaves from side to side, move it backward. Adjust the tow hook so that the ship will rise quickly from the launch without weaving and still be instable enough to follow you while searching for lift. As the model comes overhead in a thermal, try to get it into its glide turn as slack is thrown into the line to release. With a little practice, a few feet of altitude can be gained with this method. Most fliers, for fear of bending a wing, have a tendency to release quickly once they hit strong lift, but the Hobbit is sufficiently strong to take such treatment. I recently had to finish my officials in a combined Nordic event using the Hobbit after my sheet-wing A-2 folded on the second attempt. (I blew the first attempt by breaking the towline.) Although I broke another towline on the A-1 in the 25-30 mph wind, the Hobbit came through the day unscratched, while several larger ships were broken up by the weather.

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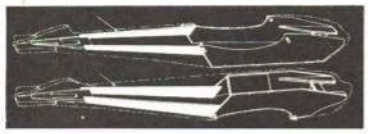

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SPAN: 65"
AREA: 630 sq. in.
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FOR .45-.60 ENGINES
FLIES COMPLETE AMA PATTERN

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For .45 - .60 engines

Flies with 10 channels or proportional rudder, motor, elevator, trim and aileron control.
FLIES COMPLETE AMA PATTERN

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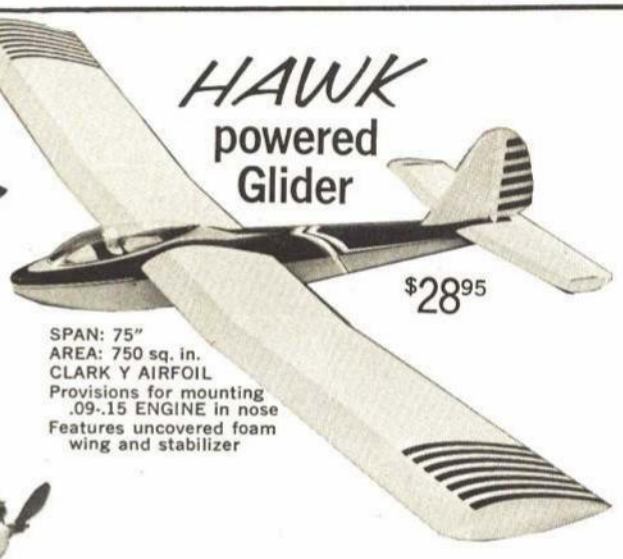

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SPAN: 75"
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CLARK Y AIRFOIL
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Features uncovered foam wing and stabilizer

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For .45 - .60 engine

Flies with 10 channels or proportional rudder, motor, elevator, trim and aileron control.
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Caprice

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Span: 63"
Area: 620 sq."
Sym. 17½% airfoil
For .45 — 60 engines

Flies with 10 channels or proportional rudder, motor, elevator, trim and aileron control.
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Wing and stabilizer are molded foam cores pre-covered with Micro-Thin AIR-O-SKIN . . . Fuselage is vacuum-formed AIR-O-SHEET, a tough pliable material that will not shatter like fiberglass and other plastics . . . Interchangeable spare parts are available.

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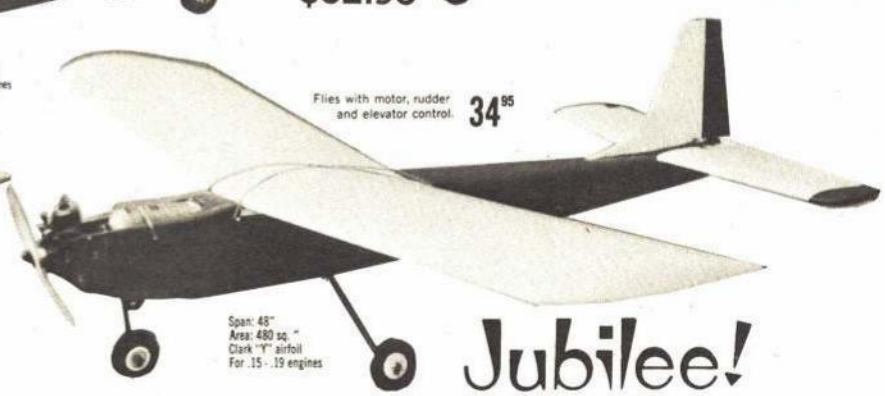

Flies with motor, rudder and elevator control. **34.95**

Span: 48"
Area: 480 sq. "
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Laniers' four easy steps to R/C flying . . . 1. Glue precut wing halves together. 2. Mount tail surfaces. 3. Attach control surfaces. 4. Install engine and equipment (not included). NOTHING to cover or paint.

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EK Champion

(Continued from page 42)

the extra PC board in the receiver case. The servos are otherwise identical mechanically and in size to those in other EK systems. Removing the amplifiers cuts servo weight a bit (these Champion units weigh 1.65 oz. each) and cuts cost a lot. The new servos are only $12.95 each (regular Logictrol servos list at $40.) Therefore, it's easier to afford servos for several planes and to leave them installed at all times, just shifting the receiver between models. Electronically, only the feedback pot, one resistor and capacitor and the motor are in each servo case (see photo). This arrangement has one drawback. If a servo amplifier goes sour, the entire receiver must be returned to the factory, rather than just the defective servo (and servos seem to be the weak link in digital propo systems today!).

The servos require five wires and matching connectors, which are the same tiny units with gold-plated contacts utilized throughout the EK line. The 4.8V 500 maH battery pack is connected directly to the on-off switch. A separate connector from the switch is provided for charging purposes, so the switch-to-receiver connector seldom needs to be disturbed. The switch must be in the off position for charging to take place. All connectors fit snugly but should be secured with tape, even with an engine as non-shake as the Wankel. EK makes plastic plug clips (their type PR-2).

The Champion system is available on all standard RC spots for the same price; ours happens to be on the "busy" spot of 26.995 MHz. Bench tests showed the receiver draws about 50 ma when idling (with transmitter on), and current rises momentarily to around 300 ma when any one servo is moved (no load). All servos but one were smooth, fast and quiet. The odd one seemed noisy and rather sluggish, although it followed the stick faithfully. Disassembly to check for bad gears, etc., showed nothing amiss. But when it was tried again after assembly, that servo was as smooth and fast as the others—explain that!

Unfortunately we were unable to obtain circuits for this outfit, and so cannot say if any unusual electronic tricks appear in its makeup.

Thinking the battery pack might have to go under the servos to achieve balance, we raised the servos by cementing ⅜ x ½" hard-rails crosswise toward the rear of the cabin area. The rudder, elevator, and MC servos are held on Logictrol UM-3 mounts, screwed to the cross-rails. This mounting necessitated raising and relocating the nylon pushrod guides for all controls—a rather lengthy process. Actually, the three servos would fit between the fuselage side-rails that come in the plane, but the pushrod guides still would need alterations to match these particular servos. When the plane was complete, final balancing showed the battery pack could be attached to the forward fuselage bulkhead, with the receiver between the pack and the servos. No strap is shown over the receiver, but one was added later to keep it from popping loose in bad landings.

Because of the long stretch of nylon pushrods, from the point of emergence at the rear of the fuselage to the control clevises, Nyrodapters were put inside each pushrod for stiffness. These rods are screwed into the pushrods a short distance; the clevises also fit on them. The nylon pushrod guides were cemented in place with "Goo," a useful cement that sticks well to this material. It is found in model railroad hobby shops.

Final balance came out at about 2¾" back from the wing LE. The T-1 plans show only 2⅜", but they also show the wing chord as only 9¼", so our CG position seems reasonable. The plan sheet has detailed fuselage side and top views for equipment installation purposes, plus various rigging sketches. Another sheet is devoted entirely to assembly sketches and instructions, two and a half pages of mimeographed instructions help the beginner through his first flights.

The complete airborne radio installation weighs about 14½ oz., and weight of the finished plane (no fuel) came out at just over 5 lb.—not too high, considering all that wing area, and certainly well within the capabilities of the Wankel engine.

During all test flying no problems whatever arose from the Logictrol Champion outfit, nor was there a single glitch—except a few fed into the system by the pilot, who has done little two-stick full-house flying! Range proved to be just about as far as one could see. The system was completely satisfactory in every way (aside from those two control sticks!).

Wankel-Cale

(Continued from page 43)

weight is built into the oversize prop drive washer). No more shaking the plane and equipment to pieces, if a Wankel is used. This engine design makes expansion of the displacement easy. Just lengthen the shaft a bit and add another eccentric and triangle. Actually, it's more complex than that, but a twin-rotor engine would be the same diameter as the single, perhaps ½-¾" longer, and would doubtless weigh considerably less than twice as much as the single. Both Graupner and O.S. have built and flown twin-rotor Wankel 60's. If anything, such engines should be even smoother than the single.

The present Graupner Wankel works best with props of about ten-inch diameter and moderate pitch. A 10/4 is ideal and, with low nitro fuel, can be turned on the ground at around 12,000 rpm. The instruction booklet (in four languages!) specifies a maximum nitro content of no greater than 10%. Certainly no more than this should be used for break-in, which takes up to half an hour, or until the engine sustains a fairly high speed. However, it should still be run a bit on the rich side. The maker states that tests have been made with nitro contents up to 40%. When used in a well-broken-in engine, with a small prop which allows the engine to rev-up (a 9/5 for example), the result is a considerable increase in power output.

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1/32×2	20c
1/16×2	23c
3/32×2	26c
1/8×2	31c
3/16×2	36c
1/4×2	46c
3/8×2	52c
1/32×3	32c
1/16×3	32c
3/32×3	40c
1/8×3	45c
3/16×3	54c
1/4×3	72c
3/8×3	85c
1/32×4	45c
1/16×4	45c
3/32×4	49c
1/8×4	63c
3/16×4	72c
1/4×4	80c
3/8×4	1.08
1/32×6	98c
1/16×6	98c
3/32×6	1.12
1/8×6	1.17
3/16×6	1.26
1/4×6	1.40
3/8×6	1.70
1/32×8	1.25
1/16×8	1.25
3/32×8	1.35
1/8×8	1.40
3/16×8	1.55
1/4×8	1.75
3/8×8	1.95

48" LENGTHS

1/32×3	43c
1/16×3	43c
3/32×3	54c
1/8×3	60c
3/16×3	72c
1/4×3	89c
3/8×3	1.24
1/16×4	62c
3/32×4	68c
1/8×4	80c
3/16×4	94c
1/4×4	1.05
3/8×4	1.38
1/16×6	1.35
3/32×6	1.46
1/8×6	1.56
3/16×6	1.68
1/4×6	1.87
3/8×6	2.20

36" LENGTHS

CONTEST 4-6 LB. STOCK

1/32×3	37c
1/16×3	37c
3/32×3	45c
1/8×3	50c
3/16×3	59c
1/4×3	78c
3/8×3	92c

C-GRAIN 8-12 LB. STOCK

1/32×2	26c
1/16×2	28c
3/32×2	31c
1/8×2	36c
3/16×2	41c
1/4×2	51c
3/8×2	57c
1/32×3	6c
1/16×3	36c
3/32×3	44c
1/8×3	49c
3/16×3	58c
1/4×3	76c
3/8×3	89c

V-H STOCK 12 LB. OR MORE

1/16×3	36c
3/32×3	44c
1/8×3	49c
3/16×3	58c
1/4×3	76c
3/8×3	89c

STRIPS

36" LENGTHS

■ 1/16 SQ.	3c
1/16×1/8	3c
1/16×3/16	4c
1/16×1/4	6c
1/16×3/8	7c
1/16×1/2	10c
1/16×3/4	12c
1/16×1	15c
■ 3/32 SQ.	5c
3/32×3/16	5c
3/32×1/4	6c
3/32×3/8	7c
3/32×1/2	10c
3/32×3/4	13c
3/32×1	17c
■ 1/8 SQ.	5c
1/8×3/16	5c
1/8×1/4	7c
1/8×3/8	10c
1/8×1/2	12c
1/8×3/4	16c
1/8×1	20c
■ 3/16 SQ.	8c
3/16×1/4	10c
3/16×3/8	12c
3/16×1/2	16c
3/16×3/4	19c
3/16×1	22c
■ 1/4 SQ.	13c
1/4×3/8	15c
1/4×1/2	18c
1/4×3/4	24c
1/4×1	30c
■ 5/16 SQ.	15c
5/16×3/8	20c
5/16×1/2	25c
5/16×5/8	30c
5/16×1	35c
■ 3/8 SQ.	18c
3/8×1/2	28c
3/8×3/4	32c
3/8×1	40c
■ 1/2 SQ.	27c
1/2×3/4	36c
1/2×1	45c
■ 5/8 SQ.	32c
5/8×1	42c
■ 3/4 SQ.	42c
3/4×1	52c

48" LENGTHS

■ 1/8 SQ.	7c
1/8×1/4	10c
1/8×1/2	16c
■ 3/16 SQ.	11c
3/16×1/2	22c
3/16×3/4	26c
■ 1/4 SQ.	18c
1/4×1/2	24c
1/4×3/4	32c
■ 5/16 SQ	20c
■ 3/8 SQ.	24c
3/8×1/2	31c
3/8×3/4	42c
■ 1/2 SQ.	36c
1/2×3/4	48c

36" LENGTHS

SHAPED L.E.

3/8×1/2	28c
1/2×1/2	32c
3/4×3/4	50c
1×1	72c

SHAPED T.E.

1/8×1/2	17c
3/16×3/4	20c
1/4×1	26c
5/16×1-1/4	31c

TRIANGULAR CUT

1/4 SIDES(X)	17c
3/8 SIDES(X)	22c
1/2 SIDES(X)	26c
3/4 SIDES(X)	36c
1 SIDES(X)	48c

BLOCKS

3" LENGTHS

■ 1 SQ.	6c
1×2	12c
2×2	16c
1×3	16c
2×3	23c
3×3	36c

6" LENGTHS

■ 1 SQ.	12c
1/2×2	14c
3/4×2	18c
1×2	22c
1-1/2×2	26c
2×2	30c
1/2×3	20c
3/4×3	28c
1×3	31c
1-1/2×3	38c
2×3	42c
3×3	70c
1/2×4	30c
3/4×4	35c
1×4	40c
1-1/2×4	52c
2×4	62c
3×4	90c
1/2×6	44c
3/4×6	50c
1×6	59c
1-1/2×6	82c
2×6	97c
3×6	1.33

12" LENGTHS

■ 1 SQ.	22c
1/2×2	28c
3/4×2	35c
1×2	42c
1-1/2×2	50c
2×2	60c
1/2×3	38c
3/4×3	54c
1×3	60c
1-1/2×3	73c
2×3	89c
3×3	1.35
1/2×4	59c
3/4×4	67c
1×4	79c
1-1/2×4	99c
2×4	1.20
3×4	1.79
1/2×6	86c
3/4×6	99c
1×6	1.15
1-1/2×6	1.60
2×6	1.84
3×6	2.68
1/2×8	94c
3/4×8	1.17
1×8	1.50
1-1/2×8	1.75
2×8	2.16
3×8	3.10

18" LENGTHS

■ 1 SQ.	31c
1×2	63c
2×2	90c
1×3	92c
2×3	1.35
3×3	2.03
1×4	1.18
2×4	1.80
3×4	2.70
1×6	1.73
2×6	2.75
3×6	4.00
1×8	2.25
2×8	3.25
3×8	4.65

24" LENGTHS

■ 1 SQ.	44c
1×2	84c
2×2	1.20
1×3	1.20
2×3	1.80
3×3	2.75
1×4	1.58
2×4	2.40
3×4	3.58
1×6	2.30
2×6	3.65
3×6	5.36
1×8	3.00
2×8	4.30
3×8	6.20

★ SECOND GRADE SHEETS

36" LENGTHS

1/32×3	18c	1/8×3	25c
1/16×3	18c	3/16×3	29c
3/32×3	22c	1/4×3	38c
		3/8×3	49c

PLANKS

36" LENGTHS

■ 1 SQ.	60c
1/2×2	85c
3/4×2	1.05
1×2	1.26
1-1/2×2	1.50
2×2	1.75
1/2×3	1.08
3/4×3	1.62
1×3	1.75
1-1/2×3	2.20
2×3	2.65
3×3	4.35
1/2×4	1.75
3/4×4	2.00
1×4	2.25
1-1/2×4	2.95
2×4	3.55
3×4	5.35
1/2×6	2.56
3/4×6	2.95
1×6	3.45
1-1/2×6	4.75
2×6	5.50
3×6	7.00
1/2×8	2.80
3/4×8	3.50
1×8	4.50
1-1/2×8	5.25
2×8	6.50
3×8	9.25

NEW BALSA ADDITIONS

SHEETS — 36" LENGTHS
5/32×3×36 50c
1/20×3×36 32c 5/16×3×36 76c
TAPER CUT SHEETS (TO 1/16" EDGE)
1/4×3×36 74c 1/4×4×36 82c
ROUNDED-EDGE PLANKING
5/32×1/4×36 LENGTHS 8c EACH
ROUNDED-EDGE (Aileron & Elevator)
1/4×1×36 40c 1/4×2×36 55c
3/8×1×36 45c 3/8×2×36 65c
WING SKINS — 36" LENGTHS
1/16×12×36 1.75 3/32×12×36 1.95

SIG SPRUCE

36" LENGTHS		48" LENGTHS	
1/16×1/8	5c	3/32×3/32	7c
1/16×3/16	6c	3/32×1/8	8c
1/16×1/4	7c	3/32×1/16	9c
3/32×3/32	5c	3/32×1/4	10c
3/32×1/8	6c	1/8×1/8	8c
3/32×3/16	7c	1/8×3/16	9c
3/32×1/4	6c	1/8×1/4	11c
1/8×1/8	6c	1/8×3/8	14c
1/8×3/16	7c	1/8×1/2	17c
1/8×1/4	8c	1/8×3/4	22c
1/8×3/8	10c	3/16×3/16	12c
1/8×1/2	13c	3/16×1/4	12c
1/8×3/4	17c	3/16×3/8	15c
3/16×3/16	9c	3/16×1/2	19c
3/16×1/4	9c	1/4×1/4	20c
3/16×3/8	11c	1/4×3/8	24c
3/16×1/2	14c	1/4×1/2	30c
1/4×1/4	15c	3/8×3/8	32c
1/4×3/8	18c		
1/4×1/2	22c	24" LENGTH	
3/8×3/8	24c	3/16×3/4	15c

LARGE BUNDLE OF ASSORTED STRIPS — "SHORTS" AND "SECONDS". 89c

BIRCH PLYWOOD

FINEST GRADE — FLAT SHEETS

12" LENGTHS		24" LENGTHS	
1/32×6	30c	1/32×12	1.20
1/16×6	35c	1/16×12	1.40
3/32×6	35c	3/32×12	1.40
1/8×6	40c	1/8×12	1.60
3/16×6	40c	3/16×12	1.60
1/4×6	45c	1/4×12	1.80
		48" LENGTHS	
1/32×12	60c	1/32×12	2.40
1/16×12	70c	1/16×12	2.80
3/32×12	70c	3/32×12	2.80
1/8×12	80c	1/8×12	3.20
3/16×12	80c	3/16×12	3.20
1/4×12	90c	1/4×12	3.60

SIG BASS WOOD

18" LENGTH SHEETS

1/16×2-1/2	15c	3/16×2-1/2	23c
3/32×2-1/2	17c	1/4×2-1/2	28c
1/8×2-1/2	19c	3/8×2-1/2	35c

BLOCKS

1/2×3/4×6	6c	3/4×2×6	14c
1/2×3/4×12	11c	3/4×2×12	27c
1/2×3/4×18	16c	3/4×2×18	40c
3/4×3/4×6	7c	3/4×3×6	19c
3/4×3/4×12	14c	3/4×3×12	37c
3/4×3/4×18	20c	3/4×3×18	55c
3/4×1×6	9c	3/4×4×6	24c
3/4×1×12	17c	3/4×4×12	47c
3/4×1×18	26c	3/4×4×18	70c

SIG BIRCH DOWELS

12" LENGTHS		36" LENGTHS	
1/8 dia.	3c	1/8 dia.	6c
3/16 dia.	4c	3/16 dia.	9c
1/4 dia.	5c	1/4 dia.	10c
5/16 dia.	5c	5/16 dia.	12c
3/8 dia.	6c	3/8 dia.	15c
1/2 dia.	7c	1/2 dia.	20c

1/16 dia. available in 12" lengths 2c

SIG DECAL PROOFER

MAKES ALL DECALS FUEL-PROOF & DURABLE (ONLY ONE COAT REQ.) 4 Oz. Jar, 59c 3 Oz. Spray, 59c

SIG MODEL PINS

#8	1/2 Long	#20	1-1/4 Long
#14	7/8 Long	#24	1-3/8 Long
#16	1 Long	#28	1-5/8 Long
#17	1-1/8 Long	#32	2 Long

Pkt. 15c 1/4 lb. $1.15 1 lb. $3.95

MODEL MAKER'S "T" PINS
Pkt 15c 1 oz box 39c 4 oz box $1.55

SIG RUBBER BANDS

#8	1/16×7/8	#62	1/4×2-1/2
#10	1/16×1-1/4	#64	1/4×3-1/2
#14	1/16×2	#84	1/2×3-1/2
#16	1/16×2-1/2	#105	5/8×5
#30	1/8×2	#107	5/8×7
#32	1/8×3		PACKETS 15c

ALL SIZES AVAILABLE IN BULK AT: 1/4 lb. Pkg. $1.10 1 lb. Pkg. $3.95

SIG AIROLAC

OUR NEW HIGH-GLOSS CELLULOSE ACETATE BUTYRATE DOPE FEATURES TRIPLE-GROUND PIGMENTS FOR AN ULTRA-SMOOTH, GLASS-LIKE FINISH. IT'S FAST-FILLING & LEVELING — BLUSH-RESISTANT & FADE-PROOF. NOW AVAILABLE IN 15 COLORS: Lt. Red / Medium Red / Gloss White / Lemon Yellow / Cub Yellow / Gray / Med. Blue / Dark Green / Gloss Black / Sky Blue / Brite Green / Brite Orange / Dark Blue / Brite Silver / Brite Gold

COLOR: 4 oz. 69c 8 oz. $1.19 Pint $1.79 Qrt. $2.98 Gal. $8.95
CLEAR: 4 oz. 59c 8 oz. 98c Pint $1.49 Qrt. $2.39 Gal. $7.19
THINNER: 4 oz. 39c 8 oz. 59c Pint 98c Qrt. $1.69 Gal. $4.39

AIROLAC ALSO AVAILABLE IN PINT SPRAY CANS ($1.49) IN ALL COLORS

SIG CORE BOND

NEW CONTACT TYPE CEMENT FOR BONDING WOOD OR PLASTIC TO STYROFOAM. Pint $1.95 / Qt. $3.50

SIG DOPE BRUSHES

FINEST QUALITY CAMEL HAIR — IN TWO WIDTHS: 5/8" 25c 1" 29c

RAZOR PLANE

USES DOUBLE-EDGED BLADES $1.55

R/C FUEL TANKS

NEW SIG DESIGN HAS TWO-PIECE PLUG & LEAK-PROOF SCREW-CAP / PLASTIC CONTAINER AND FLEXIBLE PICK-UP / NON-CORROSIVE BRASS TUBING: 2 oz. 95c 4 oz. $1.05 6 oz. $1.15 8 oz. $1.25 12 oz. $1.40

PRESSURE FUEL PUMPS

FAST, EASY WAY TO FILL BIG FUEL TANKS. AVAILABLE IN: Quart $2.89 Half Gallon $3.19 / Gallon $3.49 Pump Only $2.39 / Primer Bottle 29c

COPPER WIRE

FOR BINDING C/LINES, L/GEAR 15c

SIG EPOXY

STRONGEST GLUE EVER DEVELOPED FOR THE MODELER / COMES IN 2 PARTS (A & B) — IN POLYETHELENE SQUEEZE BOTTLES, WITH SPECIAL NO-DRIP SPOUT: 1-1/2 oz. pack 89c 3 oz. pack $1.39 12 oz. pack $3.95

SIG EPOXOLITE

NEW 2-PART EPOXY PUTTY / LIGHT AS BALSA & STRONG AS EPOXY / QUICK SETTING / EASY TO WORK / LONG SHELF LIFE / EXCELLENT BUTYRATE DOPE ADHESION / CAN BE CARVED, SAWN AND SANDED. 4 oz. Set $1.69 8 oz. Set $2.95

SIG NYLON SHEET

.010 THICK NYLON, MAKES 16 R/C OR C/L HINGES (3×4 SHEET). 25c

SIG CONTEST RUBBER

NEW "HIGH POWER" RUBBER STRIP: 1 LB. of 1/8" $5 1 LB. of 1/4" $5

SIG CELLULOID

.008×8×10 12c .015×8×10 30c

FLITE-FOAM

WHITE EXPANDED BEAD FOAM (1 lb PER CUBIC FOOT) 12" WIDE PLANKS

1x12 35c	1x36 90c	1x48 $1.20
2x12 69c	2x36 $1.80	2x48 $2.40
3x12 89c	3x36 $2.70	3x48 $3.60

NEW CELASTIC

FANTASTIC NEW PLASTIC MATERIAL BECOMES SOFT AND PLIABLE WHEN DIPPED IN THINNER. MOLDS TO ANY SHAPE — CAN BE SANDED & DOPED. PERFECT FOR COWLINGS, FILLETING & REINFORCING USES. 9×18 SHEETS: Light 85c Heavy $1.00

WE HAVE NEARLY ALL MODEL AIRPLANE PRODUCTS ADVERTISED

SIG FOAM BOND

NEW CONTACT TYPE CEMENT FOR BONDING BALSA TO EXPANDED POLYSTYRENE / WILL NOT ATTACK FOAM / COLORLESS & STAINLESS PINT Can $1.25 QUART Can $1.95 THINNER: PINT Can 89c

SIG NYLON PUSHROD

COMPLETE WITH THREADED STUD & SERVO CONNECTOR, AVAIL. IN 2 SIZES: 30" Set, 79c / 48" Set, $1.25
BULK PUSHROD (10 Ft. Length) $1.49
PUSHROD STUDS (Set of Three) 10c
PUSHROD KEEPER (Set of Two) 25c

SIG SHEET NYLON

USE .010" THICKNESS FOR HINGE MATERIAL / 1/16" FOR BELLCRANKS, CONTROLHORN EXTENSIONS / 1/8" FOR HEAVY-DUTY BELLCRANKS AND BEARINGS. 1/4" FOR SPECIAL NOSE BEARING BLOCKS AND OTHER ITEMS
.010×3×4, 25c 1/16×2×4, 60c
1/8×3×4, 95c 1/4×1×4, $1.00

SIG NYLON WING SCREWS

1/4-20 × 1" Package of 4, 39c
1/4-20 × 1-1/2" Package of 4, 49c
8-32 × 1" Package of 4, 35c

SIG NYLON BUSHINGS

THREE SIZES NOW AVAILABLE — AT 15c PER PACKAGE: #4 / #6 / #8

SIG NYLON WASHERS

FOUR SIZES (Inter. Dia.) AVAILABLE AT 15c PER PACKAGE: 3/32" Dia. 1/8" Dia. / 5/32" Dia. / 3/16" Dia.

SIG NYLON ACCESSORIES

SERVO MOUNT SCREWS, 4 for 29c
R/C 90° BELLCRANK (with bolt), 25c
R/C CONTROL HORNS (with bolts), IN LONG OR SHORT SIZES, 25c ea.

SIG HARDWARE

BLIND MOUNTING NUTS, 4 per Pkg: 2-56 Size, 20c 3-48 Size, 20c 4-40 Size, 20c 6-32 Size, 25c
NUTS AND BOLTS, 4 each per Pkg: 2-56 × 3/8, 15c 4-40 × 1", 20c 3-48 × 3/4, 15c 4-40 × 1-1/2, 20c 4-40 × 3/8, 15c 6-32 × 1-1/2, 25c
3/8" WOOD SCREWS, per Pkg., 15c IN THREE SIZES: #1 / #2 / #3
2-1/2" METAL C/L BELLCRANK, 15c
SPADE BOLTS, Package of 4 for 25c
"J" Type BOLTS, Package of 4 for 25c
THREADED HARDWOOD BLOCKS, IN 2 SIZES, 25c Pair: 1/4-20 / 8-32
ENGINE MOUNT SCREWS IN TWO SIZES, 6 for 15c: #4×1/2 / #6×3/4
R/C LANDING GEAR (HARDWOOD) BLOCKS (PACKAGE OF TWO), 39c
R/C LINK, WITH 9" LONG ROD, 35c
R/C ROD COUPLERS, Pkg. of 4, 25c
AIRCRAFT TAPE: 1", 20c / 2", 25c
1/2A C/L DACRON LINE (60'), 25c
SOCKET HEAD SCREWS (PKG. OF 4 WITH WRENCH: 4-40 × 3/4", 49c 6-32 × 1", 55c / 8-32 × 1-1/2", 59c
MASKING TAPE (12 FOOT), 15c PER ROLL: 1/8" / 1/4" / 3/8" / 1/2"
HEATPROOF FUEL LINE: ABSOLUTELY HEAT AND FUEL PROOF — SUITABLE FOR ALL ENGINES .049 THRU .61. LARGE FUEL LINE (per foot), now 45c MEDIUM FUEL LINE (per ft), now 35c

SIG JAP TISSUE

PRE-WAR QUALITY JAPANESE TISSUE IN ORANGE, YELLOW, RED, WHITE, BLUE OR BLACK. 18×20 sheet 7c

BAMBOO PAPER

HEAVIER THAN OUR REGULAR JAP TISSUE — IN YELLOW, RED, WHITE, BLUE OR BLACK. 21×31 sheet 15c

SILKSPAN

00 WHITE: 19-1/2×24-1/2 sheet 5c
GM WHITE: 24 × 36 sheet 10c
SGM WHITE: 26-1/2×33-1/2 sheet 15c

SIGRAY

NEW SIG COVERING MATERIAL — A BLEND OF RAYON AND SILK, IN WHITE, BLACK, RED, YELLOW AND BLUE (36" WIDTH). Per Yard $1.25

SIG NYLON

WHITE, 36x48, IN PACKAGE, $1.25

SIG SILK

FOR R/C MODELS — IN RED, BLUE, WHITE, GOLD OR GREEN (36" × 36") HEAVY $1.75 EXTRA-HEAVY* $2.00 — *EXTRA-HEAVY IN WHITE ONLY

JAP SILK

LIGHT-WEIGHT, FOR SMALL GAS, RUBBER, GLIDER ETC. — IN RED, WHITE, BLUE, GREEN, / SILVER OR GOLD. 36" × 36" /sheet, $1.50

SIG SUPERCOAT FUEL PROOF DOPE

BRILLIANT WHITE • DIANA CREAM POLAR GRAY • BROWN • JET BLACK LEMON YELLOW • TENNESSEE RED CUB YELLOW • ORANGE • MAROON LIGHT RED • SILVER • OLIVE DRAB FOREST GREEN • BRIGHT GREEN DK. GREEN • DK. BLUE • LIGHT BLUE MIAMI BLUE • CLEAR • THINNER

PLUS 5 NEW SUPERCOAT COLORS — GOLD, COPPER, METALLIC GREEN, METALLIC BLUE, METALLIC MAROON

COLOR		CLEAR		THINNER	
4 oz.	59c	4 oz.	50c	4 oz.	39c
8 oz.	95c	8 oz.	89c	8 oz.	59c
Pint	1.49	Pint	1.39	Pint	98c
Qt.	2.79	Qt.	2.19	Qt.	1.69
Gal.	7.95	Gal.	6.59	Gal.	4.39

SIG SUPERCOAT IN NEW SPRAY CANS

ALL 19 SUPERCOAT COLORS, PLUS CLEAR, NOW AVAILABLE IN THESE HANDY, LOW-COST SPRAY CANS 3 oz. 49c 6 oz. 79c Pint 1.39

SURGICAL TUBING

THIN WALL, FOR FUEL LINE & USE WITH CLOCKWORK TIMERS 15c FT

SIG FUEL-RESISTANT DECAL SHEETS

BRAND NEW LINE OF 44 DIFFERENT SIG MODEL PLANE DECAL SHEETS

• SOLID COLORS (CHOICE OF 9): RED, WHITE, BLUE, BLACK, YELLOW, ORANGE, GREEN, GOLD OR SILVER

• CHECKERBOARD (1/4" AND 1/2" SQUARES): RED, BLUE, GREEN (ON WHITE) • RED, WHITE, BLUE, BLACK, YELLOW, ORANGE, GREEN, GOLD OR SILVER (ON CLEAR) • ORANGE (ON BLACK) • RED (ON YELLOW)

• STRIPES (1/4", 3/8" & 1/2" WIDTH ON EACH SHEET): RED, WHITE, BLUE, YELLOW, ORANGE, BLACK, GREEN, GOLD OR SILVER (ALL ON CLEAR)

• STARS (5-PT.): RED, BLUE OR BLACK (ON WHITE) • RED, WHITE, BLUE, YELLOW, ORANGE, BLACK, GREEN, GOLD OR SILVER (ON CLEAR)

TWO 4-1/4"×11" DECAL SHEETS 45c

SANDPAPER

TEN 4-1/2×5-1/2 ASS. SHEETS 19c

GARNET PAPER

FIVE 4-1/2×5-1/2 FINE SHEETS 19c

SIG PIANO WIRE

1/32 dia.	6c	3/32 dia.	17c
3/64 dia.	7c	1/8 dia.	22c
1/16 dia.	9c	5/32 dia.	42c
36" LENGTHS		3/16 dia.	55c

SIG-MENT

OUR GREAT NEW "ONE-TUBE A & B SUPER-CEMENT" — FOR ALL MODEL BUILDING AND FAST FIELD REPAIRS — HOT FUEL PROOF, STRONG AND QUICK DRYING — FOR BALSA, PLYWOOD, HARDWOOD, WOOD-TO-METAL, METAL-TO-METAL & CLOTH 2 oz. 25c 4 oz. 49c 8 oz. 69c Also available in Pint size — $1.29

CONTACT CEMENT

ONE COAT INSTANT BONDING FOR ALL WOODS, METAL, CLOTH ETC. 4 oz. 55c 8 oz. 95c Pint 1.50

R/C HOOK-UP WIRE

SIG PACKAGE OF EIGHT DIFFERENT COLOR WIRES, 3-FT. LENGTHS. 69c

SIG "PETER CHINN" MODEL ENGINE FUEL

FUEL TYPE	Pint	Quart	Gallon
REGULAR	85c	$1.50	$4.95
CONTEST	90c	$1.59	$5.95
GRAND PRIX	$1.00	$1.75	—
R/C SPECIAL	—	$1.39	$4.50

REGULAR HIGHEST QUALITY AND ECONOMICAL GENERAL PURPOSE FUEL FOR .15 - .60 ENGINES. IDEAL FOR .35 - .45 STUNT, .35 COMBAT, .15 - .45 R/C THROTTLE-ENGINES, BREAKING-IN.

CONTEST TOP PERFORMANCE, ALL-PURPOSE FUEL FOR .01 - .15 ENGINES. EXCELLENT FOR ALL MEDIUM AND LARGE-SIZE ENGINES (AFTER BREAKING-IN) & WHERE EXTRA POWER IS REQUIRED.

GRAND PRIX ULTRA HIGH-PERFORMANCE, (GIVES UP TO 40% MORE POWER) "HIGH NITROMETHANE CONTENT" FUEL FOR ALL COMPETITION AND RACING ENGINES. FOR F/F GAS, C/L RAT-RACING, PROTO-SPEED & SPEED. NOT SUITABLE FOR STUNT, R/C ENGINES OR BREAKING-IN.

R/C SPECIAL ECONOMICAL, "WIDE R.P.M. RANGE" FUEL FOR ALL THROTTLE-EQUIPPED .15 - .60 R/C ENGINES. GIVES ULTRA-SMOOTH RUNNING AT FULL POWER AND LOWEST IDLE — IN ALL CLIMATIC CONDITIONS. ALSO IDEAL FUEL FOR C/L NAVY CARRIER AND C/L STUNT FLYING.

MOLDED FOAM WING

FOR R/C SPORT & TRAINERS — 45" span, 6-1/2" chord, 6 ounces, SEMI-SYMETRICAL AIRFOIL / ONLY $3.50

SIG WINGSKINS

1/64" BIRCH PLYWOOD (THREE PAPER-THIN VENEERS LAMINATED WITH WATERPROOF GLUE) — CAN BE CUT WITH SCISSORS. PERFECT MATERIAL FOR COVERING FOAM TYPE WINGS 12" × 12", 80c 12" × 24", $1.60 12" × 48", $3.20 24" × 48", $6.40

SIG BUBBLE CANOPIES

PERFECT BUBBLE CANOPIES FORMED FROM TOUGH BUTYRATE PLASTIC — AVAILABLE IN 13 SIZES IN CLEAR — OR IN BLUE, GREEN OR AMBER

CLEAR: 4" 15c / 5" 20c / 6" 30c / 7" 40c / 8" 50c / 9" 60c / 10" 70c / 11" 80c / 12" 90c / 13" $1.00 / 14" $1.10 / 15" $1.20 / 16" $1.25

COLOR: 4" 25c / 5" 30c / 6" 40c / 7" 50c / 8" 60c / 9" 70c / 10" 80c / 11" 90c / 12" $1.00 / 13" $1.10 / 14" $1.20 / 15" $1.30 / 16" $1.35

1970 SIG MODEL KIT LINE

★ R/C SCALE		
D.H. BEAVER	45" Span	9.95
CESSNA 172	54" Span	14.55
PIPER CUB J-3	71" Span	21.95
CESSNA 170	72" Span	24.95
CITABRIA	69" Span	29.95
FAIRCHILD PT-19	72" Span	34.95
T-34 MENTOR	70" Span	36.95
ZLIN AKROBAT	70" Span	39.95
YAK 18	72" Span	45.95
★ R/C		
R/C SPORT	45" Span	8.95
DOUBLER	37" Span	9.95
BARON'S BUGGY	34" Span	12.95
PRIVATEER Super 15	60" Span	12.95
BUSTER RACER	48" Span	19.95
MIDGET 450 Racer	50" Span	24.95
STRATUS Class III	70" Span	29.95
SIMCO Class III	68" Span	34.95

THIS COUPON IS VOID IF PROHIBITED, TAXED OR RESTRICTED

☆ NEW SIG FREE COUPON ☆

• CLIP OUT THIS COUPON AND MAIL IN WITH YOUR ORDER ($3 MINIMUM) FOR ANY SIG MERCHANDISE — AND WE WILL SEND YOU THE FOLLOWING ITEMS AT NO EXTRA CHARGE (CHECK THE APPROPRIATE BOX BELOW):
$3-$5 Orders ☐ 8 oz. SUPERCOAT, or ☐ 8 oz. AIROLAC
$5-$7.50 Orders: ☐ Pint SUPERCOAT, or ☐ Pint AIROLAC
Over $7.50: ☐ Pint SUPERCOAT and 4 oz. SIG-BOND or: ☐ Pint AIROLAC and 4 oz. SIG-BOND

Oct. '70 AAM

IF YOUR LOCAL DEALER IS UNABLE TO SUPPLY YOUR NEEDS, ORDER DIRECT — ADDING 50c POSTAGE (OR $1.00 FOR CANADA) MINIMUM ORDER $1.00

SIG MANUFACTURING COMPANY, INC. / 401(A) SOUTH FRONT STREET / MONTEZUMA / IOWA 50171

SUDDEN SERVICE PLANS

Full-Size Plans — Shipped First Class Mail Within 48 Hours — No Extra Charge

No. 0101, Undone I — R/C Pattern plane for 60 engine for new maneuvers and lightweight equipment. Wing span 59". **$3.50**

No. 0102, Skyvan — Semi-scale twin 049-powered STOL transport. Simple construction, all-balsa. For C/L. **$1.50**

No. 1191, Scimitar — Unusual-looking R/C stunter. High-speed maneuvers, clean tracking. 60 engines. Low-tail Rivets look. By Joe Foster. **$3**

No. 1192, Ryan Mailplane — Light, F/F, with plenty of details. For rubber indoor or outdoor. Plan has scale views. **$1.50**

No. 1193, Mig 21d — 40-powered C/L version of Russian fighter is fast, stable flyer. By Roland Baltes. **$2.50**

No. 1194, 1937 Gas Model — Half-size 049 copy of great old-timer. Has durability and easy-to-fly characteristics. Frank Ehling. **$2**

No. 1091, Halberstadt — Nearly scale R/C WW I fighter with semi-symmetrical 6' wings. 60-powered. Two sheets. **$4**

No. 0791, Pusher Galore — Bill Hannan's all-sheet, rubber pusher for Tenderfoot. Looks like supersonic transport. **$.75**

No. 0894, Voltswagon — Trainer and stunter by Marsh for electric tether flying with slot-car motors. Plans for the pylon included. Great club activity. **$1.50**

No. 0794, Skimmer Airboat — Sled-type fun watercraft by Paul Hook. .09 engine, R/C rudder, throttle. **$2**

No. 0991, Flashby I — Rakish-looking all-balsa ROG by Wayne Brown. For the Tenderfoot. Tricycle gear. **$1**

No. 0992, Fouga Cyclone — Scale model of jet-assisted French sailplane, by Nick Ziroli. Gains altitude easily on 09 engine. A two-piece 7-ft. wing. For R/C. **$3.50**

No. 0993, La Jollita — Profile 15-powered Goodyear C/L racer by James Kloth, fast, groovy. On mild fuel and engine does 85 mph. **$1.25**

No. 0892, Taylor Cub F-2 — Sport, F/F, scale, .020. Stick-and-tissue. By Schreyer. **$1.75**

No. 0893, Martin MO-1 — Rare WW-1 era monoplane, carrier fighter ideal for Class 1 Carrier. Ailerons keep lines tight at low speed. By Reeves. **$1.50**

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No. 0902, Cloud 9 — Intricate contest winning Wakefield by Roger Gregory. Plan shows streamlined prop/hub design. **$3.50**

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No. 0904, Antoinette — Signorino/Zundel RC. 98" wing, nearly scale, flies well on .36, like powered glider. Plans 3 huge detailed sheets. **$9.00**

No. 0905, Mini Cat — Bud Atkinson scaled down the Cat series, for pulse or light digital and up to 19 engines. Easy to make RC sport flyer. **$2.75**

THIS MONTH'S PLANS

No. 1001, Phantom — Well-engineered RC Dyna-Jet-powered scale fighter by Ralph Saldivar is practical but noisy model. Highly detailed plane. Jet installation shown. **$4.00**

No. 1002, Hobbit — Simplified Nordic A1 by Bob Stalick is steady on tow, all-weather flyer. **$1.50**

No. 1003, Charger — ½A powered sweptwing stunter does full pattern on long lines safely. **$2.00**

The engine handles quite differently Although it is equipped with a variable speed carb with rotor stop and air bleed adjustment, quite similar to those on normal model engines, it does not require an idle bar glow plug. The plug furnished is termed an OK-type and appears identical to the OK plugs which have been used in the U.S. It is the "long" size plug. It screws into a little chamber of its own, with only a tiny hole (about 3/32") leading into the combustion area. After an hour of bench run-in, our Wankel plug was bright and clean, showing no oil or carbon deposits.

Contrary to the usual engine, the Wankel must be very wet to start. Instructions are to turn the prop while squirting fuel into the carb intake. It is just as easy to choke the carb continuously while giving the prop perhaps half a dozen turns. If excess fuel is taken into the engine, it will simply dribble out of the exhaust stack. It is possible to get too much in, but there is far less chance of flooding this type of engine.

While hand-starting is quite possible, an electric starter is a big help, especially when the engine is new. The engine surprised us by roaring off on the first try, almost as soon as the electric starter was switched on. The Graupner Wankel has an odd-sized shaft (.234" dia.) so U.S. props and spinners won't fit properly. An O.S. AMA-style prop nut, a small spinner about 9/16" dia. toward the end, comes with the engine. With this spinner, it is practically impossible to use an electric starter. To remedy, an insert made from Delrin (any material would do, including hardwood), was turned to slip inside the rubber tubing in the starter's business end. This insert is 13/32" long, 9/16" ID and ⅞" OD. It needs to be only large enough to stay put inside the rubber tubing, as the prop is driven by the outer edge of the rubber. With this addition, the starter worked perfectly. Graupner makes a pull-cord starter with a built-in fly wheel that will work nicely on the Wankel; however, this unit takes two persons to operate. The engine can be hand-started, but why labor, when the electric starter makes it so easy?

The needle valve lean point was quite sharp. Up to a certain point the engine leaned out and increased speed smoothly, but just a little past that point it would quit almost instantly. Perhaps with more running this will be less noticeable. Another unusual characteristic developed when the engine was started with a rich needle valve setting, which gives a good rpm but somewhat less than max speed. When the glow plug clip was taken off, the speed instantly dropped drastically! The engine kept right on running at the lower speed, and was brought back to the desired speed by further leaning of the mixture.

The engines apparently are run before being shipped, and the carb comes adjusted. No readjustment was attempted, since idling seemed quite good, although somewhat faster than with standard engines. Readjustments will be made after more running time is accumulated, but it seems unlikely the Wankel will be able to run at a tick-over, as do some U.S. RC jobs.

Because of that undersize shaft, U.S. props won't fit correctly. Graupner sells prop adapters—little plastic rings with the proper ID for the Wankel shaft. They require a shallow hole in the back of the prop hub, about .385" dia., which

no U.S. props have. It was simpler to turn out the inside of ⅜" length of hobbyshop ¼" OD brass tubing to fit the engine shaft.

Many modelers have asked when the Graupner Wenkel engines will be available in the U.S. This depends upon arrangements being made with Curtiss-Wright, which has exclusive license to market Wankel engines of any size in the U.S. These negotiations are progressing satisfactorily, and the engines may be on sale by now.

This most interesting powerplant was installed in an ARF plane because the writer hadn't time to tackle design and construction of a new plane or to build a conventional kit. We wanted a plane of around 550 sq. in. wing area (couldn't see risking this rather precious engine on the nose of a small and hot bomb), preferably with trike LG (again, to protect the engine.) A balsa fuselage was required, so that the nose lines could be altered to blend into the engine shape. The Cale T-1 Trainer, a high-winger intended for full-house controls (the radio system also is reviewed here) best met these requirements. The T-1's all-wood fuselage and foam-core wing covered with balsa proved reasonably easy to modify.

Two versions are available from Cale Kits (Box 3104, Ogden, Utah 84405). The standard kit includes sheeted wing halves with ailerons completely installed; balsa fuselage with nylon push-rod guides installed for rudder, elevator, throttle and nose-gear steering; engine mounts and fuel tank (six oz.) installed; all landing-gear wire components cut, shaped, and fitted; sheet tail surfaces with all hinges installed (elevator in place, rudder hinges in but rudder loose). The assembly work was excellent; the fuselage is built in a jig, apparently with Ambroid and epoxy cements. Formers are of ply with a ply doubler to the rear of the cabin area. Hardwood servo rails are in place. All wood surfaces are smoothly sanded and could be finished just as they come.

The engine may be mounted with the carb and other projections angled just about any way desired. However, the glow plug possibly could flood out if it were pointed downward. The carb was not put on the bottom where it would be vulnerable in bad landings. The needle valve is easily reached and the exhaust stack sticks straight out, where it will be handy for attachment of the Wankel muffler, when this becomes available.

Since this was somewhat of a rush job, and we wanted to keep weight down as much as possible, the entire plane was covered with Super MonoKote. Windows, windshield, and other trim details are made from the sticky Mono-Kote. Applying this covering to the already-installed control surfaces can be a real chore. (The plane comes with these parts already hinged in place.) A small soldering iron with a long, skinny, wedge tip was used to get in between control surfaces and the areas to which they are hinged. Needless to say, the iron can't be run at full heat! It was supplied reduced voltage from a variable-speed control unit.

After several flying sessions, claims that the T-1 is an entirely docile but able stunter were confirmed. Not every maneuver in the book was performed, but loops (inside and outside), fast and slow rolls, touch-and-goes, and so on are easy. The plane grooves quite nicely

inverted, and is more stable this way than some stunters we've flown! The Wankel engine has more than enough power for normal stunting (we didn't try a Top Hat or any brute power maneuvers). In the limited flight time available, we were unable to get a spin. Designer Kirk Lee says this is possible, but it is likely we didn't have enough rudder or elevator movement. Takeoffs from grass (rough surface) or hardtop runway were easy. Because of time constraints, no brakes were fitted, so the plane had to be held on the runway, even when idling. The Wankel produced 12,000 rpm on the ground, using a Tornado 10/4 prop, and K&B 100 fuel. We couldn't get the idle below 4000, simply because the throttle arm hit the air bleed screw. The Wankel isn't likely to just tick over, but 3500 or a bit less is certainly possible.

Plans for the plane call for CG at about 25% back from wing LE; this amounts to about 2½". We actually ran it back to almost 3". Aside from the need to trim in considerable down-elevator, the plane showed no cranky tendencies at all. It never snap-rolled or dropped a wing during all test flights. Our control movements are: ailerons, 7/16" both ways; rudder, ⅝" both ways; elevator ½" U and D (this could probably be a little less for the novice flier).

The engine was started when cold with the Penford Auto-Start, but quite a few hand starts were made when it was warm or hot. This usually took only a good husky flip or two. The engine never showed any signs of nastiness, such as kicking back. It does have a decidedly different sound in the air; the exhaust crack is quite sharp but not overly loud. When the exhaust stack is toward the flier, the noise is fairly loud, but on the opposite side the engine exhaust is barely audible! The swish of the prop and the whir of the internal gears can be heard, but the overall noise is certainly far less than a normal 30 engine. One reason for this is that the Wankel isn't vibrating the entire plane. The six-oz. fuel tank gives about eight minutes of full-throttle power.

During some hand launches, when the

plane was given a very strong heave, the engine gave a heavy cough. If set right on peak rpm on the ground (which it shouldn't be) it often quit at this point. But set a click or two rich, it gave a briefer cough but then picked up immediately and kept running. The fuel system seems quite conventional, so this may be a characteristic of the engine. There was no such problem on ROG's. The Wankel shows clear signs when the fuel is getting low; it gives brief coughs in flight but keeps on running at a steady speed. When the fuel is definitely gone, it stops very suddenly. Possibly these characteristics will be modified when it has had more air time.

All in all, the engine, T-1 Trainer and EK Champion control system have been most successful and certainly can be recommended to those who desire the special features that each offers.

Jet RC Phantom

(Continued from page 23)

the greatest single drawback is noise! Unlike conventional reciprocating engines which can be muffled, little can be done to reduce the sound level. Thus, the areas where jets can be operated are rather limited. On the other hand, flying detailed scale models is usually limited to contests. Most major contests do permit (and often encourage) jet model flying.

Some model builders shy away from jets because of envisioned difficulties with engine installation and operation. True, some items, such as engine installation and fuel tank design, must be given special consideration during construction. Yet once the requirements for jet engine operation are understood, these problems are solved quite easily. Another concern is the potential fire hazard, which has been exaggerated. By taking proper precautions such difficulties can be virtually eliminated—but do keep a fire extinguisher handy.

On the plus side of the ledger, model jet engines of the pulse variety are readily available in the U.S. Best known is the Dyna-Jet, which operates on the same principle as the engines that propelled the German V-1 Buzz Bombs in WW II. The model engines are more efficient, with the lowest fuel consumption for thrust developed and highest cycle frequency of any production-type jet. These engines run well on low-cost "white" gasoline, which is so mild no elaborate and expensive fuel-proof finishes are needed.

Naturally, techniques for starting and operating jet engines must be learned, but one quickly can become familiar with the required procedures. Lots of pioneering remains to be done with this type of aircraft, so join in! Let's get more true jet models into the air.

A certain amount of courage is required to tackle a project of this magnitude, but the reward of seeing the finished jet aircraft in action will more than repay the effort involved. Although my Phantom was radio-controlled, this ship also would be ideal for U-Control. It is definitely **not** a beginner's project, but construction should not offer any particular problems to the experienced scale modeler.

To improve flying characteristics, the Phantom incorporates a few departures from exact scale. The wing chord was increased, as was the airfoil thickness. With these changes, the relatively small wing of the one inch to the foot model

was successfully utilized. In addition, the upper fuselage line has been raised slightly to provide extra space for the rudder and stabilator actuating servos. The changes have not disturbed the overall appearance of the aircraft to any great degree, and the alterations usually go unnoticed.

Before reaching for the balsa, study the photos and plans (See centerspread, May 1970 AAM, 10¢). Most potential "worry areas" will vanish when approached in a patient, logical manner. Unless otherwise specified, all balsa employed in this model is medium hard.

Construction

Fuselage: Using carbon paper underneath the plans, transfer the outlines of formers F-1 through F-10 onto ⅛" plywood. Cut them out accurately, since they create the basic fuselage contour and some of them also determine incidence alignments.

Next, construct the simple fuselage assembly jig from ¾" pine or plywood. Any errors built into it are passed along to the model, so take time to line everything up correctly. If desired, the first two jig members may be notched to accept the nose-gear mounting strip.

Cut the fuselage longerons to size from spruce that is free of warps or twists. Place one directly over the plans and mark the location of each former. Slide all formers onto the longerons and set the resulting skeleton framework onto the assembly jig. The framework can be temporarily secured to the jig with tape. Install the upper ¼ x ⅛" spruce longeron to help hold the formers in alignment, but do not glue it at this time.

The inner wing ribs (R-1) are cut from medium hard 3/32" balsa, and placed on formers F-4, F-5, and F-6. Recheck that formers F-2 through F-10 are in proper alignment, then glue in place. The R-1 ribs are not glued on but are removed to be assembled later on the wing jig. A long, straight strip of balsa can be used to check alignment along the sides of the formers. In the top view, note the "Coke bottle" effect created by the outer contours of the fuselage.

Next, the ½ x ⅜ x 10½" spruce nose-gear support member is added, along with former F-1. While they are drying, glue and secure the longerons in place.

Wings: Cut out the pine front and center wing spars, and the medium hard balsa ribs. Construct a simple jig (indicated on the plans) to support the spars during wing assembly. Note that the inner wing ribs are reinforced with plywood segments. Place wing ribs R-1, R-2, R-3, R-4 and R-5 in their correct locations on the spars, and place each assembly on its wing jig. Check for correct alignment before gluing the parts in place. After the assemblies have dried (wing tips have not yet been added), slide them into position on the fuselage sides. Clothespins may be used to hold them during the next operation, which establishes the proper dihedral angle for the inboard wing panels.

This is measured by placing a straightedge under the longeron just forward of F-6. The vertical distance can be measured at location No. 3, as indicated on the top-view drawing, and should be ⅜" on each side. If fuselage formers F-4, F-5, and F-6 have been made and installed correctly, the wing incidence (+2 degrees) will be built-in automatically. When satisfied that these angles are as they should be, drill through the ⅛" dia. holes in formers F-5 and F-6 into the wing spars adjacent to them. These holes will accept bolts during the assembly phase (see locations No. 1 and No. 2 on the top-view drawing).

Now remove the wing panels from the fuselage, and replace them on their jigs. Cut and splice the center and rear wing spars to achieve the specified wing tip dihedral, as indicated on the spar drawings, and add the remaining wing ribs. The leading edges and tip blocks may then be installed. After everything has dried, the wings may be removed from their jigs, and fastened permanently to the fuselage.

Landing Gear: Bend the main landing gear struts from 5/32" music wire and install them with J-bolts, as indicated

in the wing top-view drawing. The nose-gear strut is constructed from mild steel rod so that it can be flattened and bent as shown on the detail drawing. Also, mild steel is much easier to solder than music wire. Assuming that the model lands in the recommended nose-high manner, the main gears will absorb most of the landing loads anyhow. The nose-gear pivot bearing is machined from aluminum stock and is held in place by a large washer which is soldered in position. The axle also is soldered in position. As an extra precaution, it is well to wrap a few turns of fine wire around this junction before soldering. Note that the upper steering arm of the nose-gear is drilled to accept the link pin of a Nyrod, which will be actuated by the rudder servo. The nose-gear strut bearing is liberally coated with epoxy and inserted through the hole in the nose-gear support member. In addition, a small pair of wood screws is used to hold the bearing flange against the support member (see fuselage side-view drawing).

Once the basic structure is built, attention can be turned to the various subassemblies. A 3/32" plywood servo mounting board is cut to size and installed between formers F-7 and F-8. A pair of short longerons also is added on each side between F-7 and F-10. Now is a good time to make and install the ½" sq. hardwood engine mounting blocks.

Several items, such as the engine heat shield, are unique to jet models and must be constructed from metal. Those reluctant to make this unit can have it fabricated by any sheet metal shop for a reasonable fee. Such a shop would most likely close the joint in the tube with a folded lap seam, but a simple overlap secured with ⅛" dia. aluminum rivets will do just as well. After the tube has been completed, it is wrapped with a single layer of 1/32" thick asbestos cloth, obtainable from a hardware store. This material is usually used for insulating steam pipes. Wet it before wrapping around the tube; when it is dry, it will retain the curve. The heat shield tube is held in the fuselage by the engine mounting screws.

The forward engine mount is cut and filed to shape from .051 aluminum sheet. The lower flanges are bent at right angles and fastened to the engine mounting blocks with 4/40 machine screws. One of the screws also serves as a grounding point for the engine-starting electrical lead. The external connection points on the model were the removable tips from automobile spark plugs. (See fuselage side-view drawings.) A 3/64" dia. piece of music wire is used to secure the engine in the mount. The rear of the engine is held in place with a simple .012 thick stainless steel strap (detailed on plan). If stainless steel is not available, .035 or thicker aluminum may be substituted.

The rear heat shield, which fits directly above and behind the engine tailpipe outlet, is cut from .016 sheet aluminum. 1/32" asbestos cloth cut to the same size is sandwiched between the shield and the underside of the fuselage, and secured with wood screws.

Fuel Tank: This important item must be carefully constructed to assure that the engine will not flame out because of faulty fuel feeding. The drawing shows the proper method of construction; .008 tin sheet is suggested. The main portion of the tank is bent from a single sheet, and the baffle, ends, and lower fuel reservoir are soldered on separately. An optional fuel shut-off device also is shown. This involves an additional servo fitted with a wire to pinch the fuel feed line on command. Generally speaking, this item would not be needed, since the fuel tank is designed for only about two and one-half to three min. flying time. (Assuming 30-45 sec. ground running during starting and launching.)

The location of the fuel tank is somewhat critical. Best results in RC models have been obtained by keeping the top of the fuel tank within ¼" from the level of the engine metering jet. If the fuel tank is mounted too high, the fuel will gravity feed into the engine, re-

sulting in a potential fire hazard. On the other hand, too low a fuel level will result in difficult starting.

Stabilator: The hinge assembly for the stabilator (all-moving horizontal tailplane) is constructed from aluminum and plastic. Particular care should be exercised to achieve a smoothly operating, slop-free unit. It is spring-loaded to the neutral position. (See fuselage side-view drawing.)

The stabilator is shown true size on the top-view drawing, and it is constructed from balsa and plywood, sandwiched over the actuator plate. The two stab sides must be added after the hinge assembly has been installed in the fuselage. The bolts and nuts are inserted and epoxied prior to adding the upper and lower balsa sheets. Final shaping and sanding is done on the aircraft.

Fin and Rudder: The fin is made from 3/8" medium hard balsa, sanded to shape, while the rudder is cut from ¼" hard balsa. Use your favorite brand of hinges and control horn.

Miscellaneous: A few items remain to be installed on the fuselage. The rudder and elevator servos are mounted on .020 aluminum mounts, bent to shape as indicated. The remainder of the electronics components may be installed at this time. Caution: All electronics hookup wiring should be located at least an inch away from the engine heat shield to protect the insulation from melting!

The ailerons are both actuated via Nyrods from a single servo mounted in the port wing, as indicated in the top-view drawing. This servo is mounted to an aluminum angle bracket with grommets in the mounting holes. The bracket is mounted atop a piece of 1/16" plywood, fitted with two pieces of 3/16 x 5/8" pine which accept the bracket mounting screws. The receiver antenna should **not** be placed parallel with the jet engine, but rather at right angles to it. In other words, it should run from the receiver out to a wing tip, rather than the usual receiver-to-fin setup.

Engine: My jet engine installation techniques have been developed over a period of years, and the basic principles thoroughly tested in a number of different models. Certain important considerations deserve special attention. Perhaps most significant is the matter of assuring adequate cooling to protect not only the engine itself, but also the potentially flammable structure of the model. The drawings indicate the relative locations of the air intakes and the engine heat shield, which also serves as a passage for cooling air. Regardless of the provisions made for proper cooling of the engine and insulation of the model structure, it still is important to confine ground running time to a minimum. Since the engine does not require any sort of warm up, it is pointless to operate it for any extended period while stationary. Correct cooling can best be assured by getting the model into the air as soon as possible.

When installing the engine, the thrust line is inclined two and one-half degrees with respect to the fuselage reference line. This corresponds to downthrust in a conventional reciprocating engine.

Note that the entire engine and heat shield may be removed, if necessary, after the model has been completed, since the forward hatch allows sufficient room. Other items, unique to jet installations, such as the fuel tank are described separately.

Planking: After all the internal components have been installed and tested to satisfaction, begin planking. A good place to start is the top of the wings, which are covered with sections of sheet balsa, rather than strips. The grain is arranged parallel to the wing leading edges. Ambroid glue is used for this operation, and straight pins hold the sheets in place while the glue is drying. Next, invert the model and install the aileron ribs, actuating Nyrods, and control horns. Carefully mark the top skin to indicate where the ailerons will be cut, and proceed to cover the bottom of the wings. The ailerons then may be cut free, and their hinges installed.

The remaining carpentry work involves cutting out the fuselage tail block, nose block, and air intake baffles. Note that the lower rear portion of the fuselage, featuring the dummy afterburner outlets, is just for appearance and is removed for flying. The entire fuselage is planked, mostly with ⅜ x ⅛" balsa strips. In some locations, such as the relatively flat fuselage bottom, wider sections of ⅛" sheet balsa can be used. Planking is tedious business at best, but the model soon begins to take on an exciting appearance.

Wherever a hatch is to be provided, such as over the servos and the entire cockpit area, provisions must be made in advance of planking. Short balsa wood members are installed at the parting lines, with waxed paper inserted between them. As the planking proceeds, mark on the outside where the incisions will be made to free the hatches. Forget this and you'll find yourself having to do a lot of guesswork (and probably patching) trying to locate the hatch parting lines. The hatches may be hinged or completely removable, at the discretion of the builder. An effective type of latch is detailed near the nose-gear drawing, but any dependable system may be employed. A small bulkhead should be added at the forward portion of the cockpit hatch.

When all the planking is in place, carve and sand the nose and tail blocks to blend in properly. After planking, the underside of the fuselage will not be quite flush with the lower wing skin. Fill in this area with ⅛ x ½" balsa strips and blend in with sandpaper.

A suitable opening must be made in the upper fuselage rear to accommodate the rudder-actuating pushrod. Finally, a thorough overall sanding should reduce the thickness of the planking to approximately 3/32" and prepare the model for finishing. The entire wood portion is treated with enough thick

coats of a talcum powder/dope mixture to fill the balsa grain. Sand well, then add two more coats. Sand again, and apply two or more coats final color.

Cockpit Canopies: Since no standard commercially-made canopies will fit correctly, make your own! This may seem a tough challenge, but persistence will see the job through! Obtain some 1/16" clear plexiglass. Ours was purchased from a local sign shop, where the material is used to fabricate displays. Carve a male mold from balsa (see plans). Sand it to a smooth finish and glue it onto a hardwood board. The female mold is cut from hardwood or plywood, allowing about 1/16" clearance around the male mold, in the center opening. Apply wax to the male mold so that the plastic will not stick to it.

Now is a good time to be sure that your wife isn't in the kitchen, since she may mistrust your use of her stove! Heat the oven to 350°, allowing about ten minutes for it to reach a stable temperature. Place the male mold in the oven so that it may be evenly heated also. Lay the plexiglass sheet over the male mold inside the oven and watch it carefully through the oven window. Five to ten minutes may be required to properly soften the plastic, depending upon a variety of unpredictable conditions. At this point, call your wife back in or, better yet, get another model builder to help, and be quick about it. You must act fast! In fact, the first plastic sheet may melt before you realize that it is ready. Next time, be prepared. Using gloves to protect the hands, whip the male mold and plastic out of the oven. Have your assistant force the female mold down over the plastic. Put the whole thing on the floor and place a foot on each side to hold the female mold down firmly for about three minutes.

After the plastic cools, remove the molds and trim the plastic into the required three sections. Next, cut out and add the thin aluminum canopy framing, which may be held in place with tiny countersunk screws, available from any model railroad shop. Do not try to rivet on the frames, as the plexiglass is very apt to crack. Various internal cockpit details are left to your discretion. Since I feel this sort of detail really adds to the charm of any model, mine is complete with cockpit hinges, latches, instruments, seats, and pilots. The extra time required to add these features is repaid many times over by compliments.

Decor and External Detailing: Phantom aircraft are used by the U.S. Navy, Air Force, and Marines, as well as by some foreign nations. Thus, any of a wide choice of color schemes is appropriate. My model was patterned after a VF-121, since the machines are based at N.A.S. Miramar, convenient to my home. Thanks to the splendid cooperation of Chief Ed Mangel and various VF-121 personnel, I was able to examine the full-size aircraft at close range.

Those who do not have ready access to the real thing should obtain as many photos of Phantoms as possible to use as guides. Such photos have been published in **Air Progress, Aviation Week,** and other magazines. Another hint: take a good look at some of the Air Force, Navy, and Marine recruiting literature, free at many Post Offices!

Most of the external details such as landing gear components, air scoops, etc., can be made from scrap aluminum and balsa. Panel lines, rivets, and the like are added with india ink and a drafts-

man's pen. Squadron markings are made from decal paper, such as Trimfilm. Thanks to the use of mild (white gas) fuel, no fuel-proofing or exotic paint is required.

The indicated equipment locations allowed my model to balance correctly without additional ballast. It was equipped with Heathkit components, so the use of other brands may bring about the need for slight weight additions to arrive at the correct CG. The model should balance at a point one inch aft of fuselage former F-5.

Dyna-Jet Engine Operation

External Equipment: I used a Dyna-Jet engine which requires only air and fuel supply once it is running. However, it must be started with the aid of outside air and electrical sources. The air can be provided by a heavy-duty tire pump or by a small compressed air tank, which can be filled at any automotive service station.

A regular spark plug, rather than a glow plug, is fitted to the engine, thus, a spark source must be provided. It generally takes the form of a vibrator spark coil of the type employed in the old Ford Model T and Fordson tractors. These items still may be obtained from some large chain stores which deal in auto supplies. Another possible source is automotive wrecking yards. In addition, a 6V battery and a switch are required.

Fuel Supply: Although some speed merchants advocate the use of special fuels, the Dyna-Jet factory specifies unleaded automotive gasoline or, if that is not conveniently available, regular grade. The use of ethyl gasoline is not recommended.

Flying: When you finally have mustered up enough nerve to attempt a flight test, find a couple of brave cohorts and head for the field. Quite a few U-Control flyers have had the necessary experience, since jet engines are quite commonly used for Ukie speed flying. If you can locate one or more of these fellows, so much the better! Needless to say, a long smooth runway is essential, since hand-launching this type of model is out of the question!

The threats of fire hazards are greatly exaggerated. Even a few glow-engined models have gone up in smoke for lack of a handy extinguisher, so take one along—as insurance. Perform the usual pre-flight tests to be certain that everything is operating correctly. (This provides plenty of time to think up good excuses for delaying the test flight!) As a final check, be certain that the stabilator is in its correct neutral position, prior to takeoff. The fuel tank should be filled at the last moment before starting the engine.

Starting: Ground running of the Dyna-Jet engine should be for very short periods, since proper cooling is provided only while the engine is in motion. Thirty seconds is the suggested limit for stationary operation.

The ground wire and high tension spark plug lead are attached, the tank is filled with fuel. The air source is attached by screwing the air supply tube onto the engine's blowpipe. Next, the switch is closed, actuating the spark coil system. The resulting sparking action can easily be heard.

At this point, operate the tire pump, using deliberate, full length strokes. If an air tank is being employed, allow the air to enter the engine intermittently. Usually the engine will send popping sounds from the tail pipe; shortly thereafter it will run continuously. (Note how quickly the spectators back away!)

When the engine is running, air and spark sources may be removed. As mentioned before, the engine should **not** be operated for extended periods on the ground. Once in motion, however, the Dyna-Jet can be operated for indefinite lengths of time with no harmful results to the engine.

Waste no time getting the model airborne. A jet engine does not receive proper cooling while stationary. The wing incidence is such that **no** up control should be required to get the aircraft off the ground. Since the model is exceedingly fast, it is sensitive to control movements, particularly in respect to the ailerons. When the model is in the air, gain altitude as rapidly as possible, in order to gain familiarity with the control response at a safe height. All maneuvers should be performed as smoothly as possible. It is a must to think ahead of the model; very little reaction time is available at these speeds!

Stopping: The engine may be stopped by cutting off either its fuel or air supply. For remote control stopping, as might be desired in a U-Control or radio-control installation, it usually is easiest to arrange a simple mechanism to pinch the fuel supply line. Needless to say, the engine generates intense heat, and common sense dictates keeping hands away from the engine until it has cooled.

When the engine stops, apply slight down control to retain airspeed. If your

model is not equipped with a fuel shut-off, be prepared to land at any time. There are no touch and goes with this bird, and when the fuel has been consumed the plane is committed to a landing—period! Landings should be performed in such a manner as to allow a nose-high attitude at touch-down so that the main gear will absorb the initial landing loads.

As a crowd-pleaser and attention-getter, a true jet scale model has no equal.

Getting Started in R/C

(Continued from page 41)

engine drive are common. Power boats include a wide range of types, many are close or exact copies of full-sized boats. RC gear ranges from the simplest (rudder only) to extremely complex. Since weight is not too important a factor in most boats, heavier equipment can be utilized. It's a fine field for the older, larger and heavier control systems, some of which can be had second-hand at low prices. A fair number of boatmen compete in several categories and many engine classes but, again, the sport boatman is the backbone of this field.

RC cars are coming on strong, with more and more equipment suppliers entering the field. As in Pylon planes, the real fun is racing against other cars, although sport running is widespread. The more exotic cars require only three controls—steering, throttle, and gear shift. The centrifugal clutch is common equipment, so the engine may be started and idled without the car's moving. Many cars have some sort of braking, often operated from the throttle servo.

Boats and cars generally require simpler control systems than do many planes—only two or three controls in most cases. RC makers offer such equipment, which is also appropriate for RC gliders and the simpler types of powered planes.

RC spot frequencies in the 27 MHz area, also those on the Amateur 50 MHz band, can be utilized for any sort of radio control model—plane, boat, car or whatever. But the 72 MHz spots are reserved strictly for RC planes of all types.

Stalick on F/F

(Continued from page 37)

a slightly larger fin and more dihedral than the calm-air types.

Still another design configuration is for extreme windy weather. This model would be used in the late rounds when, in many areas, the wind is the strongest. It would feature a relatively low wing aspect ratio of 10:1 to 12:1; a thicker airfoil of the Benedek B-7457d/2 or NACA 6409 variety. CG range would be in the neighborhood of 50%, with very sturdy wings and tailbooms. Windy weather models have relatively large fins and large dihedral angles and are trimmed to fly in tight circles so that they don't drift too far and will stay in any lift that is located.

To summarize: when looking for Nordic designs, the following rule of thumb applies. An A-2 with a strung-out, spindly appearance is primarily a calm-air design, while the more compact the model, the rougher the weather it is designed for.

The recent FAI decision to allow three models per contestant should give the competitor a great deal of latitude in selecting the correct three models for any possible weather variations that might be encountered in the seven rounds of an FAI contest.

A-2 enthusiasts interested in improving their understanding of the Nordic glider should read and study the excellent report by the late Mike DesJardins, published in the July and August 1968 issues of **Free Flight**. These back issues still may be available from NFFS. Another excellent source is the **NFFS 1970 Symposium Report** (See Broadhurst).

Meuser on F/F

(Continued from page 36)

surface spars. Turbulent air stays attached to the wing better and delays stall. Mother Nature knew that a long time before Man tumbled to it, for she provided all owls, and only owls, with wonderfully efficient turbulators. The tips of the barbules, or branches, of the feathers along the top of the leading edge curve outward to form a series of tiny wings projecting into the airstream, each one leaving behind it a miniature tip-vortex. Some say the turbulators contribute to the silence of the owl's flight. Probably they also help produce the high lift essential to the rapid maneuvers by which the owl earns its living. If high lift is essential to the owl's survival, why didn't Ma Nature simply give owls bigger wings? She gave them the largest wing area for their weight of any bird in the business — perhaps that wasn't enough. . . .

Metric Plans: All plans appearing in European publications, and some in the U. S., are dimensioned in millimeters. To prepare full-size working drawings it is not necessary to convert all the dimensions to inches. Just buy a millimeter ruler at the school-supply store or five-and-ten, and make the drawing directly in millimeters. A 6-ft. metric yo-yo ruler can be obtained from Edmund Scientific. Sheet thicknesses will give little trouble if you remember that ¼ in. is a shade over 6 mm. . . .

Cole's Glider Launcher Revisited: Some glider fuselages cannot be gripped firmly by the "hand" of Hank's launcher. (See this column, May AAM.) A two-handed version holds the wing instead. The arms are 50" long, and the strings are set to release the wing-holding rubber bands when the arms are 60 degrees above the horizontal. For a free set of detailed plans, send stamped, self-addressed envelope to Bob Meuser, care AAM.

Broadhurst on F/F

(Continued from page 37)

tains numerous technical papers authored by such distinguished names in modeling as Bogart, Cole, Schwartzbach, Kaczanowski, Krouse, and others. A special feature is the listing and commentary of Bill Hartill's Selection Committee, which had the near-impossible task of choosing the ten best models of the year. Every free-flighter, whether he flies power, rubber, glider or indoor, will find something of value in the 1970 Report. Members of NFFS and AMA can obtain a copy of the Report for $3.50; those not members of both organizations, $4.50. Send check or money order to Annie Gieskieng, 1333 S. Franklin St., Denver, Colo. 80210. . . .

Labor of Love: Dick Mallow (15 Boxwood Lane, Willingboro, N. J. 08046) would like to know whether anyone has undertaken a comprehensive FF bibliography covering the past 20 years. If not, he plans to do one using material from **AAM, MAN, FM** and **Aeromodeller**, covering aerodynamics, construction, trimming and other pertinent information. The data to be cited and referenced would be general in nature, rather than lists of specific planes and plans. "As far as I know," Dick says, "there is nothing like this in aeromodeling. It would fill a definite need. . . . for a coherent body of pertinent and easily obtainable data." . . .

Auto Stab Rig: Former USA FF Team Manager Bill Hartill designed this device (see sketch) for cranking incidence into his Roadrunner FAI Power job. Beam is made from ⅛" magnesium. Weight of complete unit is six grams. . . .

Pussycat: The sleek front-end belongs to Earl Thompson's new, modernized FAI Pussycat. It is the updated version of the design featured in the Nov. 1968, AAM. Model uses Supertigre 15 and features semi-cowled engine, plug-in wings. Thompson held the FAI Power record with it until Jan. 1, 1970.

Tenny on F/F

(Continued from page 36)

lin (USA) and Ron Draper (Great Britain) all joined the Forty Minute Club, and Rieke and Redlin initiated the Forty-Five Minute Club — in this same hangar. With such a good site and such great enthusiasm, the British fliers may well have a strong entry in the 1972 Indoor World Championship. . . .

More Junior Winners: Earlier this year, the Long Island Association of Model Airplane Clubs held an Aeromodeling Awards Dinner. Junior Bruce Pailet was 1969 individual champ, beating out Open flier Bob Lampione (second) and Bruce's younger brother, Barry. Rather than following their father's interests (Jean Pailet is a well-known UC flier), Bruce and Barry earned many of their high point scores

from indoor flying. They often dominate the winner's circle in Junior indoor events, as they did at the LIAMAC Spring Indoor Meet. Barry won first place in Easy B and second in Scale, while Bruce won first in Scale, second in Easy B and second in HLG to become Junior high point winner. The Senior-Open high point winner was Dan Domina, a "graduate" of a youth modeling program sponsored by NIMAS instructor Chester Wrzos. . . .

Contest Note: The LIAMAC (see above) will host its Fall Indoor Meet, Sept. 27, 1970, at the domed (190 ft. dia., 50 ft. high) skating rink at Cantiague Park, Hicksville, Long Island. For more details, drop a card to Bud Tenny, Box 545, Richardson, Tex. 75080. . . .

Model Decoration Hint: It was inevitable — a penny on a Pennyplane! Bill Hannan's twin-fin Pennyplane has its fins made from tissue decorated to look like pennies. Bill suggests that his technique is applicable for any kind of model where lightweight decorations are needed. He says, "I just doped a couple of layers of art store tissue together to increase the stiffness. There is no other structure in the rudders. The Lincoln heads were drawn on with a Pentel pen. They could just as well have been Indian heads." . . .

Speaking of Pennyplane: Multi-talented Dave Linstrum quips that, with inflation, the Pennyplane will soon become the Nickelplane!

Mooney on F/F

(Continued from page 37)

surrounded by empty fields, was an ideal site. As far as a hundred yards from shore, the water was not over a foot and a half deep, so retrieving capsized models was easy. The calm, warm day made wading pleasant, too. Several kayaks were available but, after a few early attempts to use the boats, models were brought back to the takeoff site by eager waders.

Flightmasters' events for RC, UC, FF Gas, and FF Rubber Scale seaplanes had a large number of entries, considering that this was their first all ROW scale contest. All flights were required to rise unassisted from the water to be eligible for the scale judging. Of more than 25 entries, at least 11 managed to make a qualifying flight.

UC was won by Granger Williams flying a Gloster VI Schneider cup racer. Dan Lutz took RC first with a Piper J-95 Cub. Junior Gas went to Dan Lutz, Jr. and his Stinson Reliant SR-6. A WW I Short 184 biplane won Open Gas for Chuck West, and a Tiger Moth on floats took Open Rubber for Fernando Ramos. Unfortunately, none of the several Junior entries in Rubber managed a qualifying flight. Several of them did look interesting, in particular, Jon Hoshizaki's Burgess-Dunne flying-wing biplane.

Probably the finest scale effort was Jack McCracken's Vought O-2U single-float biplane. Just a trifle underpowered, it couldn't quite get up on the step. Bill Stroman, Flightmasters president, had a nice rubber-powered Curtiss Hawk on floats. It was quite stable on the water but, again, it couldn't quite get off.

Models which had qualifying flights were: Gloster VI, Piper J-95 Cub, Stinson Reliant SR6, Short 184, Morane Saulnier Monoplane, two Tiger Moths, Taylorcraft, Westland N-16 biplane, Longster, and Pilatus Porter.

A truly beautiful model was the rubber-powered pusher-puller Savoia Marchetti S-65 racer designed and almost completed by Vic Harden. Shortly before the contest, Vic unexpectedly died of a heart attack, so Kingsley Kau and George Honda put on the finishing touches. Mrs. Hardin brought it to the meet, where initial tests revealed interference between its tandem motors which were too close together. Rather than risk this last beautiful creation of Vic's, it was withdrawn from the flying. . . .

And in the East: Val Dahlem (secretary, Wing Masters Model Airplane Club, Dayton, Ohio) sent the results of the indoor scale meet held at Wright-Patterson Air Force Base. Run by three Dayton-area clubs — WORKS, the Wing Masters, and the Buzzin Buzzards — the meet had 62 entries. AMA scale was won by Bucky Servaites, 1911 Cessna. A Fairchild 24 won Peanut Scale for Tom Stark.

Contests for Open and Junior Delta Darts also were held. Jan Servaites took Open with a 162.3 sec. two-flight total, and Susan Johnson (age 9) took Junior with a 127.1 sec. total.

Marks on R/C

(Continued from page 40)

on the chart corresponds fairly well.

One peculiarity is that weight has not been mentioned. Weight definitely affects acceleration at takeoff, rate of climb, tightness of maneuvers, landing speed, sink rates and the effects of crashes. However, this chart deals with top speed, an area on the airfoil charts of low C lift and low Cdt. Within limits, weight is not a serious variable in this range. Note, also, that the fastest full-size planes, fighters, have high wing loadings and the power to carry them. However, watch that weight for a trainer or you will have a fighter and a fight on your hands.

If this chart does not seem to match your planes, especially stunt and racer types, take clocked speeds and adjust the constant (712) to a higher value, then replot the chart.

Empirical data is always more interesting than theoretical because it shows the spread of data available. Straight lines occur because two of the independent variables are used for the axis. If Vmax versus the BHP function had been plotted, surely enough a cubic would be created. Actually, the plot shown is more nearly representative of the effects of power and drag for a given wing loading,

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Dear R/C Modeler:

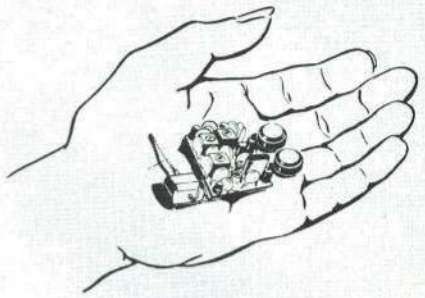
In the August AAM we presented our first "Go-Go Tail" award. This caused some questions: What is a "Go-Go Tail"? Well, our Rudder Only Pulse systems have their rudder (tail) Go first to one side, and then Go to the other side! But they are fully proportional. That simply is the nature of pulse.

This issue we are proud to present our "Go-Go Tail" award of the month to Bob Petro of Bob's Hobby Shop at 8674 Lake Murray Blvd., of San Diego. Bob is one of the founders of the Bushwhackers Pulse Rudder-Only R/C Club--and he is also among many dealers who are finding that the Commander Pulse R/O is the only way to satisfy customer requirements for radio gear for small and light airplanes. Bob says that the Commander Pulse units sell themselves just by simple demonstrations. They are ideal for such planes as the Nomad sailplane, Dick's Dream, Thermic 50X R/C, and others. They will also handle up to .19 and larger powered aircraft.

AND our Commander R/O Pulse Packages come complete with ALL batteries--including airborne nickel cads!

R/O Pulse has great versatility at a very minimum expense. It may be installed from plane to plane or plane to boat, and offers more options than anything else on the market. We have a special R/C Data Sheet covering this, and it is included in our Handbook-Catalog. It is also available separately by sending us a large No. 10 stamped addressed envelope and requesting special Supplement 70-3 titled "E-X-P-A-N-D".

The line drawings above are just to serve as a reminder that Ace R/C is now the prime manufacturer of many of the fine accessory items of the Rand Rack and More-Craft Goodie line. We have rubber grommets (especially selected for servo use), and these are available in TWO needed sizes; VINYL single sided and double sided 3M tapes (the best!) for saddles and mounting--vinyl won't discolor and absorbs little or no fuel; Rand Swing-In Keeper--still the best keeper available; Four different kinds of Rand hinges; Aileron-Elevator Horn Bearings; Metal fasteners of all kinds; Fiberglass tapes in 3 convenient widths; Servo and engine mounting kits; Wing attachment kits and nylon bolts; Hookup wire; Finger guards; etcetera, etcetera! If your dealer hasn't got them--he can get them from his distributor. Or you can order direct! A full listing in our Handbook-Catalog.



A HANDFUL FOR YOUR PLEASURE

For the modeler who has been looking for superhet systems which are ultra light to go into the mini and micro series of airplanes!

Weight of the receiver and the small Bentert is less than 1 ounce, and depending on your battery choice you can keep the weight well under 1¼ ounces.

This is excellent for the mini and micro plane enthusiasts, and also is finding increasing use in the boost glide phase of model rocketry.

We are listing below all of the components that are required for an ultra light weight installation, and you can select your handful of pleasure to fit your application.

The receiver is compatible with our R/O Pulse Commander Transmitter, and this may be had separately or you can add this handful of pleasure airborne package to your present R/O system.

COMMANDER MICRO GEM RECEIVER

The Micro Gem is available in two models. This is a proven design of which thousands are in satisfactory use throughout the world. The receiver measures 1 1/16 x 1 1/2 x 1/2 inches. Weight of the bare receiver less hook-up wires is .5 ounces. With light weight hook-up wire is .7 ounces. Operation is on 2.4 volts with phenomenal range; may be used with 3 volts.

The two models are the DE, which has a double ended output to feed into the Adams style actuator, and the SEB, which is designed for the Bentert type of actuator only.

No. 12K2—Commander DE Gem Rx $31.50
No. 12K3—Commander SEB Gem Rx 30.75
(For the Bentert only)
(Available all 27 MHz except 27.255.)

COMMANDER R/O TRANSMITTER

The foregoing receivers are compatible with our Commander Pulse Transmitters. Requires 9 volt battery of the M1603 type.

No. 11K1—Commander R/O Tx $42.50
(Available all 27 MHz except 27.255.)

BENTERT ACTUATORS

These are single coil units with magnetic return. Small model weighs 7.5 grams and draws 50 ma at 3 volts. Large model weighs 15 grams and draws 80 ma at 3 volts.

No. 14K1—Small Bentert Actuator $9.95
No. 14K2—Large Bentert Actuator 9.95

MALLORY MS76 SILVER OXIDE

Non-rechargeable 1 1/2V. Good for 60-90 minutes with Gem and Bentert. Only 2.2 grams; .46 x .21".
No. 38K32—MS76 Silver Oxide cell, ea. $.50

50 MA BUTTON NICAD

Rechargeable 1.25V. Only 3 grams; .606 x .230". Solder tabs.
No. 38L4—Nicad B50T Button/tabs, ea. $1.39

100 MA BUTTON NICAD

Rechargeable 1.25V. Only 8.5 grams; 63/64 x 1/4". Solder tabs.
No. 38K29—Nicad B100T/tabs, ea. $1.70

2.4V/B100T PACK

Two of above 100 ma cells stacked for 2.4V pack with tabs. Measure 63/64 x 1/2".
No. 38K9—2.4V/B100T Pack $3.65

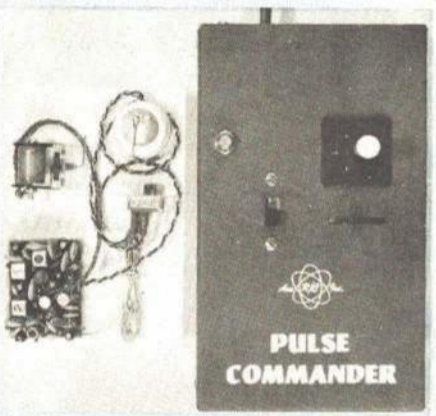
PULSE .. Best Choice for You!

FULLY PROPORTIONAL--BUILT-IN RAND STICK WITH TRIM; ALL BATTERIES SUPPLIED, NICKEL CAD PAK FOR AIRBORNE UNIT; THOUSANDS IN USE

RUDDER ONLY PULSE IS:

* FULLY PROPORTIONAL!
* LIGHTEST--2.5 oz. for Baby
* LOWEST COST--Packages include ALL batteries; Airborne cost pack uses nickel cads for repeatability and dependability; need only recharging.
* SIMPLEST--only one moving part, noise free
* VERSATILE--arrange to suit your particular installation. You can go up in size or down in size. You can even go micro and mini, and not obsolete your transmitter or basic receiver. Simple changes of battery and actuator allow a variety of installations. Motor control can be easily added to larger units.
* EASY to install
* GREAT for Beginners--CHALLENGING to the pros.
* FUN!

WITH ALL BATTERIES!



COMMANDER R/O PULSE PACKAGES

Ideal for Beginners and Sport Flyers

Now available in four sizes!

The Commander R/O packages contain the Commander DE 2.4 superhet receiver, Commander Pulse Transmitter, Adams actuator size of your choice, and nickel cads, wired with on-off switch. AND each package saves you $10.00 over buying components separately.

The R/O Packages are available in 4 sizes for most sporting needs from the smallest to the larger aircraft--or boats. Ready for installation, completely wired and tested.

The Baby is for .010 to .020 jobs. Has two 225 ma Nickel Cadmiums and the regular Baby Adams. Airborne weight is 2.5 oz.

The Twin Baby is for hot .010 to .020 jobs. As above, except uses Twin Baby actuator. Airborne weight is 2.9 ounces.

The Standard uses the Single Adams for more power for .049 to .07 size. Uses larger capacity nickel cads. Airborne weight is 4.5 oz.

The Stomper uses the Twin Adams actuator for up to .15, or can be boosted for use with .19. Airborne weight is 4.9 oz.

(Charging equipment extra)

No. 10G15—Commander R/O Baby pkg. $69.95
No. 10G15T—Commander R/O Twin Baby 72.95
No. 10G16—Commander R/O Standard 71.95
No. 10G17—Commander R/O Stomper 74.95
Available all 27 MHz, except 27.255. Specify.

Thousands of Satisfied Users

COMMANDER CHARGERS

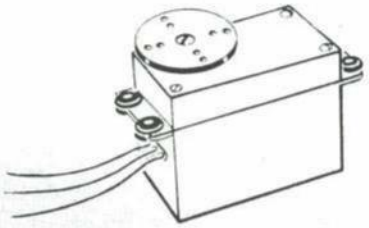
Now chargers of four different kinds as required by the Commander series of airborne units. Baby--25 ma at 2.4 v; S--Standard and Stomper--50 ma at 2.4 v; GG--60 ma at 3.6 v; FP--100 ma at 3.6 v. Assembled.

No. 34K4—Commander Baby Charger $4.95
No. 34K5—Commander S* Charger 4.95
No. 34K6—Commander GG Charger 4.95
No. 34K7—Commander FP Charger 4.95
* Standard or Stomper

VARI CHARGER

If you want a more universal type of charger for your nickel cadmium battery supplies the Vari-Charger has much to recommend it. It features a high quality transformer and will charge up to 5 or more cells in series with up to 150 milliamp current. Charging rate is adjustable from 20 to 150 mils, with easy-to-use chart.

No. 34K21—Ace Vari Charger Assembled 9.95
No. 34K22—Ace Vari Charger Kit 7.95



KEN'S PULSE THROTTLE CONTROL

Manufactured by Ken's R/C this new unit uses a motor driven servo. Designed for high, medium and low throttle on Rudder Only Pulse systems, the control requires only slight modification to the Transmitter. Easy to hook up to airborne R/O Packs--just three wires. Uses same battery supply. Designed specifically for the Commander R/O series of Standard or Stomper size.

Housed in a WE S4 case. Completely wired and tested. Weight only 1¾ oz.

Transmitter modification is simple, since Throttle Control requires a fast pulse momentarily. Kit is available or complete custom factory conversion of your transmitter.

No. 14K69—Ken's R/O Throttle Control $24.95

TRANSMITTER CONVERSION

Kit to allow you to convert your Commander R/O Transmitter for above motor control. Easy to follow instructions.

No. 14K70—Tx FP Throttle Control Kit $3.00
No. 14E71—Factory Custom installation of above unit in your Tx (includes above kit) $6.00
(Postage return paid)

PLANES JUST FOR FUN!

Easy to build, easy to maintain, and low in cost and upkeep, this new breed is fine for beginners. AND more and more of the big plane fliers are joining in on the fun so they can keep their hands in--or teach their youngsters.

To help the Fun Plane along, Ace is offering two plans now. More later. These are full size with enough details to allow almost anyone with just a bit of experience to build and fly. They are designed specifically for radio gear of no more than 3 ounces--and here is where the new Commander R/O Baby Twin pack comes in. Just right and proven dependability!

Rudder-Only does allow you much more than simple steering--you can do loops, spirals, Split S, and many more. You can gain or lose altitude simply by widening or tightening your turn.

DICK'S DREAM

This 34" job is designed by Owen Kampen. Named for the late Dick Adams who developed the magnetic actuators. Essentially this is a scaled down Whiz Kid, but has a few features especially for this size plane. Easy construction. Plans are full size.

No. 13K29—Dick's Dream Plans $1.00

CITABRIA

This semi scale is a design by Roman Bukolt. Has 34" span and features simple slab construction. Another eye catcher at the Toledo Conference. Full size.

No. 13K30—Citabria Plans $1.00

COMMANDER GALLOPING GHOST

Rudder, Elevator, Motor--One Actuator

No. 10G18—Commander Ghost $109.00

COMMANDER FAST PULSE PACK

Rudder, Elevator, Motor--Two Actuators

No. 10G19—Commander FP $139.00

All 27 mHZ frequencies, except 27.225.

NEW HANDBOOK-CATALOG
For the Fun Flyer and Tinkerer

Our NEW Handbook-Catalog is bigger and better than ever. We specialize in equipment for the Beginner, Sunday and Fun Flyer. More items for the do-it-yourselfer; more products from most major manufacturers, in addition to many Ace exclusives. Greatly enlarged HANDBOOK section. Last year this was called "bible for R/C", "a MUST!" by R/C editors. Price is just $1.00 POSTPAID. This is completely refundable on your first order! And that order also puts you on our mailing list for our newsletters and R/C Data Service—acclaimed the world over. You can't lose—send your buck on a round trip today. It could be the best dollar you ever spent!

Important: For overseas delivery on catalog or Binder please add 50¢ for additional postage.

ACE RADIO CONTROL • BOX 301 • HIGGINSVILLE, MO. 64037

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

My BankAmericard #

Guaranteed delivery anywhere. Orders over $5.00 sent prepaid. Orders under $5.00 please add 50¢ for postage and packing.

if the dash lines are observed. It would be interesting to study, on a magnified scale, the variation in performance of some of the current competition models. I have the impression that a powerful, 60 size engine that never misses a lick is mandatory. Why? All such models have about 600 sq. in. of wing area and are powered by 60 engines. This should mean that they are grossly overpowered, but they aren't. If an even slightly poor engine run occurs, the flight is a bust.

The reason lies in a function which is not apparent without examining other facets of performance. As soon as a maneuver starts, the model must generate more lift, as well as provide potential energy in the maneuver. At this point, Cdt contains a factor which is minimized at Vmax, namely induced drag. Induced drag is a function of lift.

With a relatively small wing area, a heavy model and tight maneuvers, quite an increase in BHP is required to maintain the constant speed needed for good maneuvers. That is precisely the makeup of the current competition models: an area of about six hundred square inches and a weight of over seven lbs. What is gained? Smoother flight with less effect by gusts. Frankly, I have the feeling I'm swinging a log on the end of a wire when flying one of them. That ought to stir up enough controversy to last a while!

Siposs on R/C

(Continued from page 39)

built to ROAR specifications. These can be ordered for 25 cents. Better still, get a book which describes the cars, engines, racing, driving, tuning, tools and shop hints, racing activities, clubs, suppliers and racing rules all in one volume. Send $3.95 for "Car Racing by Radio Control," ROAR, 2855 Velasco Lane, Costa Mesa, Calif. 92626. . . .

Shop Hint: Here is a quick adjustment method to make a car run straight with hands off. The wire leading from the steering servo should have in it a kink that can be bent easily. This will make the front wheels point straight ahead in case transmitter trim proves to be insufficient. The kink also serves as a spring to prevent damage to the servo gears in case of a crackup. The servo is resilient-mounted on aileron mounts, which are fastened to the chassis plate with double-backed servo tape.

Lowe on R/C

(Continued from page 38)

them easier and requires less play of the throttle. . . .

Worth Repeating: From the April "Hear Ye" (Valley Forge Club newsletter) comes a warning. It reports danger to the eyes from looking directly into the sun, even for a few seconds. Ophthalmologists unanimously agree that permanent damage can occur to the retina of the eye from direct exposure to the sun for a second or two. Suggested precautions are: (1) always wear good sunglasses when flying when the sun is visible and (2) shut your eyes (or avert your gaze) if your plane sweeps across the sun. You can't see it anyhow and, after all, eyesight is a bit more important than an airplane. Good advice! . . .

RC Ukies: An inquiry from Lt. jg Shaddock, stationed aboard the U.S.S. Bon Homme Richard, is of general interest. He wonders about converting U-Control designs to RC use. Few Ukies can be used directly without modifications. They tend to be small, have high wing loadings and short tail moments. These ships can be flown safely as Ukies because they employ one axis of control (pitch). Some designs, such as Ed Sweeney's Nobler and his combat Voodoo, have been converted to RC use. Years ago I converted a Veco Brave as per Ken Willard's instructions, but I had

only rudder control and it wasn't a satisfying experience. Among the ships adequately designed for this use is Goldberg's Shoestring, which makes a good pylon trainer and, no doubt, a good sport Ukie. Most Ukies employ construction techniques which make them a bit heavy by RC standards. When selecting a Ukie for conversion, consider the following: (1) most such conversions will tend to be hot ships and will not be the best trainers; (2) wing loading must be kept under about 20 ozs. per sq. ft.; (3) tail moments/tail areas should approximate modern RC designs through simple modification.

McEntee on R/C

(Continued from page 40)

Gottorf, (2) Herschel Terry, and (3) Lee Messick. All three are from the Dover, Del., Mosquitos! Modified FAI winners were Walt Good, Gus Geissinger, and Carl Lorber. Several Mosquitos placed high in this event too. A most spectacular "flight" was made by an unknown pilot who broke off half his glider wing 400-500 ft. up. The glider went into a perfect maple-seed auto-rotation, descended at quite a reasonable rate and landed within the spot circle — the judges gave him full spot landing points! The broken half-wing was last seen going up, far to the southwest.

Ten Graupner Cirrus gliders were entered; Good and Geissinger flew theirs to top places, many others placed among the leaders. This kit is one to reckon with in thermal competition. Walt Good was the only one of top placers to utilize a "thermal sniffer." Top placers received unique silver medals and merchandise.

West Coast Gliders Active: The League of Silent Flight is keeping things humming in West Coast glider competition. Based at Santa Clara, California, this group has run both

thermal and slope soaring events. The former are usually held at "Hummingbird Haven," Ted Nelson's full-size glider airport at Livermore. Latest contest, in late May, included three events. Precision — a one-min. flight terminating in a spot landing; on second day, a 5-min. flight followed by a spot landing. Distance — pilots made a maximum number of laps over a measured course within 10 min.; on the second day, scores were based on the best speed for a fixed number of laps over the closed course. Duration — 15-min. max flight time was allowed. Experienced pilots flew in Open category, novices in Sportsman group. Details on LSF, which has worldwide membership, may be had from President Bob Andris, Box 2606, Mission Sta., Santa Clara, Calif. 95051. . . .

Scale Team Manager: AMA President Patton appointed Joe Bridi to act as Team Manager for U.S. RC Scale Team at the 1970 World Championships. Joe, a member of the 1969 RC Scale Team which flew at Bremen, knows the ropes. Maxey Hester, Hale Wallace, and Walt Moucha, who were chosen in competition at the 1969 Philly Nats, are the 1970 team. . . .

FAI 1971 Aerobatic Team: Top stunt pilots in the country are busy piling up points for places on the 1971 U.S. Aerobatic Team (meet probably to be held in England). By mid-June, top placers were: Ralph Brooke, 18.9 points (one meet); Norm Page, 16.2 (2); Roger Hooper, 13.5 (1); Dan Carey, 12.5 (3); William Thomas, 11.2 (2). Point score depends upon place in any Class AA or larger meet; use of a muffler adds 10% to the meet score. If pilot earns his place in Class D Expert (which requires flying to straight FAI stunt rules) another 10% bonus is given. A flyoff is planned for selecting the three team members, plus alternates.

McCullough on R/C

(Continued from page 40)

library of the serious scaler who understands that a correct color scheme is half the battle toward a realistic model. The colors are related to Federal Standard 595 color chips for dope mixing and matching purposes. A complete set of these, available from the General Services Administration (Washington, D. C. 20407) Business Service Center for $2.25, is being used more and more in markings literature as a standard color reference. . . .

Scale Data Sources: Over the years of test and development work at Wright Field, a gold mine of detail photography of most Air Corps and Air Force craft has been filed. Copies of these photos may be obtained from Mrs. Signi A. Impey, Chief, Documentation Div., ASD (ASAD), Wright-Patterson AFB, Ohio 45433. Describe number and type of photos required. Most of those available are closeups of details, structures and parts or views of sections of an aircraft under static test. Pertinent photo numbers will be supplied, 8 x 10" prints are 90 cents each. For a large number of shots ask for copies of the "Parts and Tests" list for the subject. Some interpretation of these is required. A few of the titles are perfectly straightforward — "Front cockpit, left side." Others containing "Assembly" or "Installation" such as "Rudder Frame Assembly" or "Pilot's Seat Installation" will be good. Be wary of those including "Jig" or "Die," they show more of tools than airplane. Pictures of static tests are usually obscured by hydraulic jacks or steel frames but can be useful when short of detail on smaller items such as the landing gear.

Keep your models away from high-tension lines!

Flight in a Phantom

(Continued from page 21)

weather scientists from the National Center for Atmospheric Research (Colorado University, Boulder) was having a similar chamber checkout in about two weeks. My flight was scheduled two days after the chamber ride.

The basic PTU curriculum consisted of one and one-half days spent learning about the effects of high altitude flight, plus half a day in the high altitude chamber. Standard Air Force training films and general lectures by the competent staff helped us absorb the material. After passing a written test, we were given a rigorous "ride" in the chamber. It included rapid decompression, hypoxia recognition, etc. No problems developed in my personal chemistry. I was cleared to fly at high altitudes.

With an official high altitude card in my wallet and my family packed into the station wagon, we headed south toward New Mexico and Holliman Air Force Base. SSgt. Jack Lynch, my contact from the Information Office, greeted me at the gate. He had made arrangements with security to allow my camera equipment on base. From the gate area, we proceeded to Operations where I met my "Flight Crew," Major Steve Kaufman, Captain Dick Swope, and Captain Charles Cotton. Let it never be said that fighter pilots are a shy breed! I'd heard that they like to talk about their profession, and these men were no different.

After an introductory get-together, we went to the simulator area and I was given a one-hour check-ride in the F-4 synthetic trainer. Conversation between the pilots was always lively and they were most courteous to me. As a civilian pilot, they knew I was out of my environment with Air Force. But this didn't slow the discussions, and everything from Piper Comanches to B-52's was covered.

From the simulators we went to Operations where I was fitted with the sexy clothes of the fighter pilot. The big surprise here was my flight suit, decked out in wing patches and complete with my name patch. This made me feel truly accepted. Next came a thorough orientation in egress from the Martin Baker ejection seat and a short session in parachute handling. The time was fast approaching when I would be taken to the flight line.

Final fittings of the oxygen mask and G-suit were completed. Then, we were off! The blue van that transported us wasn't as jaunty as the jeeps of WW II, but we were enclosed and less apt to tumble across the tarmac. The flight line was a beautiful sight to behold! The 49th had a whole gaggle of Phantoms, all decked out in the Southeast Asian camouflage scheme. Our truck pulled up in front of one big bird.

The Phantom is big! The full impact of its size came when I went over to stand beside it. A glance around the F-4D told a few things about the history of this particular plane. For instance, the paint around the intakes was skinned to the bare metal. This only could indicate a few hours of flight at high Mach numbers. The camouflage was inconsistent, and the shades of tan, green and light gray showed signs of chronic weathering. Not more than fifty yards away stood a freshly painted F-4D. What a beauty! The numbers on the fin of our plane indicated the year of manufacture. Above this were large letters indicating Wing assignment. The tip of the vertical fin was painted red to indicate squadron colors.

A flurry of activity surrounded the plane as the ground crew readied her for flight. Staff photographers from the Information Office were shooting pictures. Finally, the word was "climb aboard," and Major Kaufman was first up the yellow ladder. While he was strapping in, I climbed aboard, into the rather cramped quarters of the Radar Operator's seat. The RO's cockpit has complete flight controls and instrumentation for flight, so I didn't feel out of my environment. Our helmet visors were painted the same color as the fin-top; we began to look as though we belonged here. The wonderful noises around the airplane thrilled me.

Anticipation was about to get the best of me when the external power cart started to howl. Soon Major Kaufman's quiet voice broke through as the power came on and radio intercom switches put the system into use. We conversed back and forth about the panel and various RO checklists that I had to complete. The power cart barked. I scanned the panel to see if there were indications of the first start. As the percentage rpm gauge came to life, I knew that something was happening in the engine behind me. First one engine and then the other—ready to go!

Major Kaufman broke silence again by calling the ground control, and slowly the taxi out to the active runway began. Last item on the checklist was to arm the M-B ejection seat. It has the capability of getting a pilot out even on the ground—that helped ease my soul. We taxied into position on the runway, and Major Kaufman went through the procedure of checking the aircraft before takeoff. "Are you all set back there?" came the question. "Rog." "Good, let's go."

The big torches came on and we rocketed down the runway. The feeling is difficult to describe. It is somewhat like riding in the back seat of a dragster. I couldn't have picked a $100 bill off the instrument panel! Finally, we broke from the bonds of Mother Earth. Within the bat of an eyelash, the aircraft shuddered as the gear started coming up. Major Kaufman pointed the Phantom's nose skyward and the "burner climb" was on.

The earth moved away at an unbelievable rate. It's said that a good pilot, in his first few F-4 climbouts, has a difficult time staying ahead of this airplane. Now I know why. Things happen very, very fast. In a burner climb attitude, the aircraft has a tendency toward a nose-high configuration, and the only way to keep it from flying vertically is control and trim. We climbed so rapidly that I had difficulty getting pictures to show sequence.

On reaching 32,000 feet, Maj. Kaufman asked me what I wanted to do. My first inclination was to say, "Fly it,"

but I needed five more shots before taking the controls. After the necessary photos were clicked off, came the words I'll long remember, "First follow me through, then it's your airplane."

"Rog!" The experience was unreal. Stick control was about like the simulator, but now the seat of my pants felt every attitude change. This bird goes where it's pointed! After several sheepish banks, the time had come to get some guts and really fly it. First, a shallow dive. The plane literally rocketed toward the earth. The altimeter showed we were moving—down! A few G's were pulled as I brought the stick back to put the plane into a climb. Again, the only word to use is "rocket." The altimeter wound up and I was jammed back into the seat by the rearward G force.

Since the plane has a very rapid roll rate, I was cautious about the first "On your back" roll. However, I felt confident. No need to worry much about "Top rudder," changes in power, and the like. It went over flat on its back and came right back around again—smooth as glass. One thinks completely in terms of pressure rather than control movement. Not much is needed to effect a change in attitude.

It was time for some more photos. Major Kaufman asked if I wanted to go up to the "Big Sky." Using his phraseology, that's a "Big, Big Ballpark." Trying to be cool and not to show my schoolboy enthusiasm, I agreed. Again things went by very fast. Up we flew. When the negative G indicated we were hitting the top of an arc, I focused on the altimeter and shot the moment we passed through 50,000 feet. Just short of ten miles high!

The next maneuver was equally thrilling. We rolled inverted and shot downward—the beginning of a Mach dive. Earthward we hurtled. The Mach meter passed Mach one and the plane didn't give even an indication that the shock wave was breaking. Faster and faster we went. We passed through Mach 1.5. At the bottom of the dive, as we pulled a terrific number of G's, my G suit really came to life.

I took the plane again for another half hour of fun and games. I did become a little nauseous from continually pulling positive and negative G's. The pilots back at the flight lounge later reassured me that more than one guy has had problems in the back seat of this aerial hotrod. However, since nausea presented no big problem, we continued to fly above the beautiful white sands and colorful mountains of central New Mexico.

When it was time to head back to Holliman, I pointed the Phantom's nose southward. On approaching the pattern, I gave the stick back, reluctantly, to Major Kaufman. He executed the standard military approach and we hurtled past leg one, then two, etc. As expected, the approach was hot! Flaps were extended, then gear. This very clean plane "shuddered" at the thought of putting its dirty barn doors out in the slipstream.

The runway came up at us. The plane did not exhibit any tricky characteristics that might be expected from such a high performance craft. Immediately on touchdown, Maj. Kaufman deployed the drag chute, which had a definite slowing effect on the ground speed. It finally was down to the point where we could taxi off of the active runway. The chute was detached for later pickup. Up came the canopies and the inrush of fresh New Mexico air cooled my face around the oxygen mask seal.

Soon the aircraft was parked in its proper slot. Like an Oklahoma farmboy who just had had his first Jenny ride, I scrambled down the ladder with a grin two feet wide. Smiles and a couple of slaps on the shoulder made me feel as though I had just soloed this wonderful airplane. Aboard the blue van, the pilots continually asked my impressions! Needless to say, I told them. Then came a short trip to Ops, out of the G-suit, off with the helmet and a jog upstairs to the pilots' lounge.

The pilots of the 9th Squadron, known as the Iron Knights, had gathered in the lounge for the ceremony that followed. I was initiated into the "Phantom Phlyers" and the "Mach Busters" Fraternity. It was a simple thing—they tore the "survival sheath" from the inseam of my flight suit and hung it on a light fixture (not unlike tearing the shirt tail off a fledgling that just soloed a Cessna 150). After a couple of pictures we all ambled over to the coffee bar.

This was the experience of a lifetime. The flight in the F-4 was tremendous, but the moments of fellowship with a group of fighter pilots is truly the thing I will long remember and equally cherish. Men like Col. Larsh, Col. Steffens, Major Kaufman, Captains Cotton, Swope and Nelson, all epitomize what this country should be proud of—men of courage, skill and determination to keep America free. It was, indeed, a pleasure and an honor to fly with them, an experience this civilian pilot will never forget.

AMA Contest Calendar

(Continued from page 60)

Races. Site: Club Flying Site. R. Roberts, Jr. CD, 2443 Woodside Way, Chamblee, Ga. 30041.

Sept. 13—Brighton, Wisc. (AA) 27th Annual Midwestern States FF Championships. Site: Bong Field. P. Scotch CD 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: **Chicago Aeronuts.**

Sept. 13—Wausau, Wisc. Annual Wausau RC Sportsmen Fall Fun Fly. Site: Club Field. K. Sparr CD, P.O. Box 441, Wausau, Wisc. 54401. Sponsor: **Wausau RS Sportsmen.**

Sept. 13—Columbus, Oh. CORKS 2nd Annual RC Fun Fly Meet. Site: Columbus. E. Tisdial CD, 2657 Lindora Pl., Columbus, Oh. 43227. Sponsor: **CORKS.**

Sept. 13—Mentor, Oh. MARCS ¼ Midget RC Pylon Race. Site: Club Field. F. Vidmar CD, 26500 Zeman Ave., Euclid, Oh. 44132.

Sept. 13—Salina, Kans. (A) Mid-America RC Meet. Site: Old Salina Municipal Airport. B. Kirn CD, RFD #2, Minneapolis, Kans. 67401. Sponsor: **MARCS RC Club.**

Sept. 13—Queens, N.Y. (AA) Queens Stunt Masters Second Annual CL Meet. Site: Flushing Meadow Park. V. Macaluso CD, 384 Central Islip Blvd., Lake Romkonkoma, N.Y. 11779.

Sept. 13—Alton, Ill. (AA) Illinois Metro-East CL Meet. Site: Civic Memorial Airport. J. Blum CD, 2417 Glen Pl., Granite City, Ill. 62040. Sponsor: **Tri-City Sky Steelers.**

Sept. 13—Fort Wayne, Ind. (AA) Flying Circuits 15th Annual Mid-State RC Contest. Site: Smith Airport. J. Smith CD, 2925 Ridgeway Dr., Fort Wayne, Ind. 46806. Sponsor: **Flying Circuits RC Club.**

Sept. 13—Ohio City, Oh. (A) Club RC Contest. Site: Club Field. D. Kraner CD, RR #1, Ohio City, Oh. 45874. Sponsor: **SHOO Flyer MAC, Inc.**

Sept. 13—Melbourne, Fla. I.R.K.S. Fun Fly. Site: Melbourne. C. Wertz CD, 2415 Floridiane Dr., Melbourne, Fla. 32935. Sponsor: **Indian River Kontrol Society.**

Sept. 13—Sacramento, Calif. (AA) Northern Calif. FF Council Contest. Site: Condors Field (Weagel Field). B. Vanderbeek CD, 630 Ashton Ave., Palo Alto, Calif. 94306. Sponsor: **900 Club.**

Sept. 13—Portland, Ore. (AA) Falcon Invitational CL Meet Site: Delta Park, V. Mathney CD, 75 N.E. Going, Portland, Ore. 97211. Sponsor: **Falcons.**

Sept. 13—Des Moines, Iowa (AA) Model Manglers of Iowa CL Meet. Site: Euwing Park. R. Baldus CD, 1218 68th, Des Moines, Iowa 50311. Sponsor: **Model Manglers of Iowa.**

Sept. 19-20—Tullahoma, Tenn. (AA) Tennessee Valley RC 1st Annual Meet. Site: Coffee Air-Foilers Field. J. Wyatt CD, 502 Young Ave., Chattanooga, Tenn. 37405. Sponsor: **Tennessee Valley Radio Control Club.**

Sept. 19-20—Indianapolis, Ind. (AA) 2nd Annual Indy RC Meet. Site: 30th & Post Rd. J. Goad CD, 10906 Willowmerg, Indianapolis, Ind. 46280. Sponsor: **Indianapolis Radio Control Club.**

Sept. 19-20—So. El Monte, Calif. (AA) Southern California RC Air Races. Site: Whittier Narrows. J. Garabidian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: **San Gabriel Valley RC.**

Sept. 19-20—Newark, Del. Delaware RC Fly for Fun Day. Site: Newark. R. Black CD, 22 Windflower Dr., Newark, Del. 19711. Sponsor: **Delaware RC Club.**

Sept. 20—Valley Park, Mo. (AA) Hot Heads 13th Annual Airplane CL Contest. Site: Buder Park Flying Field. A. Biehl CD, 2195 Bienville Dr., Florissant, Mo. 63031. Sponsor: **Hot Heads MAC.**

Sept. 20—Santa Ana, Calif. (A) Orange County Thunderbugs Club CL Contest. Site: Mile Square Field. T. Spychalski CD, 7437 El Dorado Dr., Buena Park, Calif. 90620. Sponsor: **Orange County Thunderbugs.**

Sept. 20—Warren, Oh. T.C.R.C. 3rd Annual RC Fun-Fly. Site: Club Field. R. Plant CD, 550 Freeman St., Warren, Oh. 44483. Sponsor: **Trumbull County RC Modelers.**

Sept. 20—Frederick, Md. (AAA) 1970 Maryland FF, CL & RC Model Airplane Meet. Site: Frederick Municipal Airport. J. Patton CD, Route 5, Frederick, Md. 21701. Sponsor: **Frederick MAC, Inc., Baltimore Aero Craftsmen, RC Modelers of Baltimore.**

Sept. 20—Hastings, Minn. (AA) 10th Annual Little FF Internationals. Site: Webers Airstrip. W. Anderson CD, 300 Park Ave., Apt. 30, Elk River, Minn. 55330. Sponsor: **Minneapolis Model Aero Club.**

Sept. 20—New York, N.Y. (AA) Assoc. of M.A.C. of Greater N.Y. CL Meet. Site: Flushing Meadow Park —Flying Field. J. Condon, Sr. CD, 89-09 247 St., Bellrose, N.Y. 11426.

Sept. 20—Plymouth, Mass. (AA) Balsa Bugs CL Contest. Site: Plymouth-Carver High School. L. Wirzburger CD, 92 Nicks Rock Rd., Plymouth, Mass. 02360. Sponsor: **North Plymouth Balsa Bugs.**

Sept. 20—Denver, Colo. (AA) Model Museum 8th Annual Fall FF Old Timer Events. Site: East Colfax Air Park. H. Elmore CD, 1326 Geneva St., Aurora, Colo. 80010. Sponsor: **Model Museum Flying Club.**

Sept. 20—Lockport, N.Y. (AA) United RC Pylon Racing Circuit Meet. Site: Niagara County Model Airport. H. DeBolt CD, 3833 Harlem Rd., Buffalo, N.Y. 14215.

Sept. 20—Garden City, N.Y. (AA) L.I.D.S. RC Annual Contest. Site: Mitchell Field. W. Fuori CD, 28 Fernwood Dr., Commack, N.Y. 11725. Sponsor: **Long Island Drone Society.**

Sept. 26-27—Memphis, Tenn. RC Masters Team Selection Finals Tournament. Host: **Memphis RC Club.**

Sept. 26-27—Huntsville, Ala. (AA) 1st All South All Scale FF, CL & RC Meet. Site: Old Huntsville Airport. A. Wilson CD, 1404 Glenwood Dr., S.E., Huntsville, Ala. 35801. Sponsor: **Huntsville Aeromodelers.**

Sept. 26-27—Fresno, Calif. (AA) Fresno's 30th Annual FF Contest. Site: Near Kerman, Calif. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: **Fresno Gas Model Club.**

Sept. 26-27—W. Suffield, Conn. (AA) 6th Annual NCRCC RC Contest. Site: NCRCC Field. R. Bernier CD, 761 Mather St., Suffield, Conn. 06078. Sponsor: **Northern Conn. RC Club.**

Sept. 26-27—Denver, Colo. (AAA) 5th Annual Rocky Mountain FF Championships. Site: East Colfax Air Park. T. Dannels CD, 1265 Yates St., Denver, Colo. 80204. Sponsor: **Magnificent Mountain Men.**

Sept. 27—Brighton, Wisc. (AA) 8th Annual Chicago Aeronuts Fall Old Timers FF Contest. Site: Bong Field. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: **Chicago Aeronuts.**

Sept. 27—Dallas, Tex. (AA) CMC Fall FF Bash. Site: Preston Rd., N. B. Wilder CD, 2010 Boston, Irving, Tex. 75060. Sponsor: **Cliff Cloud Climbers of Dallas.**

Sept. 27—Dover, Del. (AA) East Coast RC Glider Championships. Site: J. Allen Frean School. L. Messick, CD, 23 Brian Ln., Dover, Del. 19901. Sponsor: **Dover Mosquitoes.**

Sept. 27—Valley Park, Mo. 60th Anniversary Air Races for Special Scale events. Site: Buder Park. A. Signorinio CD, 11959 Glenvalley Dr., Bridgeton, Mo. 63043. Sponsor: **Greater St. Louis Modeling Association.**

Sept. 27—Lafayette, Ind. (AA) Lafayette C-J Annual Fall CL & RC Fly-In. Site: Market Square Shopping Center. R. Ramsey, Jr. CD, 223 Main St., Lafayette, Ind. 47901.

Sept. 27—Tucson, Ariz. (AA) Fall Invitational CL Meet. Site: Rodeo Park. F. Townsend CD, 2751 N. Campbell, Tucson, Ariz. 85719. Sponsor: **Cholla Choppers.**

Sept. 27—Mystic, Conn. (AA) SCAMA CL Sweepstakes. Site: Lantern Hill Field. H. Struck CD, RFD #2, Lyme, Conn. 06371. Sponsor: **Southern Conn. Aero Model Association.**

Oct. 3-4—Tulsa, Okla. (AA) Formula Gala RC Meet. Site: Glue Dobbers Field. W. Salnikov CD, Rt. #1, Box 130-C, Coweta, Okla. 74429. Sponsor: **Tulsa Glue Dobbers, Inc.**

Oct. 3-4—Montevallo, Ala. (AA) Birmingham RC Contest. Site: "X" Ranch Field. E. Riley CD, 1924 2nd Pl., N.W., Birmingham, Ala. 35215. Sponsor: **Birmingham Radio Control Club.**

Oct. 3-4—Santee, S.C. (A) Wings & Wheels RC Jamboree. Site: Wings & Wheels Museum. R. Thompson CD, P.O. Box 621, Sumter, S.C. 29150.

Oct. 3-4—Sebring, Fla. (AAA) Hurricane FF & CL Meet. Site: Sebring Airport. R. Fritz CD, 3812 Pelican Ln., Orlando, Fla. 32803.

Oct. 3-4—Jamestown, N.Y. (AA) United Pylon Racing Circuit RC Championships. Site: Winch Rd., Lakewood, N.Y. H. DeBolt CD, 3833 Harlem Rd., Buffalo, N.Y. 14215.

Oct. 3-4—Amarillo, Tex. (AA) ARKS 10th Annual RC Contest. Site: Club Flying Field. B. Irwin CD, 3302 Lewis Ln., Amarillo, Tex. 79109. Sponsor: **Amarillo Radio Control Society.**

Oct. 4—Arlington, Tex. (AA) Ft. Worth Plainesman Fall Annual FF Meet. Site: Arlington. C. Davis

CD, 7612 Sybil Dr., Ft. Worth, Tex. 76118. Sponsor: **Ft. Worth Plainesman.**

Oct. 4—Dayton, Ohio (AA) Cold Cash CL Bash. Site: Municipal Model Flying Field. H. Roe CD, 165 Broadripple Rd., Centerville, Ohio 45459. Sponsor: **Dayton Buzzin' Buzzards.**

Oct. 4—Pittstown, N.J. (AA) Central Jersey 1970 Eastern States RC Championships. Site: Sky-Manor Airport. L. Shulman CD, 42 Blake Ave., Cranford, N.J. 07016. Sponsor: **Central Jersey Radio Control Club.**

Oct. 4—Lincoln Park, N.J. (AA) 12th Annual CL Model Air Show. Site: GSCB Club Field. E. Dickson CD, 36 Vreeland Ave., Clifton, N.J. 07011. Sponsor: **Garden State Circle Burners, Inc.**

Oct. 4—Milford, Conn. (A) Flying Aces Club Fall Meet. Site: Pinkham Field—Orange Ave. D. Scott CD, 66 Bankside St., Bridgeport, Conn. 06606. Sponsor: **Flying Aces Club.**

Oct. 4—Council Bluffs, Iowa (AA) Annual Goodyear & Rat Race CL Contest. Site: Iowa School for the Deaf. H. Hough CD, 924 Avenue I, Council Bluffs, Iowa 51501. Sponsor: **Balsa Busters.**

Oct. 10-11—Taft, Calif. (AA) Califas Annual FF Contest. Site: Gardner Field. A. Vela CD, 11807 Crystal, Chino, Calif. 91710. Sponsor: **Califas Club.**

Oct. 10-11—New Orleans, La. (AA) 9th Annual Crescent City RC Contest. Site: Crescent City RC Club Field. A. Wiltz CD, 3231 47th St., Metairie, La. 70001.

Oct. 11—Ohio City, Ohio (A) RC Club Contest. Site: Club Field. D. Kraner CD, RR #1, Ohio City, Ohio 45874. Sponsor: **SHOO Flyers MAC, Inc.**

Oct. 11—Mentor, Ohio MARCS ¼ Midget RC Pylon Race. Site: Club Field. F. Vidmar CD, 26500 Zeman Ave., Euclid, Ohio 44132.

Oct. 11—Watermill, L.I., N.Y. (AA) Suffolk Falcon's 4th Annual Hydro Meet. Site: Mill Pond. D. McGovern CD, P.O. Drawer E, 140 Wagon Lane, W., Centereach, L.I., N.Y. 11720. Sponsor: **Suffolk Falcon's Club.**

Oct. 11—Sacramento, Calif. (AA) Northern Calif. FF Council Meet. Site: Condors Field (Weagel Field). R. Fallon CD, 2667 61st St., Sacramento, Calif. 95817. Sponsor: **Capitol Condors.**

Oct. 11—Lincoln Park, N.J. (AA) 12th Annual CL Model Air Show. Site: GSCB Club Field. A. Cangialosi CD, 131 Horseneck Rd., Fairfield, N.J. 07006. Sponsor: **Garden State Circle Burners.**

Oct. 11—Vineland, N.J. (AA) Charles Riser Memorial CL Meet. Site: Senior High School. K. Andrews CD, RD 3, Box 260, Millville, N.J. 08332. Sponsor: **South Jersey Aeromodelers.**

Oct. 17-18—Oklahoma City, Okla. Oklahoma Model Hobbie Fair Demo. Flying. Site: State Fair Park. R. McGee CD, 405 NW 30th, Oklahoma City, Okla. 73118. Sponsor: **T.O.R.K.S.**

Oct. 18—Garden Grove, Calif. (AAA) Golden West CL Championships. Site: Garden Grove Park. J. Plaunt CD, 106 S. Monterey St., #3, Alhambra, Calif. 91801. Sponsor: **Orange County Thunderbugs Model Airplane Club.**

Oct. 24-25—Bay St. Louis, Miss. (AA) 5th Annual Dyna-Soarers FF Folly. Site: Bayside Park. J. Pedreira CD, 4658 Redwood St., New Orleans, La. 70127. Sponsor: **Dyna-Soarers MAC.**

Oct. 24-25—So. El Monte, Calif. (AA) Open RC Pylon Races. Site: Whittier Narrows. J. Garabidian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: **San Gabriel Valley RC.**

Oct. 25—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: **Fresno Gas Model Club.**

Ink Pen

(Continued from page 32)

at this point use liquid nylon mixed with equal parts gin to prime the tank. This procedure takes patience, but is not difficult. Normal overflow will prime pipe, air vent and fuel tube. Also the pilot.

Miscellaneous: You will now want to fiberglass your ailerons and install them properly. Be sure to place them a safe distance from the contour gugets, or all your delicate work will be in vain.

At this point, you may notice that you do not have a cockpit. Me and Herman noticed that, also.

Your next procedure is to completely cowl the undercarriage and attach the flotation landing gear. We intentionally made the plans flexible at this stage to give you a chance to develop ingenuity. Just be sure your gear is symmetrical. Brass gears are fine.

Now bond bamboo dowels and trowels in place on hub shafts. Then install under engine mounting plate.

Prop and Stab: You are now ready for the final procedure. Tackle this when you are refreshed, for it demands delicate, **precise** work.

Due to some initial trouble with this craft's tendency to nose-dive unexpectedly in mid-flight, we revised our original concept, bringing the stabilizer forward from where you usually find it and inserting it in the dual fold propeller.

Trace and cut the parts precisely; then, using the finest #1,679 X-acto knife blade, gently carve out the dingles. When the corresponding dangles fit perfectly (no latitude here—we do mean perfectly), use a solution of one part nitro-glycerine to three parts almond paste to insert each dingle into its matching dangle. Follow plan instructions for remaining assembly of propeller. It is advisable to have this rotate around a central axial point to avoid foreign matter gumming up the works.

Once this task is complete, you are in the home stretch.

Now your model must be alternately sanded and sanding-sealer applied for 11 consecutive times (you want it to look nice, don't you?). You are now ready to finish it any way you like. Herman and me painted ours a pretty shade of subdued magenta with trim on the gusset and fuselage stripes in olive drab. Being country folks and fond of color, we also added a dab of orange here and there on the prop and stabilizer. Maybe you city boys prefer more subtle colors. It doesn't matter, for it will wind up black and blue anyhow.

The Maiden Voyage: It may be that you think your completed model looks a little bit peculiar. It may be that you are right.

However, we know you will change your mind when you see how smoothly this lovely bird takes off and literally "flows" into a graceful flight pattern. When she's in the air, there's nothing unladylike about this babe! If you have her rigged properly, handle the controls firmly and have faith in her ultimate capabilities. She will out-perform, outmaneuver and out-class anything on land or sea or in the air!

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MRC-ENYA MUFFLERS For the .15III or .19 V—$3.50—For the .29 IV, .35 III, .45—$5.50—For the .60 III—$7.95
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