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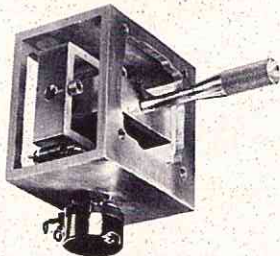


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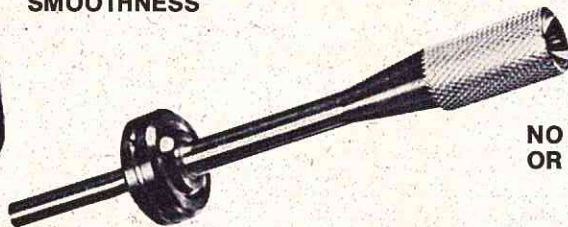
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FROM THE SHOP

BY DON DEWEY

Dear Don & Pat:

I want to express my gratitude for the tremendous effort that RCM has expended in promoting NMPRA in the past years. Especially I want to thank you for publishing the NMPRA Racing Contest Guide and membership renewal ads during 1972.

It is really wonderful that the best and largest model magazine is so intimately interested in exploiting racing. I can remember when you first helped initiate the Goodyear event, and I have followed your work through to the development of the Formula I event and the establishment of the NMPRA.

The pledged support that you have made toward a National Championship Pylon Race exemplifies your intentions to further promote our racing event. I can speak for the NMPRA in saying that we are glowing with excitement about this race. Bror Fabor and I have made some initial plans and I have started to work early to solidify these plans. Therefore, I am enclosing a copy of my President's letter for the December NMPRA Newsletter to keep you informed of the progress. I hope that these plans meet your approval.

Let me again express my extreme happiness and gratitude for your support of the NMPRA. I plan to continue the "open communication link" with RCM that has been established by Bror Fabor.

Call on me anytime.

*Ed Rankin
1973 NMPRA President*

RCM extends its congratulations to Ed Rankin and the new NMPRA officers for 1973. RCM pledges to continue its support for all forms of racing events during the coming year --- a phase of our sport that is one of the most challenging, demanding, and thrilling imaginable.

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RC MODELER

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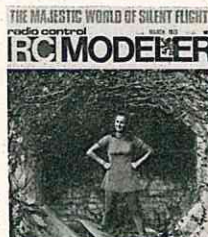
Beverly Calhoun / Pat Johnson

Rita Lord / Sheila Pierce

Jane Wall

VOLUME 10 1973 NUMBER 3

MARCH



THIS MONTH'S COVER

Miss Webber College, Janet Rossman, Babson Park, Florida, tries her hand at being camouflaged along with the Top Flite P-40 kit. Janet's "lines" aren't as easily hid as that of Terry Price's Super Tigre powered P-40. Ektachrome transparency by Ed Okie.

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PLASTICS: SHOW AND TELL

BY RAY HANISCO

PART TWO

**High Impact Styrenes - - -
How to tell them apart from
Polystyrene; their use in
modeling, as well as methods
of bonding and welding
them together.**

"TWANG" --- Plastic Man has just snapped back into your life. Did you absorb that last article? Easy. Right? Well, after your first date with Polystyrene, you now have another date. This time with her sister — one of the "MOD" ones. This gal likes to get kicked around. Her name is "High Impact Styrene." She is a modified grade of the crystal clear type.

If you think of what material would snap back easily, you would think of rubber. Huh?

Now, suppose we shrink ourselves so that we can enter between the molecules of styrene. We look around and see large spheres with thin threads connecting them together. In fact, it looks like a spider had a "ball" in here. These are weak links in a chain of molecules, and can snap apart easily. In our desire to have a better material, we decide to build up its muscles, so we add rubber in a form that will mix with the styrene. This strengthens the links like applying rubber bands between the molecules, so that if they try to separate, the bands make them snap back into place. Now we have constructed an impact grade of styrene. We notice, however, that the surface does not have a high lustrous finish anymore. It's good, but not great.

Again, we find the specific gravity is greater than water, and this material will also sink. When we cut our test sliver, we find the material does not have the tendency to chip as the general purpose material did. It slices into a nice curly type sliver. In many cases you will find the maximum use temperature had dropped slightly. With your pliers, again hold the material by one end and ignite the opposite end. HEY! It burns the same as the general purpose type, with its yellow flame and carbon particles. Blow out the flame, and smell — this time, besides smelling like styrene, you can smell burned rubber.

Impact grade styrene is a cousin to a material you see advertised under the name Cyclocac® which is used in football helmets, lawn mower housings, and automobile parts. It is known as A.B.S. (Acrylonitrile, butadiene, styrene). Don't worry about pronouncing it, just use its initials. From the name, you can recognize the Acrylic family, the rubber family, and the styrene family. This combination now gives a material that takes on a high luster, is tough, and has a much higher use temperature. It, in some grades, is self-extinguishing — in other words, it has a built in fire extinguisher. The results of your tests will show about the same as the impact grade, except, now it has real muscle.

As far as solvents are concerned for these materials, you can use the same ones as for general purpose styrene. In the Hydrocarbon family, choose Benzene, or Toluene. In the Ketone family, we have our choice of Acetone or Methyl Ethyl Ketone (MEK). These materials make pretty good bonds, and should be used carefully and sparingly; otherwise, you will find the styrenes have melted away.

Most of the A.R.F.'s are made of impact grades of styrenes, or A.B.S., therefore, the use of the solvents listed above should work fine. But, remember, try it on a scrap piece first, or you might have a piece of scrap last.

Lately, fiberglass epoxy and polyester A.R.F.'s have been showing up on the market. So, with these you will find the above solvents do not work.

Three things to remember are:

1. Keep solvents away from styrofoam.
2. Use solvents with adequate ventilation. Don't be a sniffer.
3. Solvents are highly flammable — NO SMOKING.

In using styrene for construction, think, plan, be sure before you cut pieces. You want to obtain maximum strength in the solvent cemented joints, and this means to design for maximum surface area.

Figure 1 shows three typical maximum surface joints.

Now, if you are lazy and don't want to shape the joints, do them as shown in Figure 2.

When cementing corners, for maximum strength, try this method illustrated in Figure 3.

When a dressed inside corner fillet is required, or you want to fill a slight error, (that is what I call my sloppy workmanship), cut a bunch of fine slivers, put them in a "labeled" medicine bottle and add enough solvent to make a medium viscosity caulking. It should be about as thick as the aliphatic glues such as "Titebond," or "Securit." With this, and a small paint brush, you can paint in a beautiful fillet that is easily finished.

These styrenes can also be welded with other methods that are much stronger than solvent joints. One method is spin welding. This method requires that one part be spun against another that is held stationary. When the friction of the rotating part melts

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VISION AND THE R/C PILOT

BY CDR. A. STEINBERG, MSC, USN

**WHILE WE ARE CONCERNED WITH SUCH CONSIDERATIONS
AS SERVO RESOLUTION AND RECEIVER
SENSITIVITY, WE BLITHELY IGNORE OUR MOST
IMPORTANT FLYING ASSET,
OUR VISUAL RECEPTORS!
HERE'S HOW TO AVOID IMPAIRED VISION.**

Without a doubt R/C fliers are really a breed apart from the general population, especially in the way in which we pay great attention to the most minute details. After all, operating R/C aircraft is a very difficult and demanding undertaking, and for that reason we do our best to eliminate as many "gremlins" as possible. It constantly amazes me to see how we can allow ourselves to be concerned with such considerations as servo resolution and receiver sensitivity, while we blithely ignore our most important flying asset, our "visual receptors." After all, it is our eyes which inform us what our airplane is doing. Our eyes supply the brain with the information needed to properly control the airplane, so it becomes apparent that we need the very best vision we can obtain. There are enough strikes against us in this hobby without our trying to function with sub-standard vision.

If you have not had your eyes checked in the past two years, and preferably in the last eighteen months, by all means, go to your eye doctor and get it done immediately. I do not

think any of us would consider this a very taxing requirement. Be certain to tell your doctor about your hobby, and that it involves lengthy periods of staring at a small object in the sky. Also, let him know that you spend long hours huddled over your workbench doing exacting close work with small parts. Give him as much information as possible, because the odds are that if you do not wear glasses now, he can provide you with prescription glasses that will improve your vision and your ability to operate your R/C airplanes. Even if you wear glasses now, there is probably room for improvement, as we shall see later on.

Just because you were told you had 20/20 vision when they tested your eyes at the Motor Vehicle Bureau, do not assume that meant you do not need glasses. 20/20 vision merely means that at 20 feet you can see what a normal person sees at 20 feet. 20/40 means you have to move into twenty feet to see what a normal person can see at forty feet. By this example, you can see that a person with 20/40 vision sees clearly only about half as far as a person with 20/20 vision. And yet,

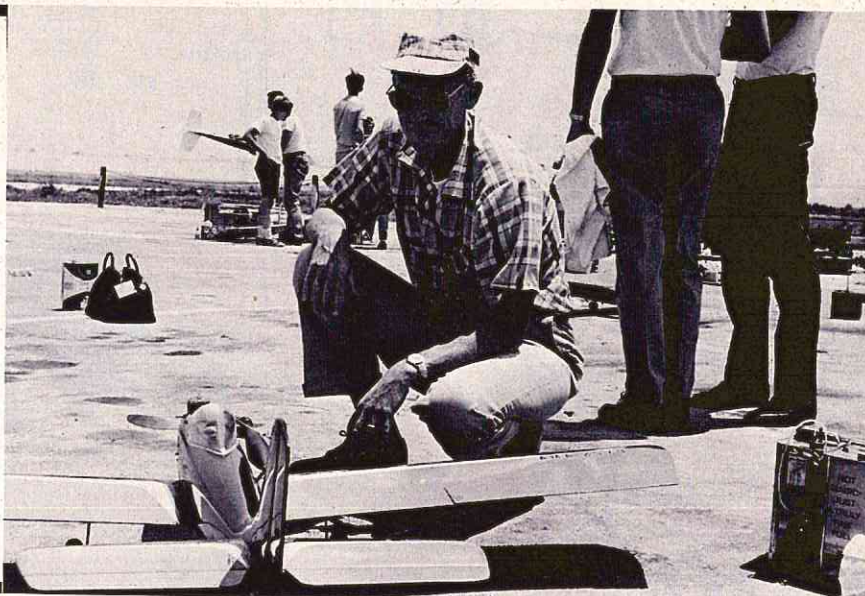
many states require only that you have 20/40 vision to operate a motor vehicle without glasses. Perhaps you can manage driving a car with 20/40, but that vision is certainly inadequate for R/C flying. The safety considerations of good vision are obvious as regards danger to spectators and other R/C fliers, but what about the possibility of a fly-away, or disorientation, or other pilot errors caused by defective eyesight? How about glider pilots who fly at much higher altitudes than power plane enthusiasts? Why risk the loss of your pet airplane and equipment, or even more important, endanger the safety of others, when a simple thing like corrective glasses will substantially improve your flying skills?

Let us return to our discussion of 20/20 vision. Earlier we explained the meaning of 20/20 vision in simple layman's terms, but for those of you who have further questions as to what it means, another and more scientific definition is that 20/20 vision pertains to the ability to discriminate an object which subtends a visual angle of five

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engine clinic

By
Clarence
Lee



This past month I received a phone call from John Brodbeck, Sr., the big boss at K & B Manufacturing. John had been receiving quite a few phone calls and letters lately from modelers wanting to know if they had made any changes to their Supersonic fuel line, Supersonic 100, in particular. It seems that with the use of mufflers becoming more prevalent, modelers are having more trouble with varnish and carbon build up, and naturally associate this with the fuel they are using. Although it is the lubricants in our model engine fuels that do cause the varnish and carbon build up, the use of a muffler greatly speeds up the formation of these deposits. Many people do not seem to be aware of this and their first thought is that some change has been made to the fuel they are using, especially when they start to use a muffler for the first time. John wanted to assure me that no changes have been made to Supersonic 100 and asked that I mention it in this column so that modelers will know, and help with some of the correspondence John has had to answer.

The castor oil in our fuels is the main culprit responsible for the carbon and varnish formations. As long as we must use oil in our fuels for lubrication there is no way of getting away from the varnish and carbon build ups. When you use a muffler on an engine the increased back pressure and heat at the exhaust outlet increases the rate at which the carbon and varnish build up. Naturally the more efficient the muffler, as far as back pressure and heat, the less it will effect the build ups. A partial solution to the carbon and varnish problem has been the use of synthetic oils in some of our fuels.

Synthetic oils have considerably less varnishing action. However, many of your synthetic oils have other shortcomings such as higher operating temperature, lower film strength, etc. Probably the best of the synthetic oils for use in model engine fuels available at present is the Klotz Special Formula oil. This is what K & B uses in the Supersonic 500 and speed fuel with very good success. The 500 is highly recommended for muffler equipped engines. The 500 is the same formula that I have personally used myself for about four years now so I can attest to its performance qualities.

Along the synthetic oil line, K & B, in conjunction with one of the countries largest chemical companies, have been developing a new oil expressly for use in model engine fuels. Where, as other synthetics have been developed for other uses and adapted to model use, the new oil being developed by K & B is strictly for model engine use. The chemical company, which K & B naturally prefers to remain anonymous at this time, has a \$1,000,000 laboratory set up expressly for developing and testing new oils. Breakdown and endurance tests are being performed using model engines supplied by K & B during this oil development program. Field tests on the new oils are also being conducted at this time. In fact, at the Winter Nats in Arizona which just concluded as of this writing, quite a few of the Formula 1 pylon racers were using the new oil in K & B speed fuel. If it holds up under the grueling conditions required for racing engines, you can bet it will most certainly stand up under normal sport flying conditions. So by the time you read this column it is

quite possible K & B will be using the new oil in their Supersonic line of fuels. The racing fuel and 500 to start with, which already use the Klotz, and then the 100 which has always been castor based. The new oil will not only be used in the K & B fuels but will be sold separately for home brew use, etc.

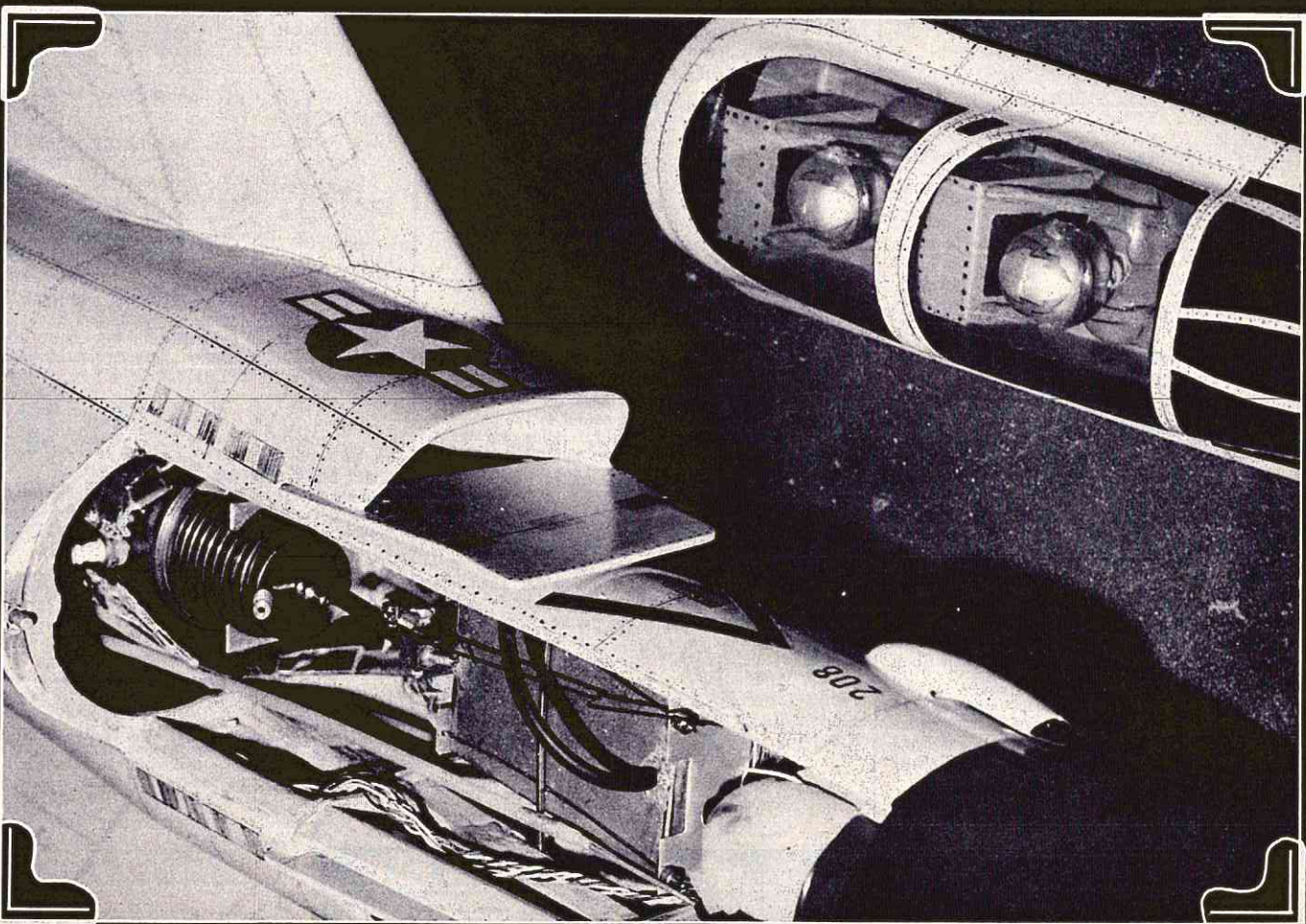
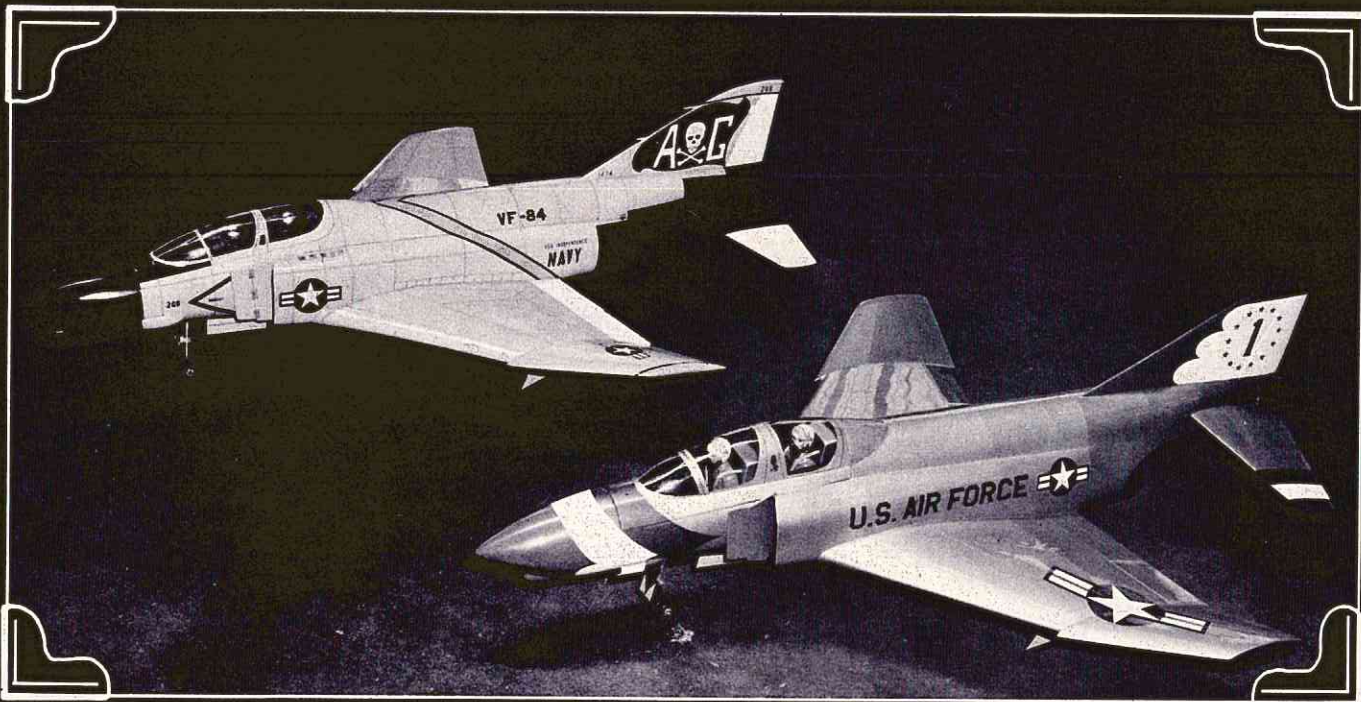
Getting back to the problem of carbon and varnish build up, I receive many letters every month from readers wanting to know what can be done to alleviate this problem. Can something be added to the fuel that will help such as some of your automotive additives, etc.? I am afraid there is not much that can be done. I have yet to find any of the automotive additives that help much in any way. These additives were formulated to work with petroleum based oils and seem to have little effect in our engines. Some of the products, if poured straight down the carburetor while the engine is running, will remove a small amount of varnish evidenced by the brown color of the exhaust oil residue, but this only lasts for a few flights. In no way do they clean the engine bright and shiny as new. There is only one way this can be achieved and that is by disassembling the engine and cleaning with a SOS pad and water. External varnish and goop can be cleaned from the head and hard to get into places, such as the exhaust stack, with Sunbeam Metal Kleen available through Sunbeam appliance dealers or larger super markets. This can also be used to clean the internal parts, but it is usually quicker and a better job can be done with the SOS pad on the really baked on deposits on the top of the piston, inside of the head, etc.

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A Page From Dick Tichenor's PHOTO ALBUM

A MAGNIFICENT R/C SCALE RENDITION OF

A pair of F-4 Phantoms by Juan Martinez and Sam Aragon. Navy version by Martinez and USAF model by Aragon. Both models are DynaJet powered and have successfully flown - - - would you believe they are fast!



BASIC SAILPLANE DESIGN

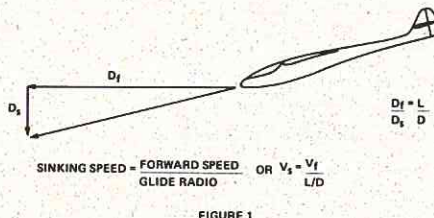
BY PRESTON ESTEP JR.

PART II: CALCULATING PERFORMANCE

A comprehensive series of articles on basic sailplane design, force factors, and computerized sailplane performance data.

In Part I we produced a stable, controllable airplane. However, this just brings us to the beginning of the real work. Now we have to make it fly like a sailplane (after all, anything will glide — but soaring is another thing). To do this, we have to control two main parameters: Glide ratio and sinking speed.

Glide ratio is equal (at least for our purposes) to the Lift/Drag ratio of the airplane. Sinking speed equals the forward speed of the plane divided by the glide ratio. This is easy to see from Figure 1.



Fortunately we can calculate forward speed from the standard lift

formula, making only a few reasonable assumptions and easy measurements. In addition, we can calculate Lift/Drag ratio and although some guesswork is involved, you will see that the calculations are extremely informative.

The forward speed is a function of the wing loading and the Coefficient of Lift at which the plane is flying. If loading (W) is expressed in oz./sq. ft., the relationship is

$$V = 7.21 \sqrt{\frac{W}{C_L}} \quad (\text{ft./sec.})$$

This explains why adding weight speeds up the plane, and why up elevator slows it down (remember from Part I how the elevator trim sets the operating C_L of the wing). Notice that doubling the wing loading of the plane will increase your flying speed at a given trim angle by 41%. To double your speed you must quadruple the weight of the plane. Much more will be said about this in the section on slope racing; to give you a preview of that part, let me say that a lifting airfoil (e.g. 9% Clark Y) with a high enough loading will fly substantially faster than a fully symmetrical airfoil at the Reynolds numbers at which we operate, if the plane is heavy enough and properly trimmed. We'll discuss this in much more detail later.

Another conclusion which we can draw from the preceding formula is that the slowest speed obtainable from our plane at a given wing loading will depend upon the maximum C_L of the airfoil. Since sinking speed decreases with forward speed, it would seem that a super high maximum C_L is the key to soaring success, and it is true that it is a meaningful factor. But we're only looking at the lift side of the picture. Drag increases with C_L — so we better have a look at how drag is computed.

Total drag is the sum of parasitic drag and induced drag. Parasitic drag includes the profile drag of the wing (CDO) plus the drag associated with the fuselage, tail, loosely flapping pieces of torn fabric, struts, wire, wing-walkers, etc. It is possible to look up the airfoil profile drag in a book, but the balance has to be measured on a wind-tunnel, or estimated. However, since we have plenty of airplane still-air test data, we can make a "guess-timate" which serves the purpose, and as you will see, this method serves well to at least establish the relative theoretical still-air performance of many designs.

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Dave Gray of Du-Bro Products demonstrates Du-Bro's newest R/C helicopter offering, the O & R powered Hughes 300. This fourteen pound machine is one of the best choppers we have seen to date. Features include a pull starter, 'nut-and-bolt' construction, and an extremely quiet engine.



The close-up views of the Du-Bro Hughes 300 evidence an extremely well-engineered helicopter where all parts are easily and quickly replaceable. The O & R 1.2 cu. in. power plant provides power to spare along with maximum efficiency and reliability. Dave Gray's demonstrations included hands-off flight.



One of the highlights of this past month was the Southern California visit of Dewey Broberg and Dave Gray of Du-Bro Products, one of the nations major manufacturers of radio controlled helicopters and general R/C accessories.

Although primarily a business trip, Dewey and Dave managed to stage demonstrations of their Whirlybird 500 as well as their new Hughes 300 helicopter at the Los Angeles Model Airport at Sepulveda Basin, California. In addition, flight demonstrations were made at the RCM site with both the new Hughes 300 and the smaller Du-Bro rigid rotor helicopter.

The new Du-Bro model of the Hughes 300 is a 14 pound helicopter with an O & R 1.2 cubic inch displacement engine which has been custom built for this particular machine. Complete with pull starter and muffler, this O & R engine, which has been converted to glow plug operation, is ideal due to its relatively low rpm, its rapid starting characteristics and its quiet operation. The helicopter, itself, is a semi-scale model that is truly "the modelers chopper." By this we mean the new Hughes 300 is a "nut and bolt" machine which can be built in less than two days by the average modeler. Thus, any part that is damaged during training sessions can be easily replaced without sustaining any extensive damage as with a helicopter featuring an all fiberglass fuselage. In addition, there is adequate room for any proportional system currently on the market today. The flight characteristics of the 300 is excellent, to say the least. Dave Gray, during his demonstration flights for the RCM Editor and Technical Editor, demonstrated such items as 75 to 80 mph "pylon" flight, sustained hovering at any altitude, stall turns, as well as many maneuvers we had not seen done in the past with a model helicopter. Be sure to watch the forthcoming issues of R/C Modeler Magazine for an exclusive step-by-step construction sequence on the Du-Bro Hughes 300.

If you had never been completely enthused about R/C helicopters, or only had a latent desire to build one, a demonstration by Dave Gray of either the Whirlybird 500 or their new larger machine will create an interest that is almost impossible to contain. But, as Dave stated to us — "If you only want to fly helicopters, you probably won't do it. If you really want to fly one, you can."

In other words, learning to fly a helicopter is an entirely new experience and is not predicated upon how much experience you have as a pilot of a radio controlled fixed wing aircraft. The advanced flyer and the beginner start at the same place and a great deal of perseverance, patience, and attention to minute details is required if you want to learn to fly one of these machines. As a matter of course, we would strongly recommend that you learn to fly with the Du-Bro Whirlybird 500 before you attempt one of the larger machines. Any accident, such as cutting the throttle in a panic situation (which will cause a helicopter to fall out of the air) would only cause minor damage to the smaller Whirlybird, whereas the 14 pound Hughes would be "bent" in all directions at once!

What it all boils down to is a strong desire to fly an R/C helicopter successfully, and the patience required to put in at least a half hour of practice each and every day of the week for several weeks until you have mastered the art of hovering the machine. Once this has been accomplished, you have overcome the biggest hurdle of all and from then on it only requires practice and more practice. But, you won't be able to do it overnight. It is going to take time, it is going to take patience, and it is going to take ability to survive the

PREVIEW:

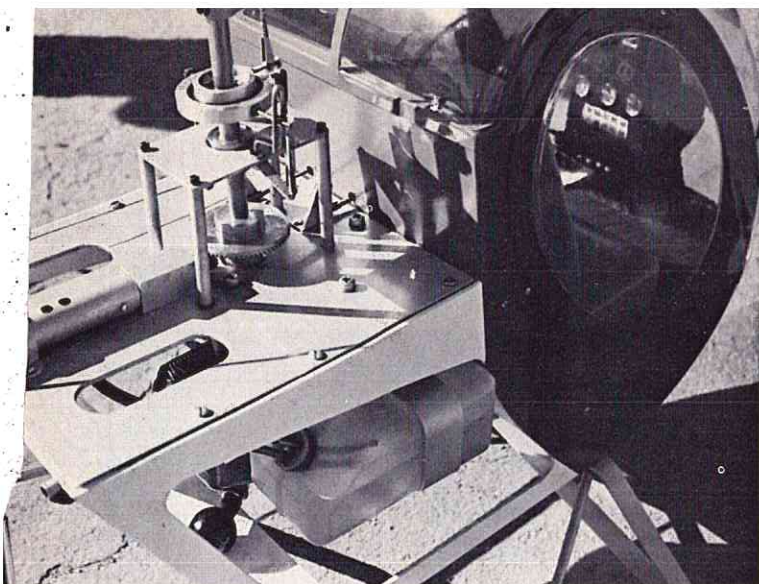


THE HUGHES 300

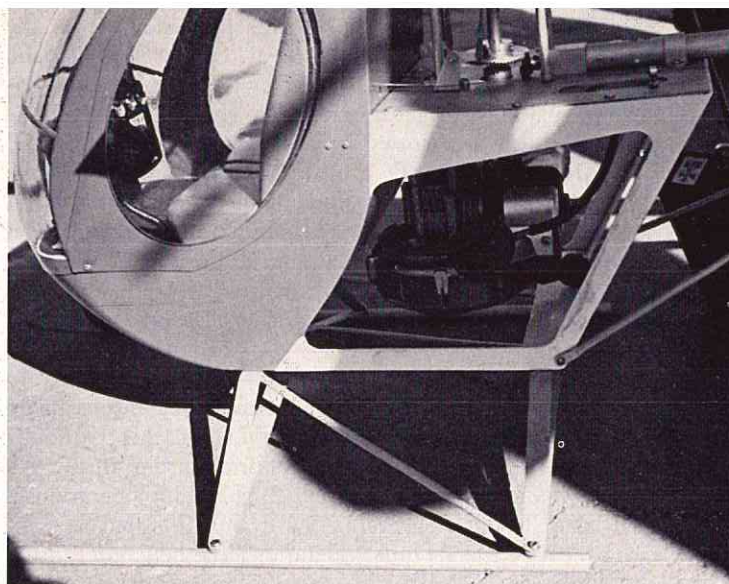
**SOUTHERN CALIFORNIA FLIGHT DEMO'S OF
NEW DU-BRO CHOPPER EVIDENCE RAPID
GAINS IN STATE OF THE ART.**

PHOTOS BY BILL O'BRIEN AND DON DEWEY

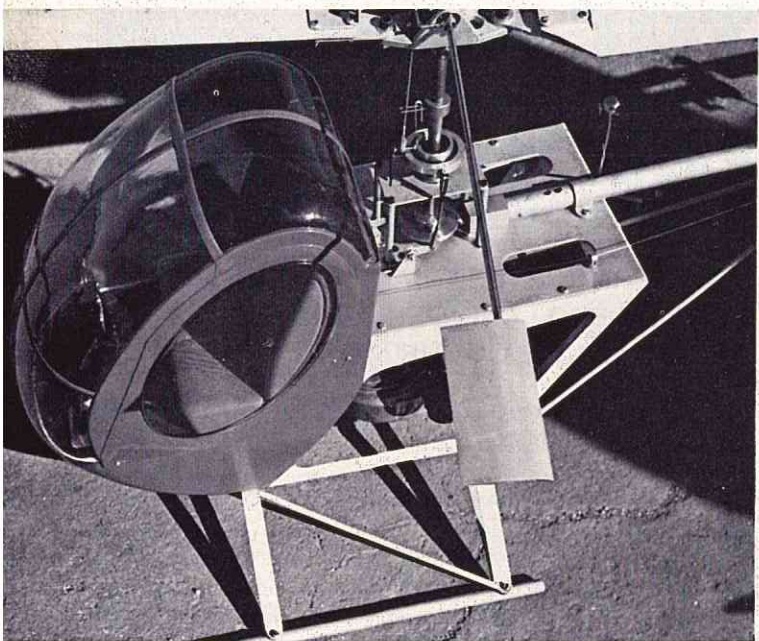
initial discouragement that you are bound to entertain during the learning curve. There is nothing more frustrating in learning to fly one of the small Whirlybirds than to see it thrashing around on the ground like a wounded rat with the consequence that you have to replace the main rotor blades due to your inability to maintain the helicopter in a hovering position. But, you can learn to fly them and, regardless of what you may have heard to the contrary, it is not easy now and it's not going to be any easier in the immediate future. It requires dedication and perseverance. When you see a helicopter pilot like Dave Gray, or Dieter Schluter, fly one, it looks all too easy. Believe me, it isn't! It is going to require a degree of dedication and perseverance and that you have not had to put forth before in this hobby. Fortunately, and thanks to individuals like Dewey Broberg and Dave Gray from Du-Bro Products, you have available to you an excellent training machine and an outstanding full blown helicopter such as the Hughes 300. If you have the desire and are willing to expend the time necessary to learn to fly, these machines can do it for you. This article is composed of photographs taken at Sepulveda Basin and at the RCM test flying site of both the Whirlbird 500 and the Hughes 300. We hope that they will stimulate your interest in R/C model helicopters and we look forward to presenting an exclusive step-by-step construction feature on one of the worlds finest model helicopters - - the Du-Bro Hughes 300. □



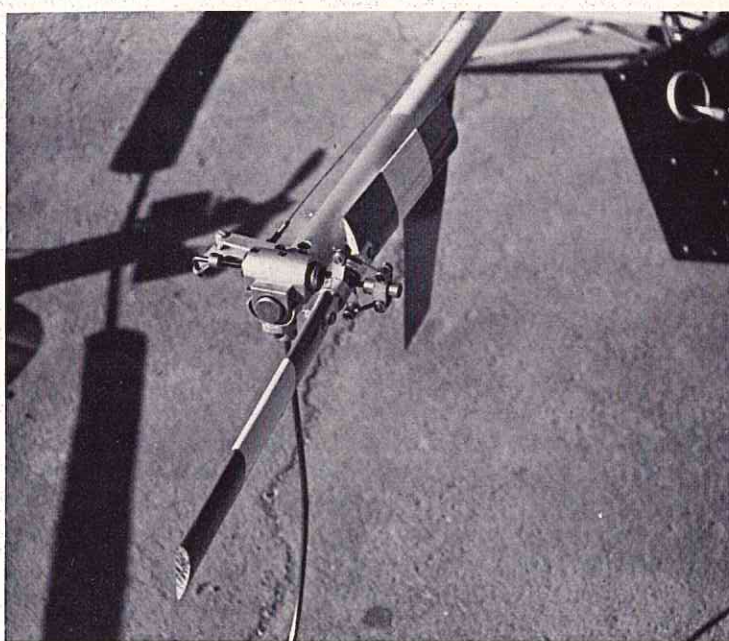
Close-up of pod and main shaft base. Note boom attachment. Sullivan fuel tank under base plate next to O & R engine.



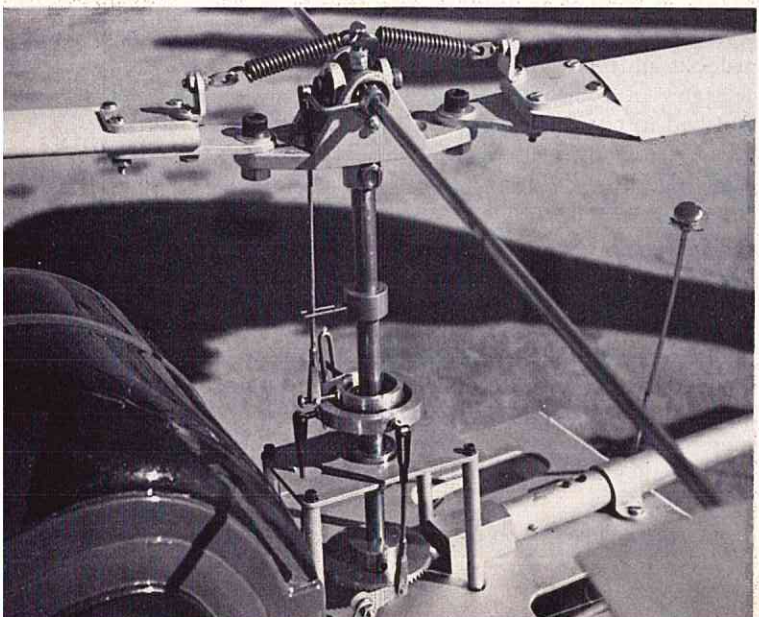
Pod is constructed of plywood and balsa with four piece butyrate "bubble." Vacuum formed seats and instrument console.



ABOVE: Three-quarter top view showing rotor flybar and flybar weight. BELOW: View of main rotor mechanism.



ABOVE: Close-up of tail rotor, boom end, and tail skid. BELOW: Dave Gray flying Hughes 300 at Sepulveda basin.





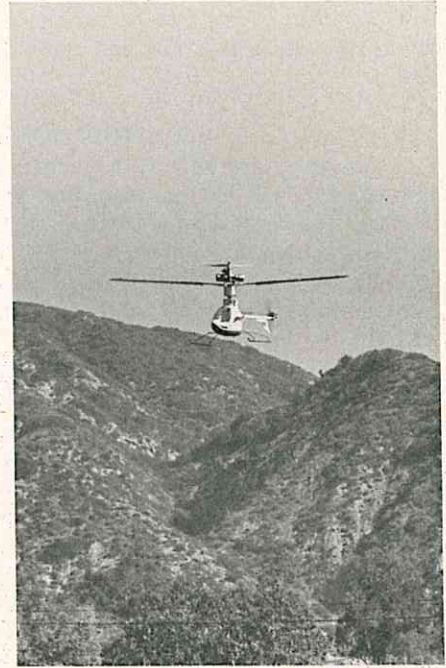
Days flying activities at RCM's flying site included a visit from one of the Pasadena Police Helicopters. Dave had first R/C helicopter mid-air at '72 Nat's --- could an R/C helicopter citation be another 'first?' 14 pound Hughes dwarfed by Pasadena's Enstrom.



Dave Gray hovers Whirlybird 505 at RCM's flying site. Little machine excellent for training but surprising in performance.



Despite gusty winds, the Whirlybird performed beautifully. Time and perseverance are pre-required for helicopter flying.



A beautiful shot of the Du-Bro 505. Learn to fly it before progressing to the bigger ones.

Mickey Mousetang is a pattern aircraft designed to take advantage of the current breed of high performance .40 cubic inch engines. Mickey's styling, a very liberally translated (i.e. Mickey Mouse) version of a racing P-51 Mustang has brought about its name.

In the air, Mickey Mousetang is a fast, sensitive, and neutral flier. Mickey is very streamlined owing to its general lines and a somewhat thin airfoil with a sharper leading edge than is normal for a pattern ship. At the same time the airplane shows no tendency to stall on landing approaches (one such stall per plane is all you usually get).

The tail-dragger arrangement may cause some concern to those who are used to tricycle landing gear. However, the wide stance main gear and the short steering moment of the mid-body tailwheel make the Mousetang very controllable on the ground both for taxiing and take-off. Besides, neither Mustangs nor Mousetangs look right with tricycle gear.

I have almost been convinced that for radio controlled flying Murphy's Law should be amended to read, "Even if nothing can go wrong, it eventually will." This cautious approach influenced the choice of the simple tail-dragger landing gear and dictated the use of a removable one piece engine cowl and tank compartment hatch. Removing this unit exposes the engine and tank to ready inspection and maintenance. The engine is side-mounted since such an arrangement minimizes vibration transmitted throughout the airframe. In addition, such a side-mounted engine is used since it certainly looks better than an upright engine while an inverted engine could idle unreliably. As luck would have it, all of this caution has proved justified. However, the removable cowl/tank compartment hatch, as originally held down, tended to be a bit too removable and would come loose in flight. The scheme presented here holds the unit firmly in place.

In spite of all this philosophizing, Mickey Mousetang is a fun airplane which can win in pattern contests (yes, even with a .40!). It can also be used to advantage as a Sport Pylon racer since it is fast and turns on a knife-edge quite well.

CONSTRUCTION

Mickey is not difficult to build and, if you like carving and sanding, will be fun when you get to completing the fuselage. The wing and tail surfaces are very straightforward. All wood used in the model can be the soft to medium grades without sacrificing needed strength. Hobbypoxy Quick-Fix glue was used, where practical, to speed building time.

WING:

Begin by cutting the foam cores, ensuring that the wing upper surface is perpendicular to the root and tip patterns. In this way, little truing-up will be necessary prior to joining the wing panels in the flat top wing configuration. Dihedral is formed by the root to tip taper on the bottom wing surface. Cut out the servo area, the full depth spar slot, and the maple landing gear block area. The latter two operations will leave a floppy section at the foam core leading edge which must be made rigid prior to sheeting the core. Epoxy soft $\frac{1}{4}$ " square strips at the top and bottom of the spar slots to provide this strength. Epoxy the maple landing gear blocks and the $\frac{1}{4}$ " sheet rear spars in place. Trim the wood and sand the cores smooth, vacuuming afterwards to remove all foam and balsa dust.

Cut a slightly oversize piece of $1/64$ " plywood to wrap completely around the wing panel. On the inside of the wing

skin mark the location of the wood pieces glued to the wing core. Apply epoxy on all wood to wood joints and a foam compatible contact cement on the wood to foam joints (Weldwood "Super" water soluble contact cement is excellent). After wetting the outside of the skin leading edge area with warm water, wrap the skin around the core from trailing edge to leading edge to trailing edge. Trim the plywood and sand the wing panels to final outline.

The wing panels should now be joined. First, cut a wing joiner from $\frac{1}{4}$ " sheet balsa and groove each wing core root for the front locating dowel. Using a slow curing epoxy glue such as Hobbypoxy Formula 2, join the wing panels upside down on a flat surface. Tape the center section to contain the oozing glue. When this has cured, tack glue $3/8$ " x $1\frac{1}{4}$ " strips to the trailing edge and razor plane and sand to shape. Glue on the fixed trailing edge pieces after mounting aileron horns at wing center. At this time, line the servo compartment with balsa. Glue on and sand wing tips to shape. Cut away plywood skin at the maple landing gear block grooves.

The wing locating dowel, $1/16$ " plywood leading edge face, $\frac{1}{4}$ " rear hold down bolt hole, fiberglass tape reinforcing of the center section, and the scoop and fairing are not added until the basic fuselage structure is built.

Bend the main landing gear struts from $5/32$ " music wire and cut the skirts from $1/16$ " plywood. These skirts are attached with screws tapped into metal plates soldered to the struts.

TAIL SURFACES:

The fin and rudder are cut from $\frac{1}{4}$ " sheet and sanded to the shape shown on the plans. The elevator halves are cut from Sig $\frac{1}{4}$ " x 2" tapered stock and joined by $\frac{1}{4}$ " dowel. Sand to the shape shown.

Build the stabilizer in a fashion similar to that used for the wing except that the stabilizer leading edge is a carved $\frac{1}{4}$ " x $3/8$ " strip. The stabilizer halves are joined with their trailing edges on a flat surface.

FUSELAGE:

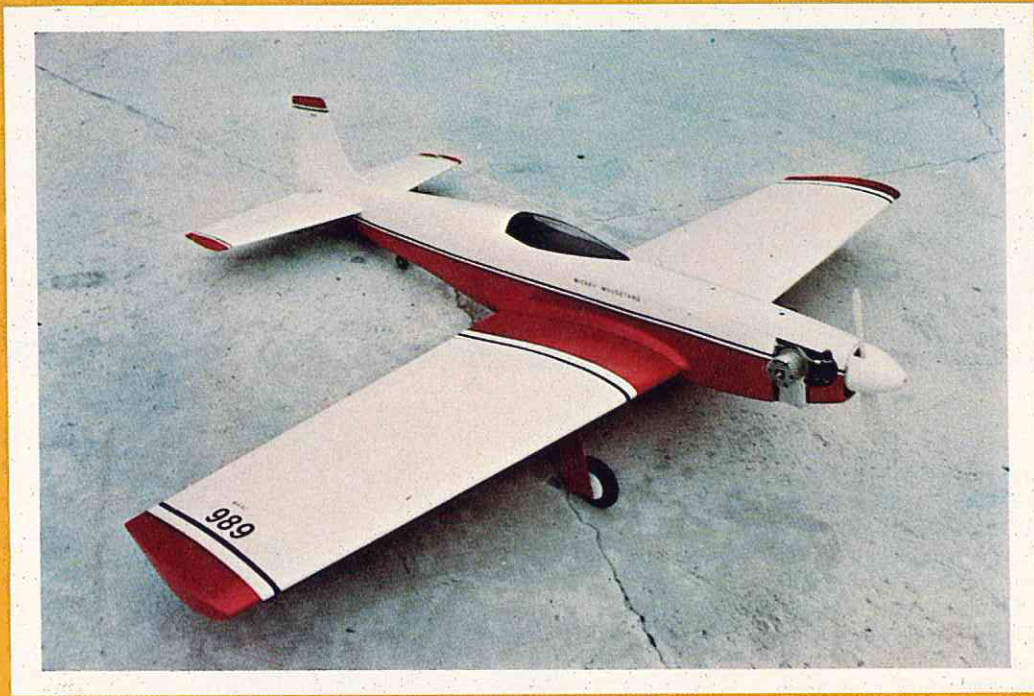
Begin construction of the fuselage by cutting out all parts. Then assemble the left and right hand sides. Note that to simplify carving the fuselage to shape the plywood doubler is not carried to the top edge of the fuselage side. Also, notch the $1/8$ " x $1/4$ " bottom longeron now to accept the tail gear mounting plate later. Plan the location of rudder and elevator pushrods and cut appropriate slots in the sides. Drill all engine mounting holes, fuel line exits, and throttle cable holes before assembly. Also install blind nuts in the firewall and coat the tank compartment area of the fuselage sides and the firewall inside surface with epoxy glue. Assemble the sides and bulkheads upside down over the plans. The $\frac{1}{4}$ " sheet tail reinforcing fill is not cut away at the stabilizer slot until the top planking is glued in place and sanded to shape.

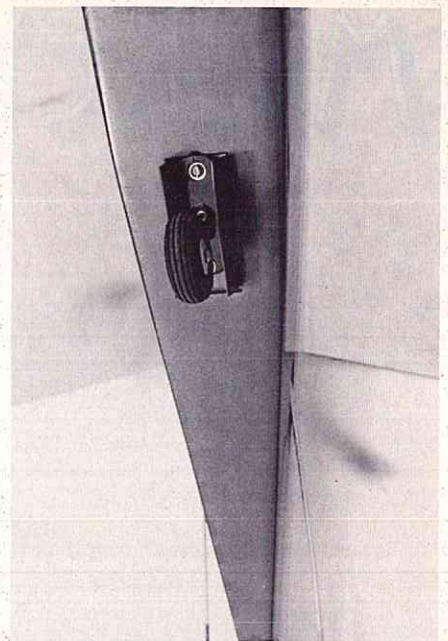
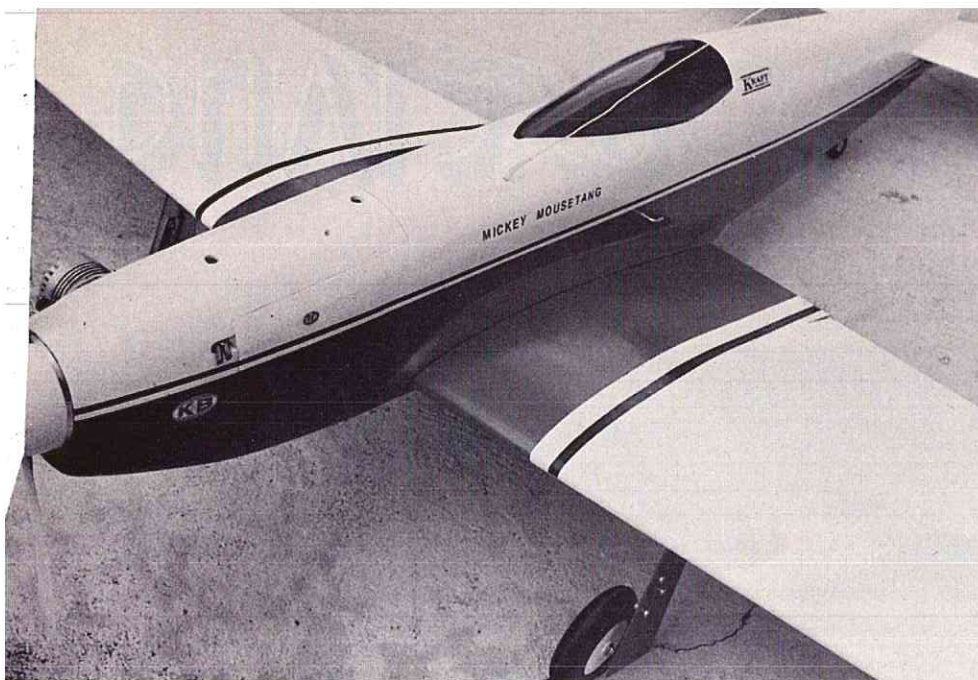
Before closing off the fuselage top, glue in the $\frac{1}{4}$ " plywood plate for the wing hold-down bolt. Align the wing to the fuselage and drill and tap this plate for the rear hold-down bolt. Glue in the $1/8$ " plywood bolt support disc, the leading edge locating dowel, and the $1/16$ " plywood face. Bolt the wing in place and hold it in alignment to ensure a proper fit for the locating dowel and plywood face. When this has cured, remove the wing and reinforce the wing center section with $1\frac{1}{2}$ " fiberglass tape applied with epoxy.

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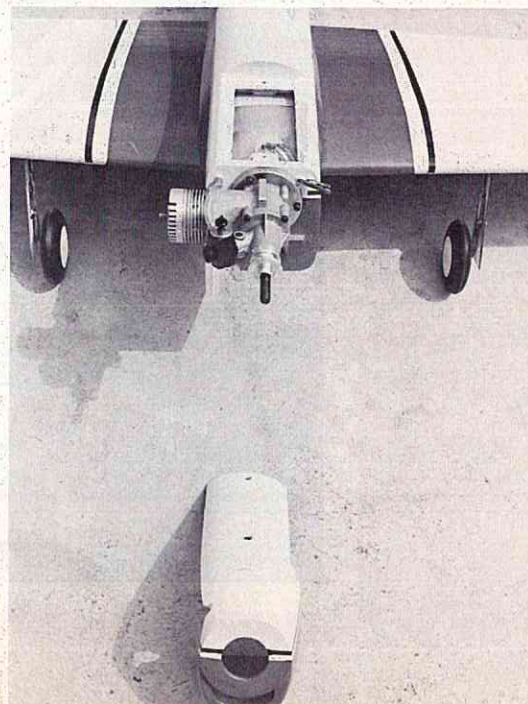
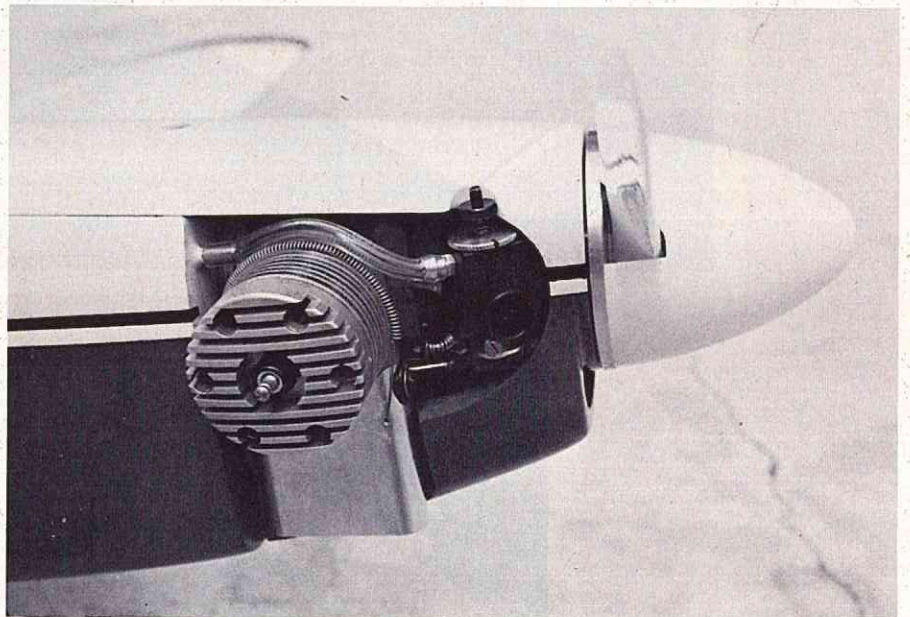
MICKEY MOUSE TANG

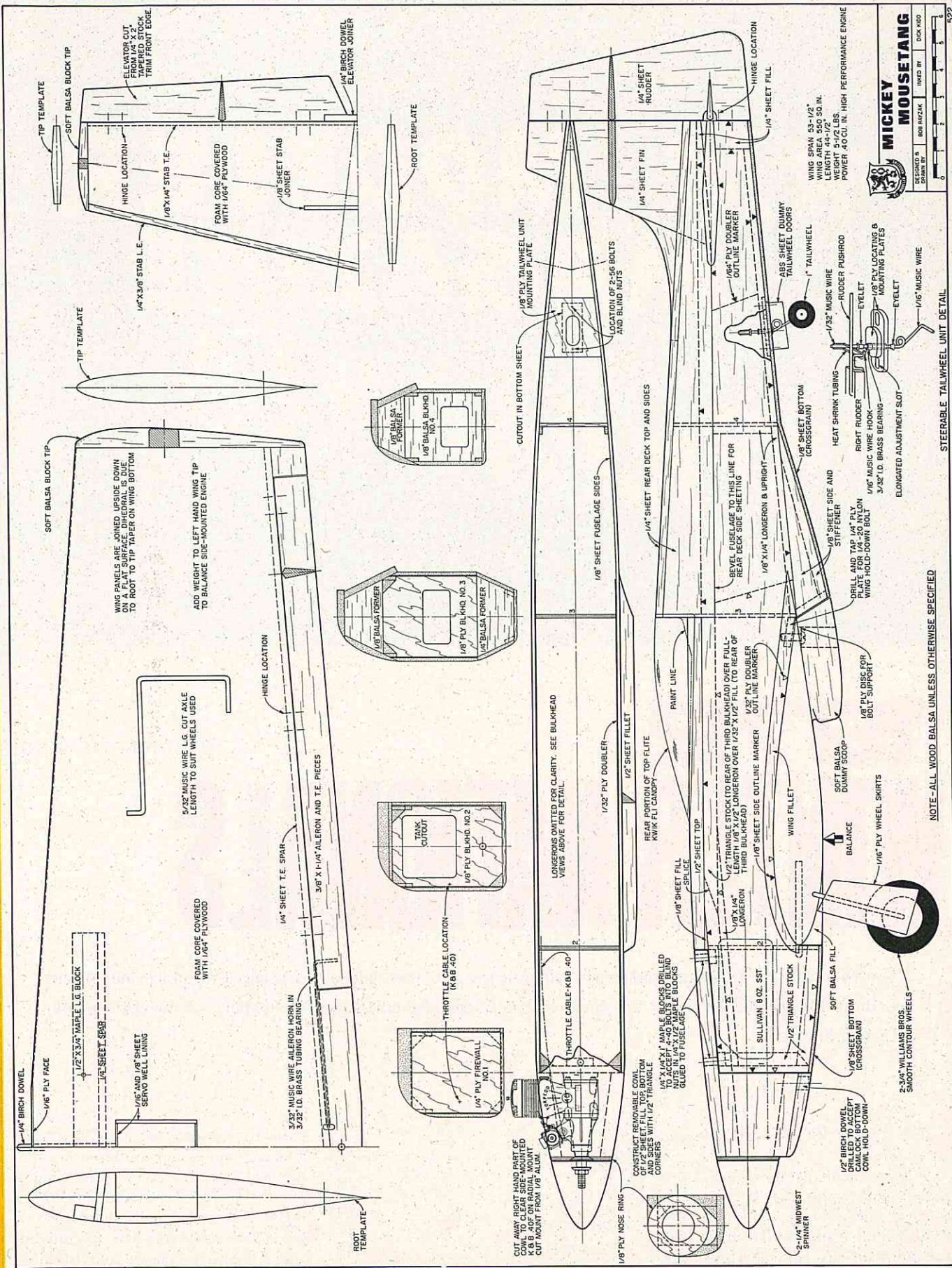
BY BOB RAYZAK





ABOVE: Front three-quarter view of Mickey Moustang. ABOVE, RIGHT: Steerable tail wheel and dummy tail wheel doors. Wheel angle adjusts by moving base plate fore and aft. RIGHT: Engine and cowl detail. Photo shows K & B .40 FR installation. BELOW: Bottom view showing distinctive paint scheme and Mustang-like styling features. BELOW, RIGHT: Removable cowl and tank hatch allows complete access and inspection for engine and tank.





NOTE-ALL WOOD BALSAM UNLESS OTHERWISE SPECIFIED

STEERABLE TAILWHEEL UNIT DETAIL

KEY MOUSETANG



DESIGNED & DRAWN BY	BOB RAYZAK	INKED BY	DICK KIDD
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522

R/C MODELER MAGAZINE *presents...*

Photoimage by James Miura

1972 WINTER NATIONALS

BY DICK TICHENOR

Two hundred and five entrants compete in nations largest R/C meet. Bill Salkowski wins Grand Champion Award as David Brown, Bud Atkinson, Bob Smith win in Expert, Pattern, Scale, and Formula I at Marana Air Park, Tucson, Arizona.

The Tucson RC Club did it again, only more so!

A long Thanksgiving weekend, gorgeous weather, modelers coming from all over the country, and the 1972 RCM Winter Nationals had more contestants than any R/C meet this year, other than the Nats. This tabulation tells the story.

PATTERN	
Class A	53
Class B	23
Class CN	18
Class CX	32
FORMULA I	64
SPORT SCALE	15
TOTAL ENTRIES	205

The site of the Winter Nationals is Marana Air Park, a jet-size airport

close to Tucson, Arizona. On the Air Park are motel and resturant accomodations; convenient and reasonably priced. A huge ramp area allowed six flight lines, ready lines and ample pit space with room left over for full size aircraft parking. Now, add to those facilities an R/C club with plenty of willing workers headed up by an ex-

perienced cadre of officials and you have all the necessary workers for holding a super contest — which must be true as evidenced by the turn-out of entrants.

Six flight lines for Pattern made for a busy sky. On one occasion two similar appearing airplanes started their Top Hat maneuver simultaneously and close together; would you believe that one pilot became slightly disoriented, locked his eyeballs onto the other man's airplane and flew his own into the ground. Even with all this activity, there wasn't a single mid-air reported in Pattern.

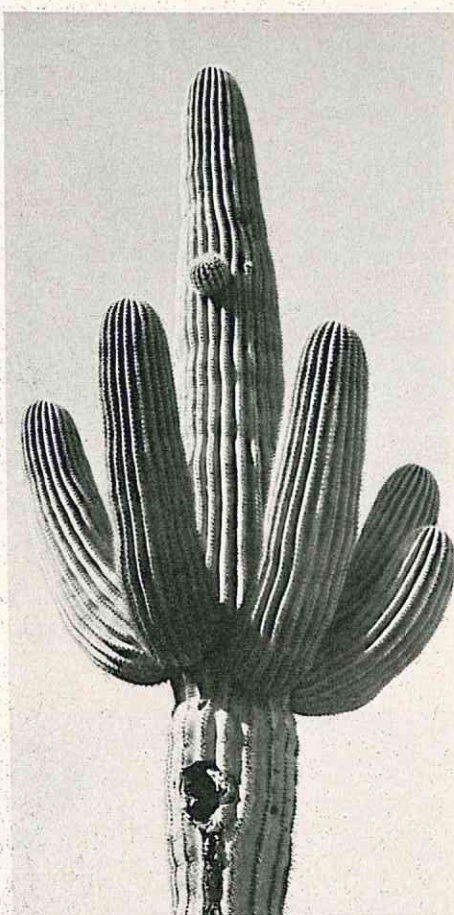
The large number of contestants forced a change in the Pattern competition. A fly-off of the first five places in each class was held on Sunday morning; this gave us a champion in each class in addition to the first through fifth place trophy winners. That's why the class champion and first place winner aren't the same.

Pattern competition can be something of a yardstick for measuring the trend in aircraft and equipment preference. At Tucson there seemed to be an increase in original designs and in major modifications to established designs, especially in the use of retractable landing gears. The Kaos, however, still dominates the kit scene.

Our good friend from Ohio and World Engines, Dave Brown, deserved his first place win in CX especially if you had heard his experiences with sky marshalls while hand carrying an R/C model across the country on an airliner! They don't trust anything anymore! Marcial Davila came up from Mexico with Kraft's Marty Barry and proceeded to take first in CN. That was great because our fliers have been bringing back trophies from the Mexican contests for many years!

Formula I was not only well attended but the racers came from quite a few directions. We have seen lots of sharp groups and the Thunderbirds club from Ft. Worth, Texas, is our championship candidate for pure CLASS. There just aren't too many clubs in which a couple of dozen modelers (including their families) can attend a meet in a plush private turbo-prop powered Convair 440. The T-bird's Monty Moncrief is a good provider as well as a top racing pilot and, besides that, his little wife Sheryl is a sweetheart.

The K & B snarleys (*Ed. Note: Dick still doesn't know how to spell Schneurle*) screamed to the winner's circle, however, Terry Prather turned



1972 RCM WINTER NATIONALS WINNERS

FLY OFF CHAMPIONS:

CX	Bill Salkowsky
CN	Marcial Davila
B	Rus Van Baren
A	Ron Gilman

PATTERN 1 THROUGH 5 PLACES

A	B
1. Gene Goldstein	Rus Van Baren
2. Tony Lopez	Dale Timberlake
3. Ron Gilman	Mike Cooke
4. Don Atwood	Vienna
5. Dennis Breene	Mike Butler

CN	CX
1. Marcial Davila	Dave Brown
2. Phil Williams	Bill Salkowski
3. Bill Cranston	Wyatt Stedman
4. Leo Prescott	Ed Hotelling
5. Dan McCan	Paul Good

SPORT SCALE

1. Bud Atkinson	T-34
2. Mel Ford	Taube
3. Maxey Hester	Zlin
4. Bud Wolfe	Schinn
5. Don Downing	ME 110
6. Steve Buck	Zlin
7. Leo Prescott	PT-17
8. Steve Mason	J-3 Cub
9. Max Hopkins	P-38

PYLON

1. Bob Smith	5. Jack Stafford
2. Kent Nagy	6. Arlen West
3. Dan McCan	7. Henry Bartle
4. Larry Leonard	8. Chuck Smith

in the fastest heat of the meet with his Super Tigre clocking 1:25.9. Bob Smith had it all together with a 1st place win in all his heats. As always the group racing at Tucson pull off lots of super hot races but for some unexplained reason there were many, many cuts on the number one pylon. A tie breaking fly-off for 4th place was won by Larry Leonard while each of the other three had a cut so they had to race again for 5th, 6th, and 7th places.

Last year Loretta Hall was calling for Howard Reed; same thing this year except they reciprocated; Loretta is now flying a speedy Formula I course. Henry Bartle from Garden Grove, California, was trying to continue his winning streak; Henry having won the Formula I championships at the Mexican Nationals the week before the Winter Nats.

It's pretty nice to see the Formula I fliers having a go in Pattern and doing well at it; Bob Smith took 9th in CX and Dan McCan was 5th in CN. Each was flying a sharp T2A.

At the banquet, the NMPRA's 1972 President, Bror Faber, introduced 1973 President-elect, Ed Rankin, newsletter editor, Ed Hotelling, and Southern California VP, Chuck Smith. Good luck, fellows, you have some large size shoes to fill.

Sport Scale was included for the first time this year and Scale flights were intermingled with Pattern. Maxey Hester, Bud Atkinson, Phil Garrard and Mel Ford were among the notables entering Scale. There were some beautiful aircraft entered and the flying was outstanding. A roaring powerhouse was Max Hopkins' demonstration of his 12½ lb. Royal P-38 powered by 2 Webras! I won't write much on Scale, the photos can tell it better than I.

The brand new Navy Competition Team from Corpus Christi, Texas, made their debut at the Winter Nats. Under the sponsorship of Chief Naval Air Training, R. Adm. James Ferris, the Navy Competition team is being formed to participate in major contests throughout the country. At Tucson they entered A & B Pattern and Scale. The team is new and if there are Navy personnel among our readers who are interested, they are invited to contact Bob Olen, Comtrawing Two, NAS, Kingsville, Texas 78363 or Bob Ricksecker VT-25, LCPO, NAS, Corpus Christi, Texas 78402. As Cliffie would say, "Wel-

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1972 WINTER NATIONALS

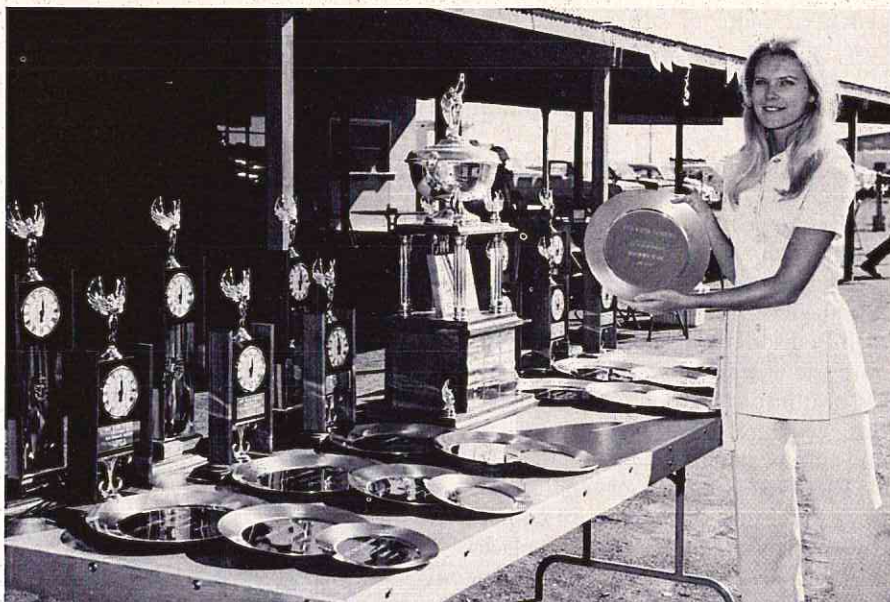
Marana Air Park
Tucson, Arizona

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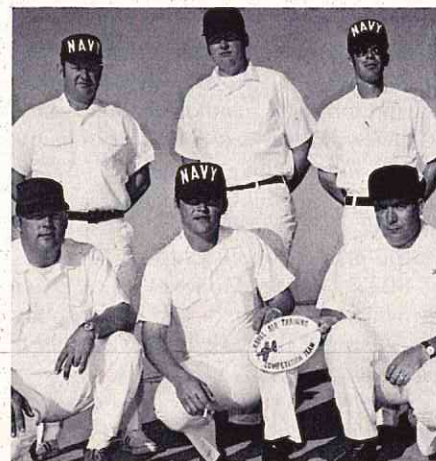
HOST
Tucson R/C CLUB



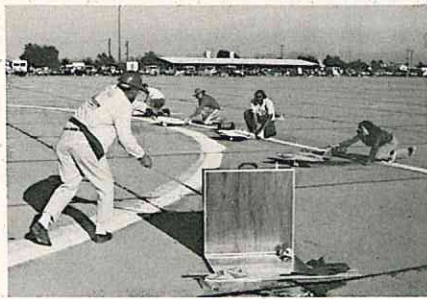
Beautiful Sheryl Moncrief of Ft. Worth, Texas, shows off the array of beautiful trophies.



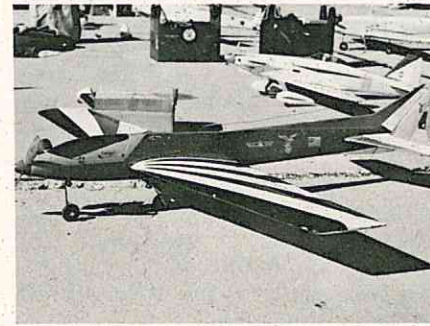
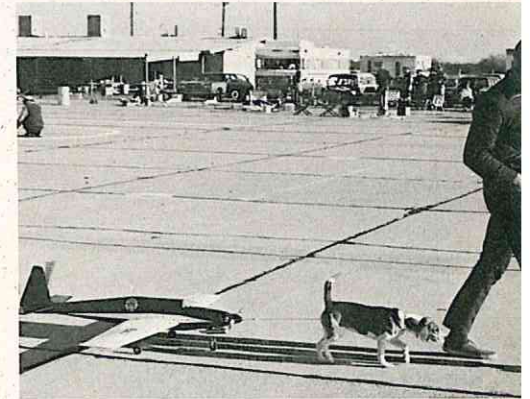
Bill Salkowski was the big winner — won the fly-off for Pattern CX, a repeat of his 1970 win. RCM's Pat Crews looks on.



LEFT: A military motif. ABOVE: Navy's new competition team made first appearance at Winter Nat's.



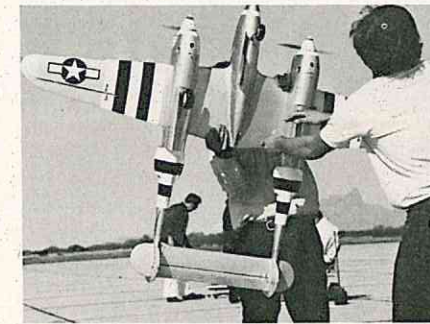
LEFT: C Expert hardware bandits: L. to R.: Dave Brown, Bill Salkowski, Wyatt Stedman, Ed Hotelling, Paul Good. ABOVE, CENTER: Bob Angus waved a lot of flags during the weekend. ABOVE, RIGHT: CN winners: L. to R.: Marcial Davila, Phil Williams, Bill Cranston, Leo Prescott, Dan McCan.



TOP, LEFT: Dan McCan flew T2A to 5th in CN. CENTER: A winners: Gene Goldstein, Tony Lopez, Ron Gilman, Dennis Breene. ABOVE: Spiffy, the Beagle, tows the airplane but missed a maneuver while calling for owner Dan Egelhoff! FAR LEFT: B winners: Russ Van Baren, Dale Timberlake, Mike Cooke, Mike Butler. LEFT: A Magic Stompin' War Lord by Jim Wilmont. Retracts, metalflake finish.



LEFT: Formula I winners: Bob Smith, Kent Nogy, Dan McCan, Larry Leonard. RIGHT: Identify your racers so the judges at #1 pylon can go ape with three white aircraft with red and blue trim at 150 mph!

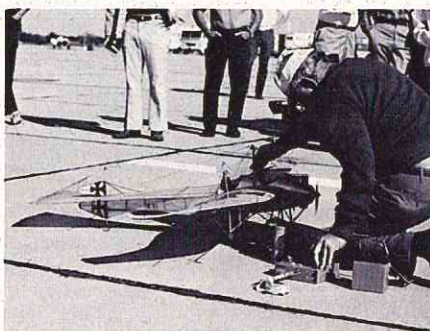


ABOVE, LEFT: Bob Smith and his machine that wins 'em all ---- like 1st at Tucson! ABOVE: Royal P-38 by Max Hopkins is powered by two Webra .61's. RIGHT: Terry Prather's service station is almost a portable hop-up shop. Terry's ST.40 turned fastest heat at 1:25.9.

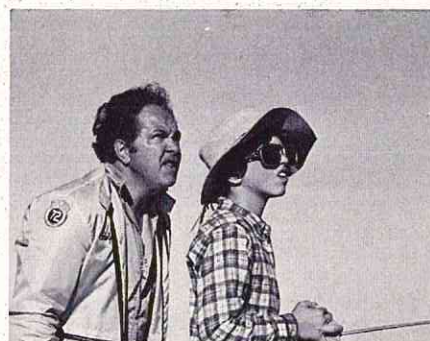
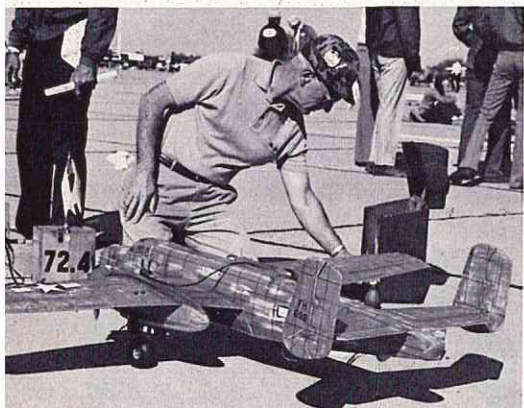




LEFT: Part of the sure line up. ABOVE: Bud Atkinson and 1st place T-34.



LEFT: Prettiest model at the meet! The Me 109 by Dr. Val Hutchinson isn't bad, either. Lovely lady is Doris Magee from Amarillo, Texas. ABOVE: Mel Ford and 2nd place Taube put on a show that amazed the spectators. RIGHT: Maxey Hester and his Zlin Akrobat. An outstanding model, it won 3rd in Sport Scale.



ABOVE: Phil Garrard with weathered desert finish B-25. TOP ROW, CENTER: Jack Stafford's latest Formula I took 5th on first test flights! TOP ROW, RIGHT: Adolph Sica called for 11 year old son, Steve, in Formula I. RIGHT: Terry McMahan flew O.S. powered Stafford P-51 in Pattern. FAR RIGHT: Big John Elliott hanging on for Ron Gilman — both from Orbit.



BY JACK HEADLEY

Thermal Soaring Semi-Scale Slingsby

SKYLARK



It all started when I won a giant family size bottle of Titebond at the Northrop Flying Wing Contest. At first I just dumped it on the work bench together with my slightly used wing, and got on with the serious business of hanging up the trophy as well as receiving the usual paeans of praise from the family – “Another dust collector, eh?” and similar tributes to my prowess.

About a week later I finally got around to cleaning up the work bench and I noticed it again, 16 ounces of the finest glue – and it wouldn't keep forever. What a challenge, enough stuff to cement the Queen Mary back together, or at least securely to the dockside! Restraining myself from placing an instant call to the Lord Mayor of Long Beach, I realized that this was a great opportunity to build my fabulous Cirrus-beater, planned for so long. A twelve foot span model, full of intricate ribs and spars, formers and longerons, stringers and spacers --- in short, a structure that would make the famous bird cage Maserati look like an orange crate.

So it was quickly to the drawing board and an outline sketch was speedily prepared. After a few preliminary scribbles it was obvious that all those intricate pieces would use up enough balsa wood to enable at least one balsa distributor to instantly retire to Hawaii and live a life of luxury forever. So out they all went --- all those beautiful ribs and spars --- and a much simpler structure was devised. It then suddenly dawned on me that all this effort was to use up \$2.50's worth of Titebond, which graphically illustrates my grasp of the theory of economics, but by this time the project had gathered too much momentum to be stopped. So, balsa wood was bought, hacked, bent, glued, broken, sanded and doped. The results can be seen from the accompanying photos. Don't be put off by the size, it's an easy model to build, and comes apart into enough pieces so that transportation is no problem. Try one if you're a sailplane fan, it's a lot of fun.

CONSTRUCTION

It's always best to begin with the bits you don't like so that when most of the construction is over you end up making the bits you do like, and this gets all the building done a little quicker. So, now go to whichever bit you always put off until last, which may or may not be:

THE WINGS

By a careful study of the plans and photos you will have realized that the wings are made in three separate

pieces, the center section and the two tip panels, each four feet long. This system was chosen so that the wing dihedral joint could be built solidly into the center section, and also to allow an easy hook-up for spoilers, if required. (More on this later). All three wing pieces are, however, built in a similar manner.

OUTER PANELS

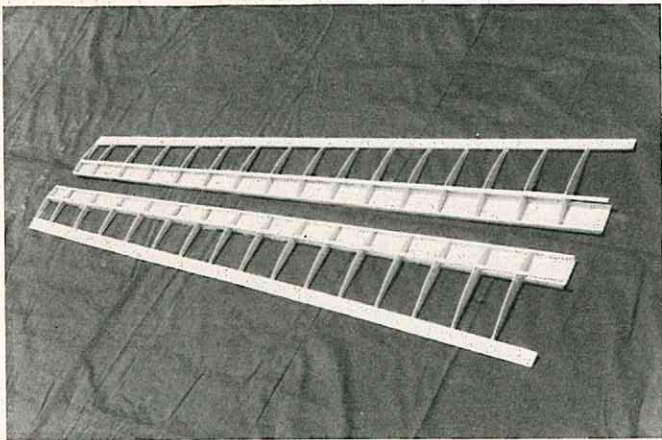
Pin down onto the plan (which should have been covered with waxed paper), the trailing edge strip and the lower leading edge sheeting. Cement the lower 1/8" x 1/4" spar to this sheeting making sure that all these spars are hard balsa. The lower cap strips, made from 1/4" wide pieces of 1/16" sheet, are then cemented into place. The 1/8" sheet leading edge piece is also cemented to this sheeting. While all this is drying the wing ribs can be made. A simple method for producing a set of tapered ribs is to cut templates of the tip and root ribs as shown on the plan, and then a set of blanks for the intermediate ribs. Pin all these together, with one of the template ribs on either side of the block, and then sand

down the blanks until the templates are reached. Don't unpin the block yet, as this is the best time to cut the spar slots. After cutting the slots the block can be taken apart, and the edges of the ribs sanded clean. However, we've included a sketch of all the various ribs if you like to cut them out individually. Cement down all the ribs except the root ribs R2, which are added after the wing joining boxes are made. Install the upper half of the main spar, which is also hard balsa, and then the spar webs. These webs are 3/32" sheet at the root,

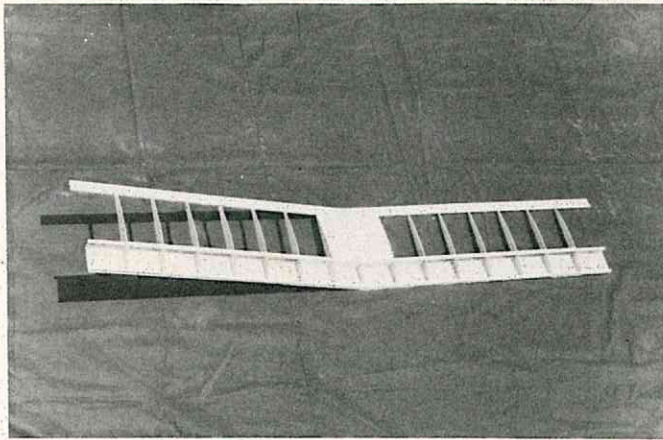


1/16" sheet between ribs R3 and R8, and then 1/32" sheet up to rib R12. No web is required past this station. Between ribs R2 and R3 the 3/32" hard balsa webbing is used on both sides of the spar, automatically producing the box for the wing joiners. Now add the root ribs which are in two pieces. Sand the 1/8" sheet leading edge to the airfoil profile then cement into place the upper leading edge sheeting, followed by the cap strips on the upper parts of the ribs. These cap strips should not be omitted, as they give considerable torsional stiffness to the wing.

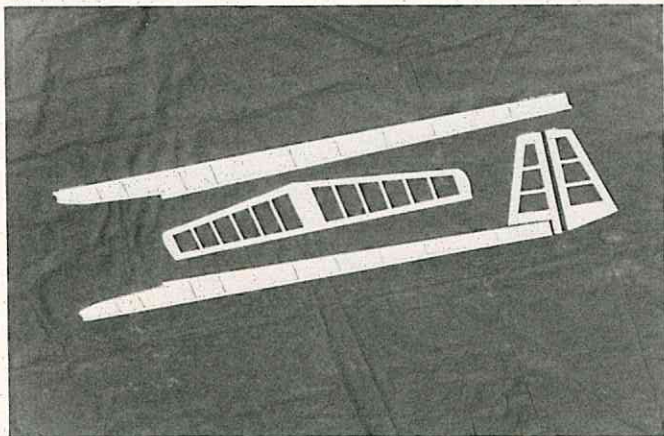
The framework can now be removed from the plan and the leading edge region cleaned up in preparation for installing the 3/16" sheet leading edge strip. This piece should be reasonably hard, as it's going to take a lot of knocks, especially during landings into heavy brush. Attaching the wing tip, made from block balsa completes the outer wing panel construction.



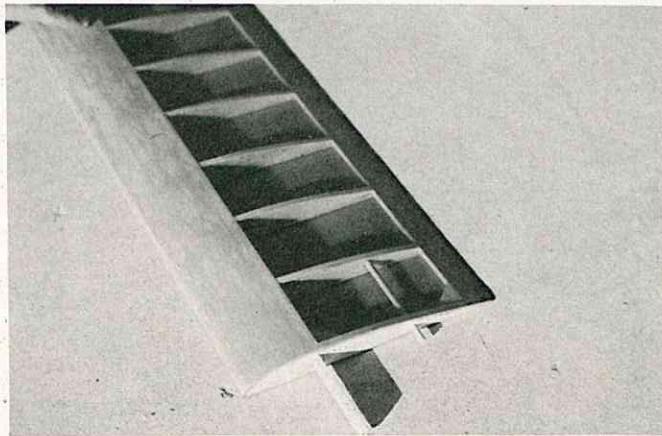
The basic outer wing panels ready for top sheeting.



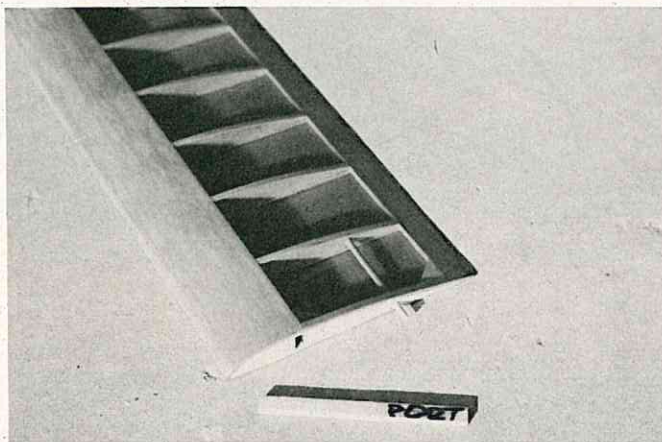
The center wing panel ready for top sheeting.



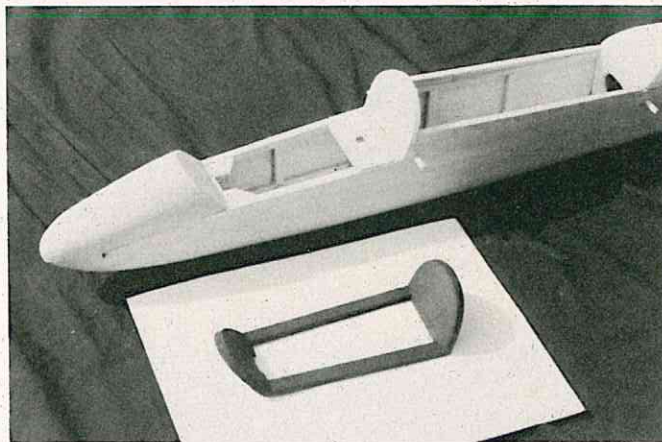
Basic fuselage sides and empennage framework.



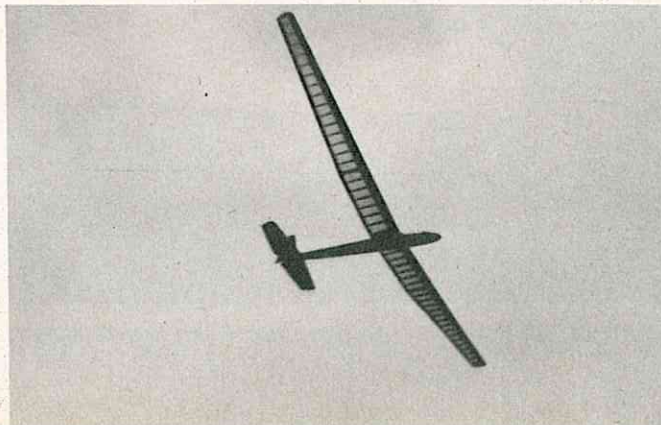
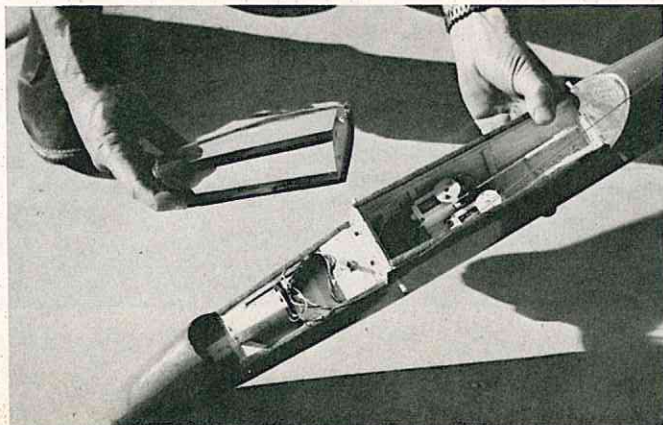
A close-up view of the wing joint.

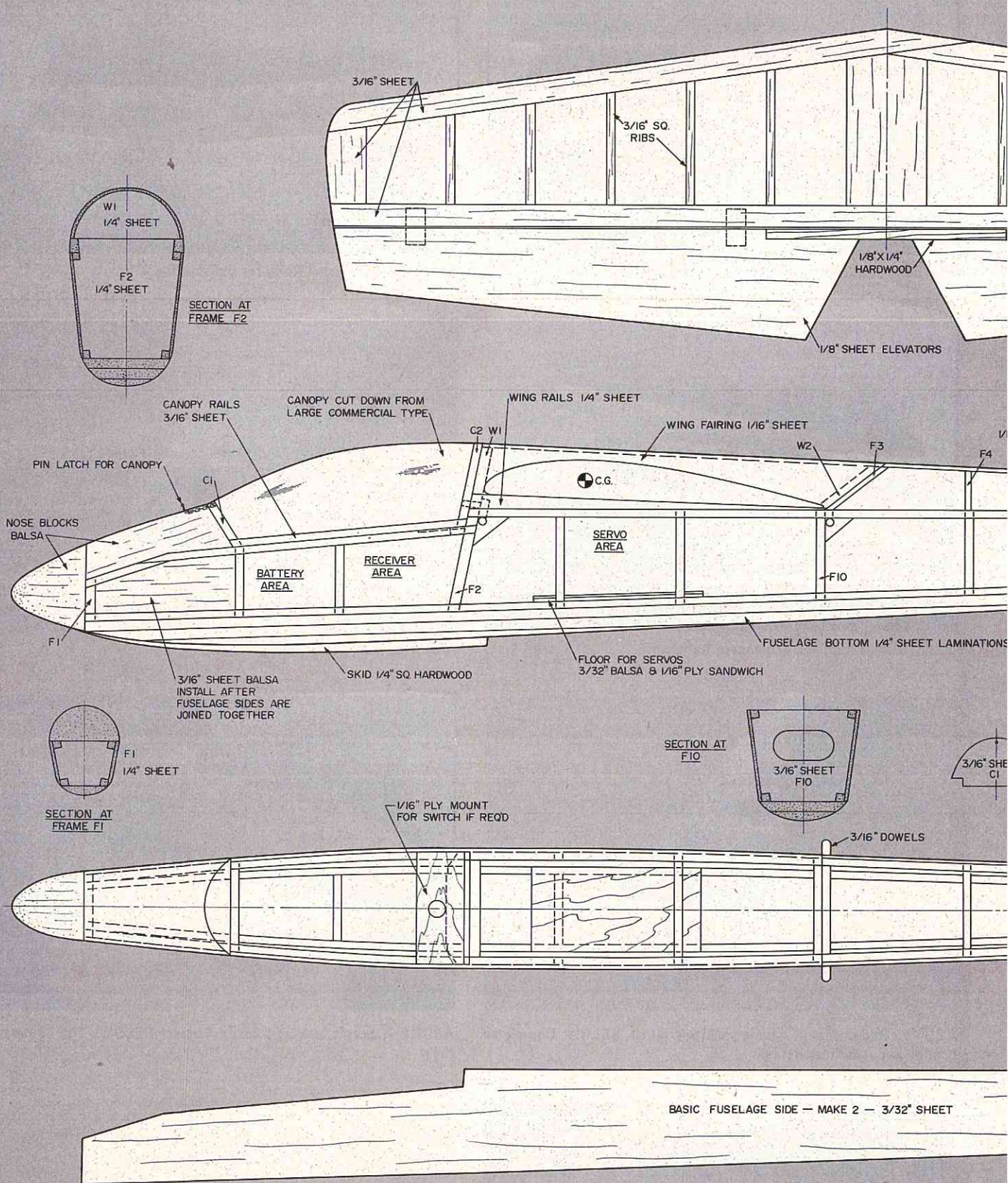


ABOVE: Detail view of a wing panel and joiner. BELOW: Completed canopy and radio installation.



ABOVE: Cockpit area and canopy frame. BELOW: The Skylark in flight.





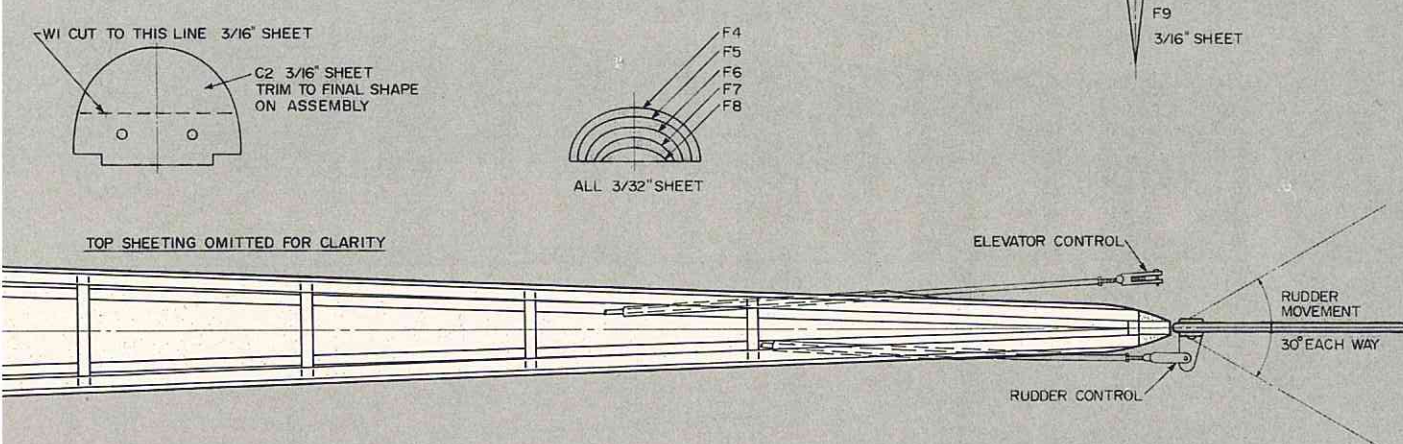
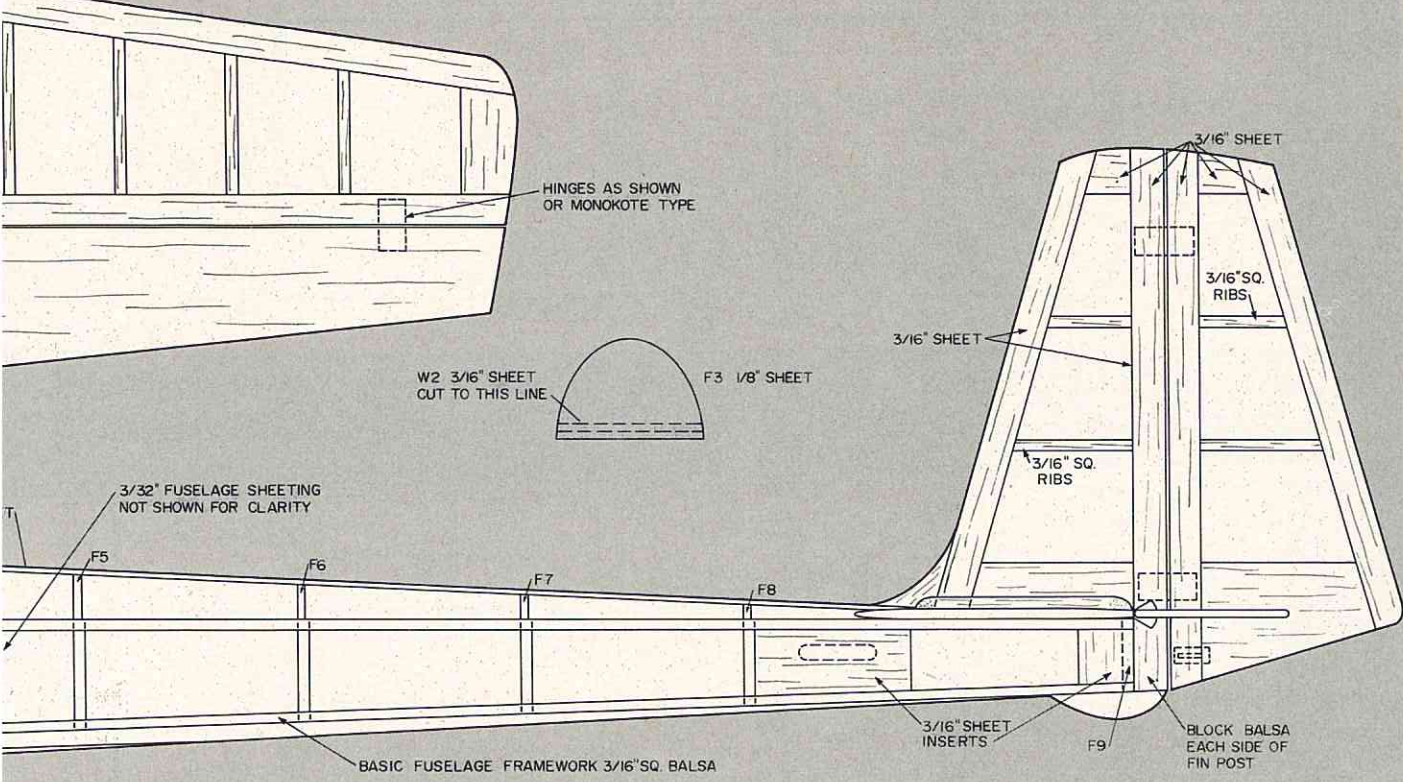


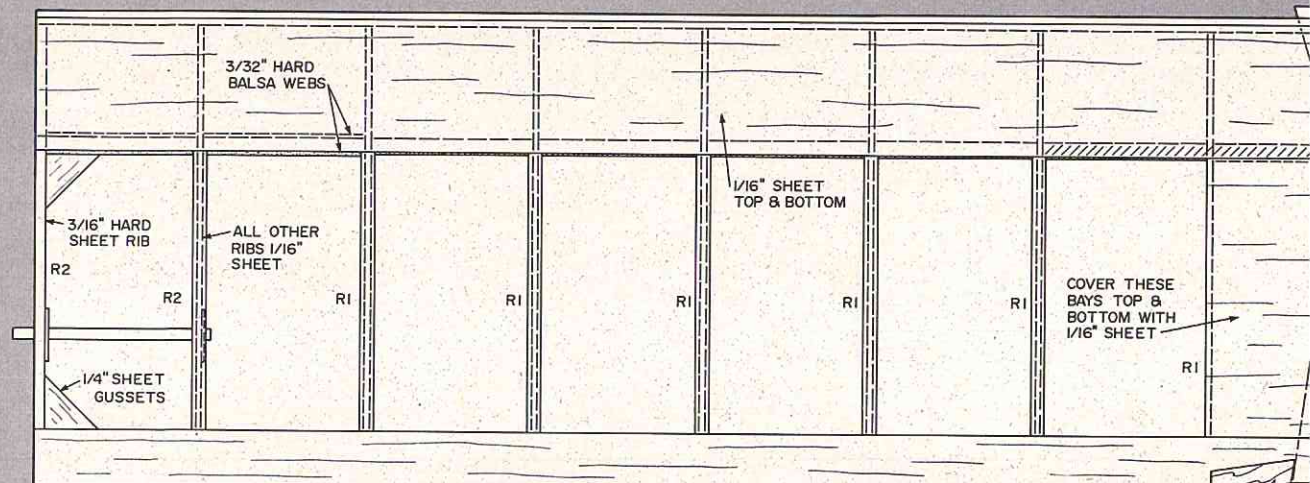
PLATE 1 OF 2

SLINGSBY

SKYLARK 4

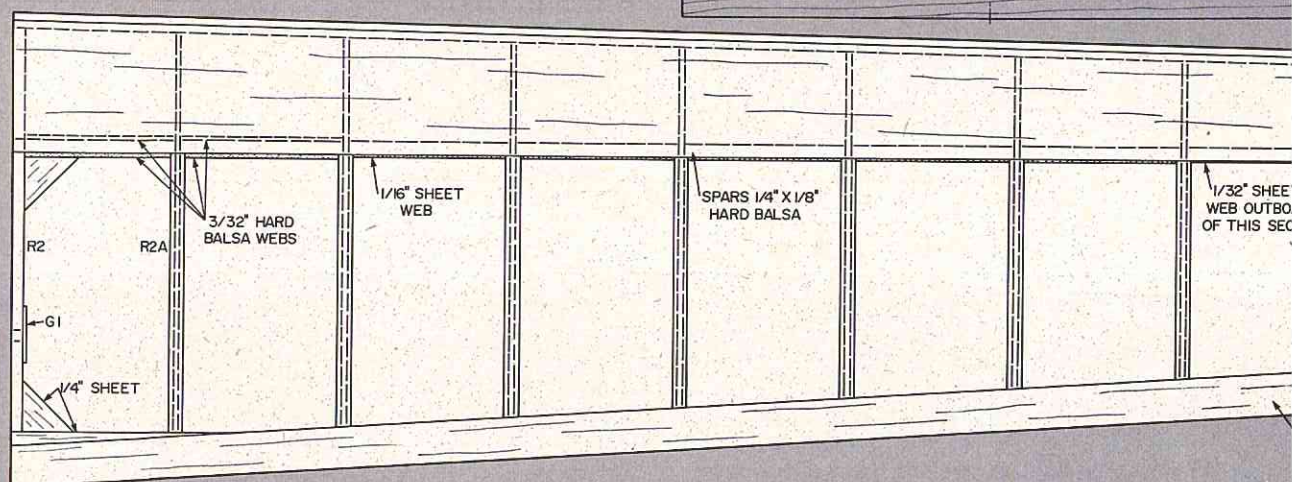
DESIGNED & DRAWN BY JACK HEADLEY INKED BY DICK KIDD RANDY KIDD

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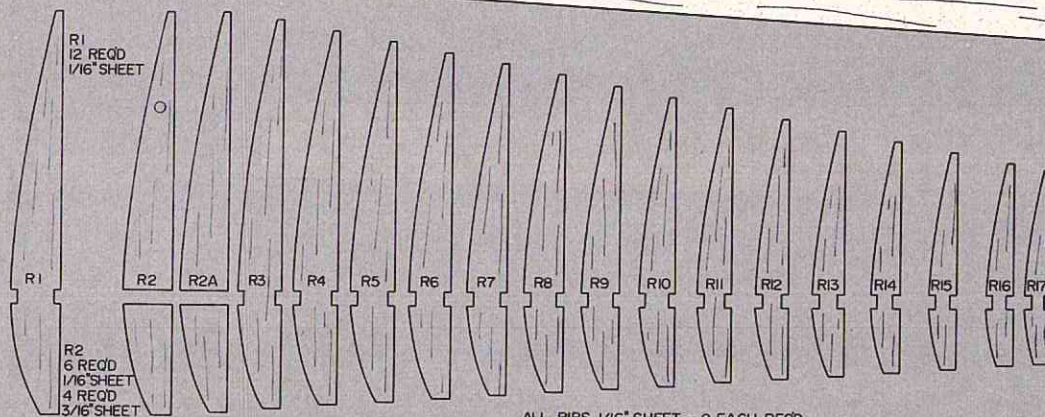
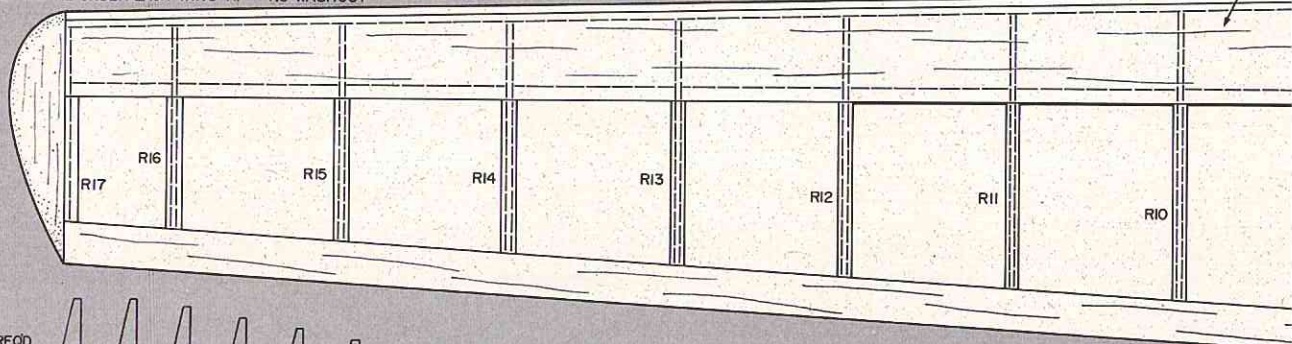


NOTCH BACK T.E. AS SHOWN

WING JOINERS 1/4" SHEET HARDWOOD



8" DIHEDRAL UNDER EACH WING TIP -- NO WASHOUT



ALL RIBS 1/16" SHEET -- 2 EACH REQ'D EXCEPT OTHERWISE NOTED

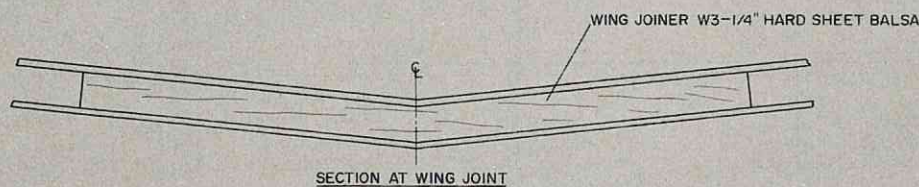
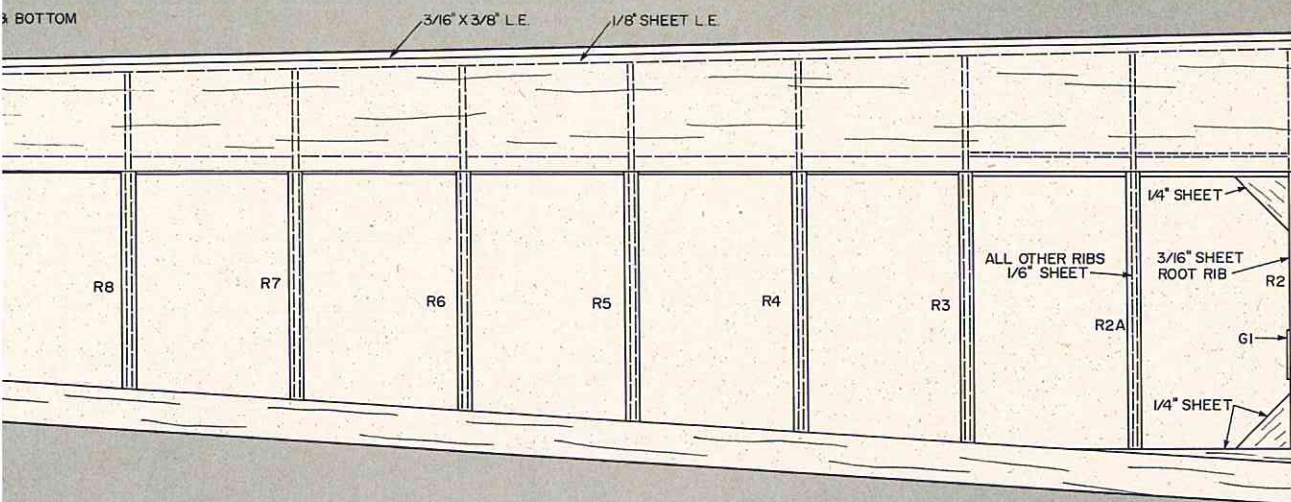
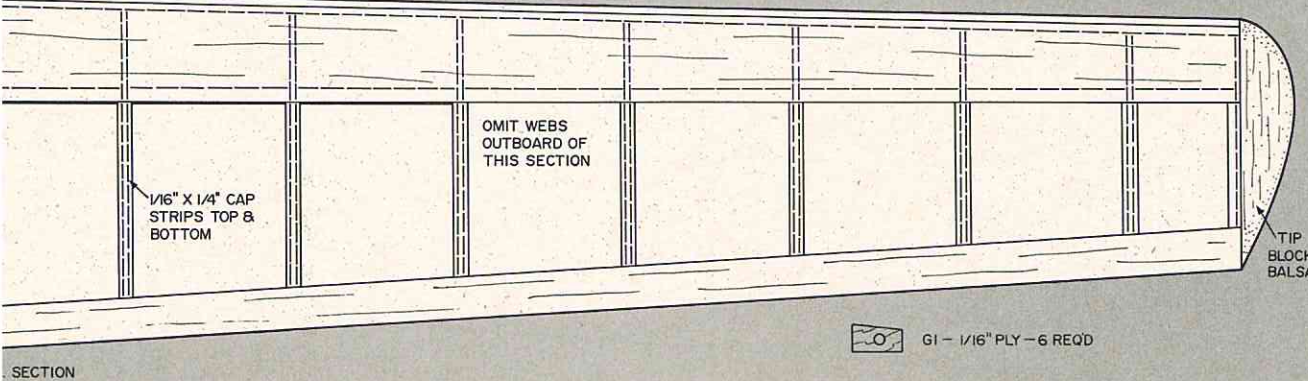
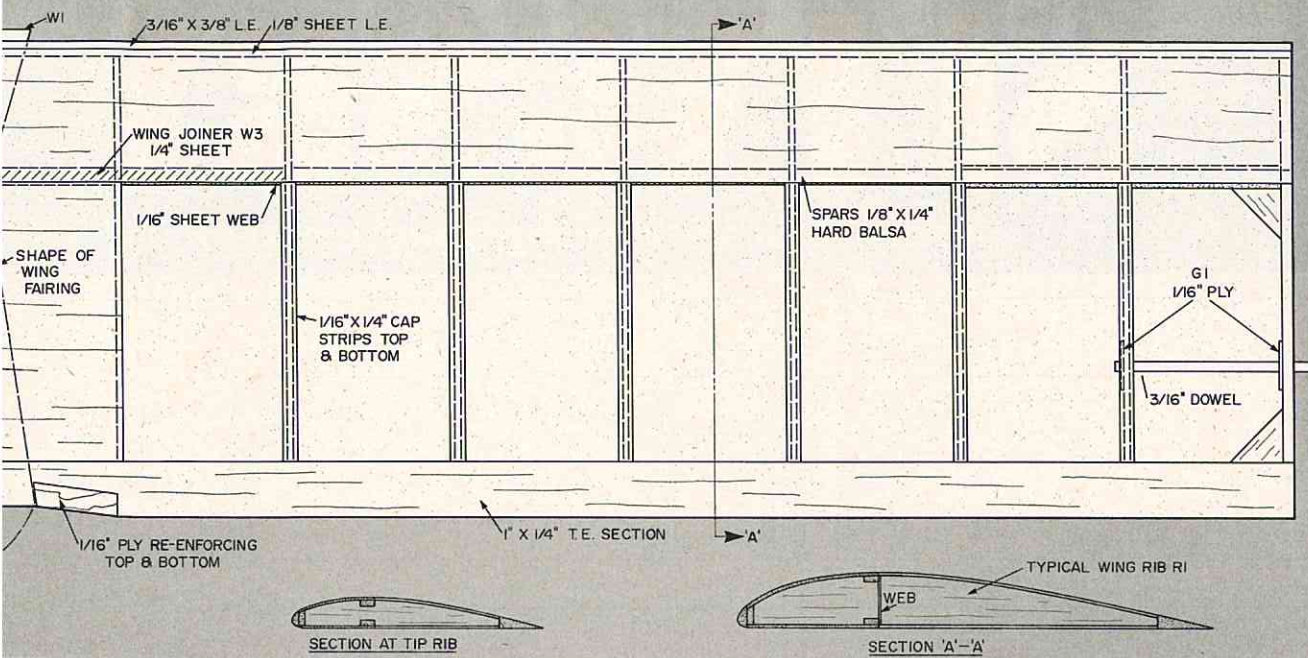


PLATE 2 OF 2

SLINGSBY

SKYLARK 4

DESIGNED & DRAWN BY JACK HEADLEY INKED BY DICK KIDD RANDY KIDD



496②

National Scale Winning Sailplane With 111 Inch



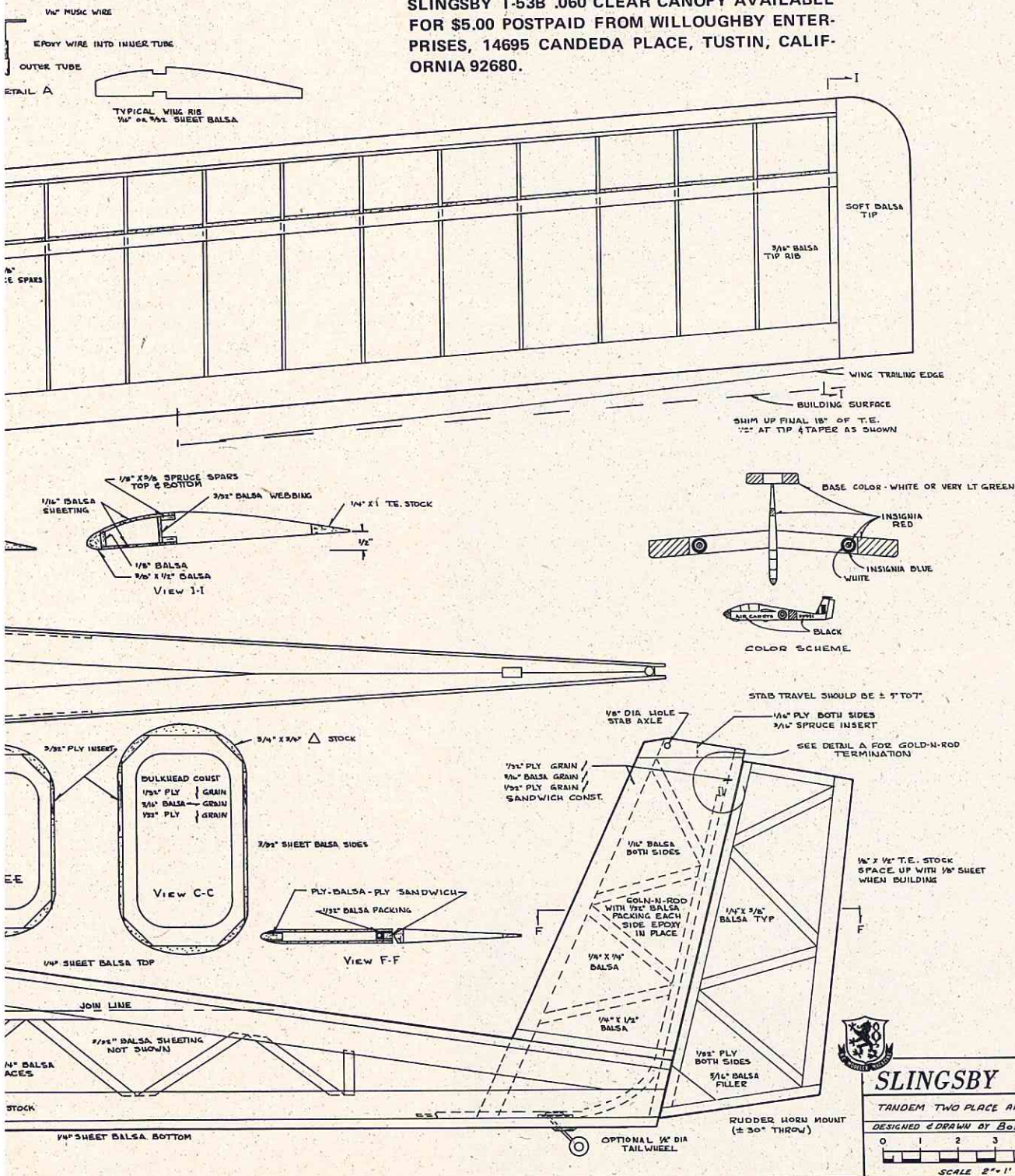
T-53B

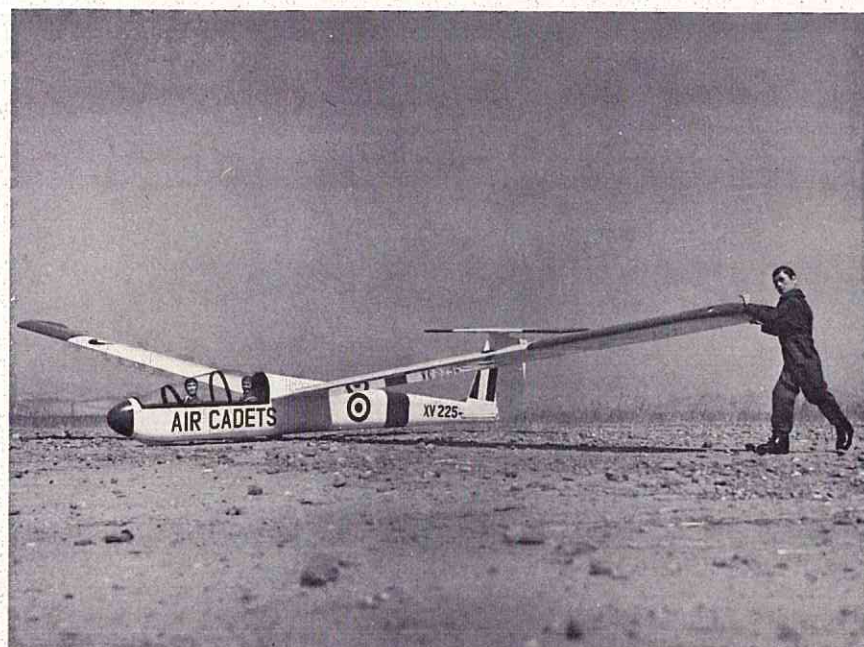
BY BOB ANDRIS

an, 16:1 Aspect Ratio. A High Performance Soarer.

FULL SIZE PLANS AVAILABLE — SEE PAGE 118

SLINGSBY T-53B .060 CLEAR CANOPY AVAILABLE FOR \$5.00 POSTPAID FROM WILLOUGHBY ENTERPRISES, 14695 CANDEDA PLACE, TUSTIN, CALIFORNIA 92680.





This model of the Slingsby T-53B is the result of an extensive search for a full size sailplane that, in model form, would meet this criteria:

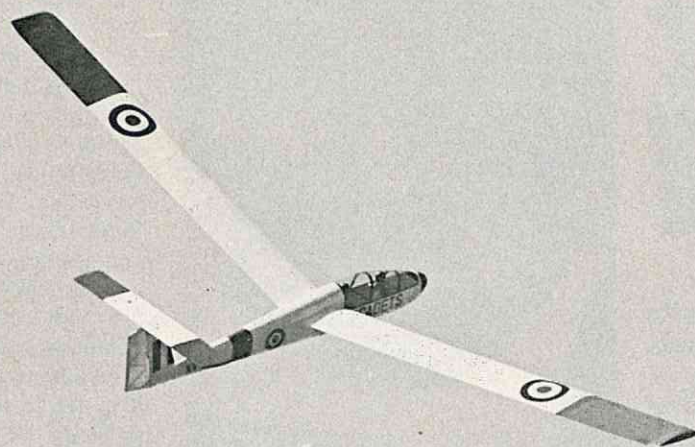
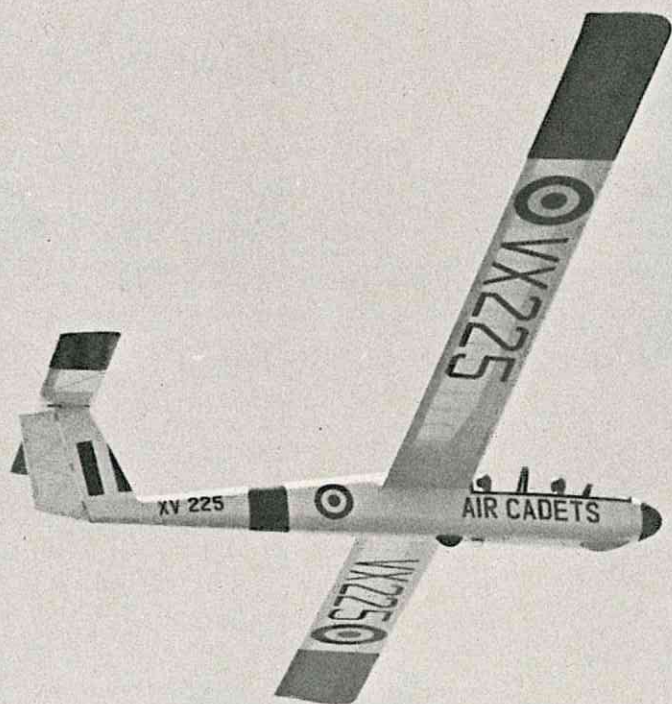
1. In one sixth scale, have a wingspan of 9 to 10 feet with generous wing area.
2. Must have good performance potential with little or no changes in the wing/stab surfaces.
3. Must not be overly complicated with compound curves and fairly simple to build for that reason.
4. Must have "Charisma."

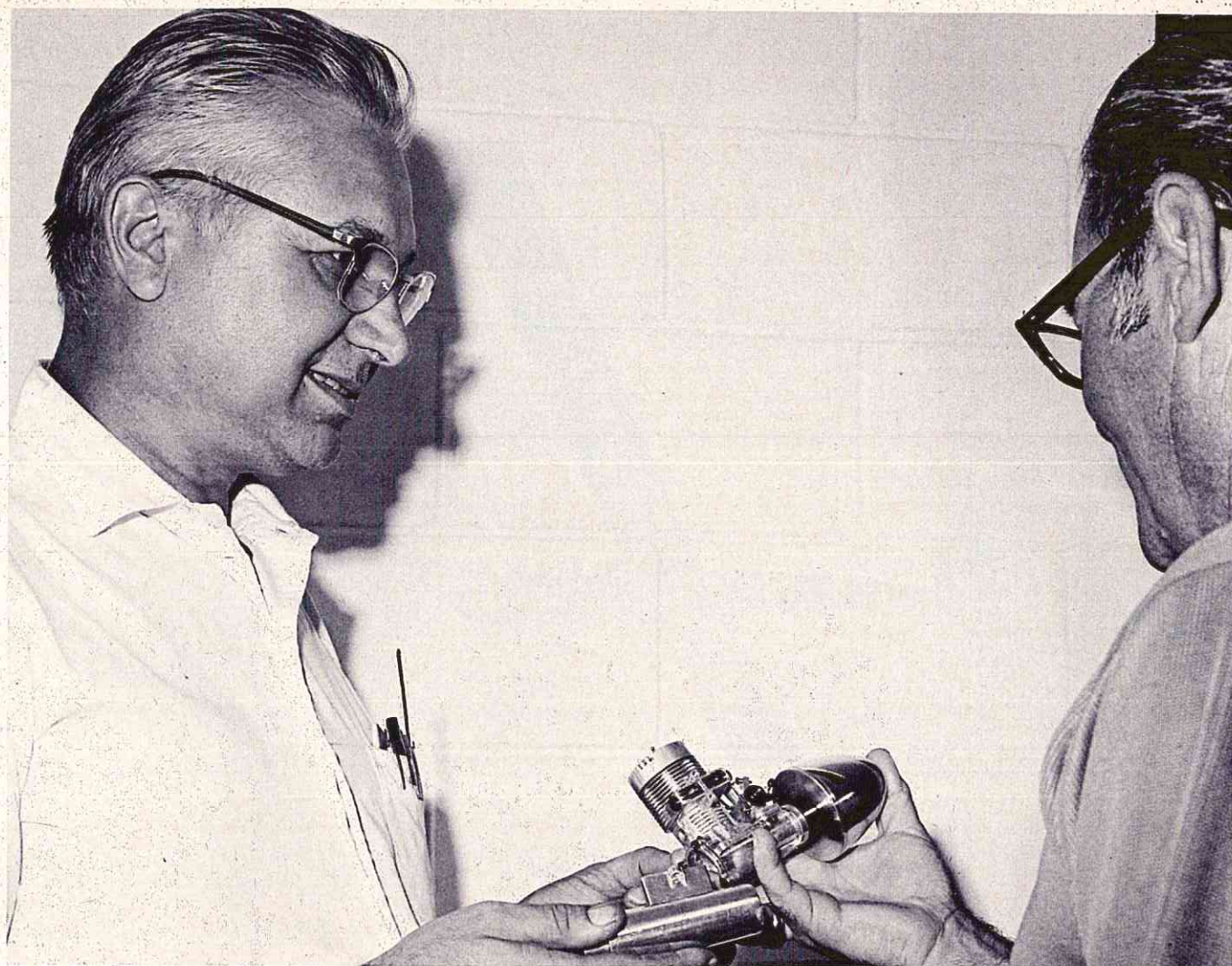
Now, how does the T-53B stack up? The scale wingspan works out to 111 inches, i.e., 9 ft., 3 inches, the Aspect Ratio is a shade under 16:1, the fuselage can be constructed using flat balsa for sides, top and bottom, and the constant chord wing permits all ribs to be cut out at one time using the sheet balsa stacking method. Further, the plywood root ribs can be used as "master" ribs and then used in the construction. Finally, with insignia red wing and stab tips, a red nose and fuselage stripe, coupled with the British roundel and "AIR CADETS" in huge black lettering, how could it miss being a stand-out anywhere?

The full size T-53B is a minor modification of the Slingsby T-53 two seat tandem trainer, and is used by the RAF for Air Cadet (pilot) training. The necessity to carry two people requires a lower-than-normal aspect ratio so worthwhile for a model; while the role it plays in training necessitates a gaudy finish and markings. The real model (one is based at Elsinore in Southern California) has a wingspan of 55.5 ft. with an area of 194 sq. ft. The structure is all metal with a weight of 700 lbs. empty. At the gross weight of 1160 lbs. (add radio, oxygen, parachute, and passengers) the wing loading is calculated at 6 lbs. per square foot. When the Slingsby factory in Great Britain decided to get away from wooden construction used in the past, they developed two T-53 prototypes conducting extensive wind tunnel testing over a three year period. Two fixed tandem wheels and a very obvious swept forward wing gives a rather unusual, but pleasing, appearance. Performance is nominal with a calculated L/D max of 29:1 at 55 mph using a proven Wortman FX 61-184 airfoil.

The T-53B was in quantity production for the RAF when, in November 1968, the entire Slingsby factory was destroyed by fire; the

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Genial Duke Fox proudly shows off his new Eagle .60, silencer, and spinner.

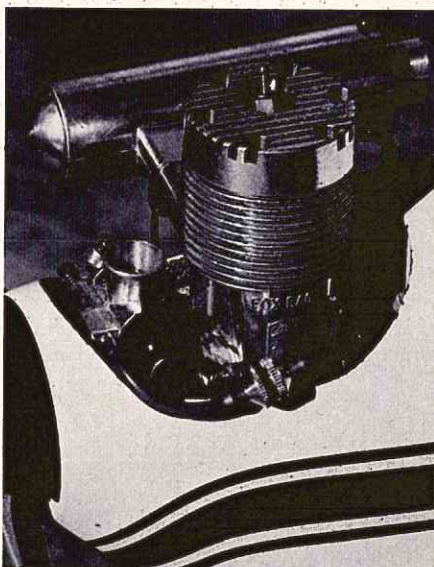
RCM VISITS

DUKE FOX

**RCM's reporter visits
Ft. Smith, Arkansas,
the home of one of
the world's leading
engine manufacturers.**

BY DICK TICHENOR

There must be thousands of people with businesses who dream of moving away from the heavy traffic, polluted air and frantic pace of the big city.



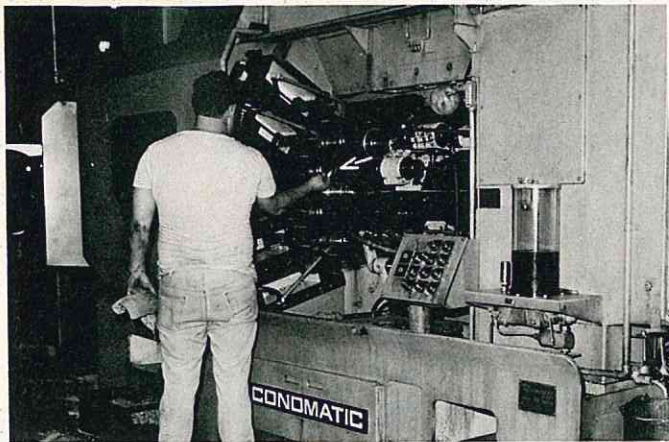
Duke's Eagle .60 --- we tried it and we liked it.

Duke Fox was one of those people, but he did something about it. He left the freeways and smog of Southern California and relocated his factory among the rolling hills, clear lakes, blue skies, and greenery of the Ozarks. Fort Smith, Arkansas, to be specific.

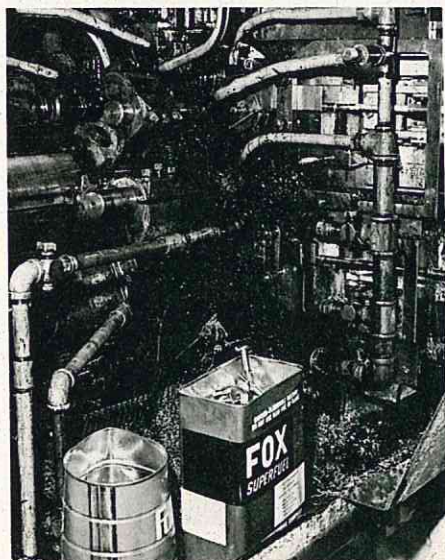
Since we were driving across Arkansas (on Dewey's money, of course), here was an excellent opportunity to look in on an old friend and see just what kind of an operation he has going. Duke Fox has been well-known as an engineer, engine designer, and manufacturer, par excellence, for a good many years. Fox engines have not only been prominent but have dominated several control line events for a long time. In R/C, Duke's engines have never seemed to enjoyed much publicity although their performance was excellent and the modelers using them were very well pleased. Here's what we saw at Fort Smith.

First of all, this is not a back yard operation; the factory covers more

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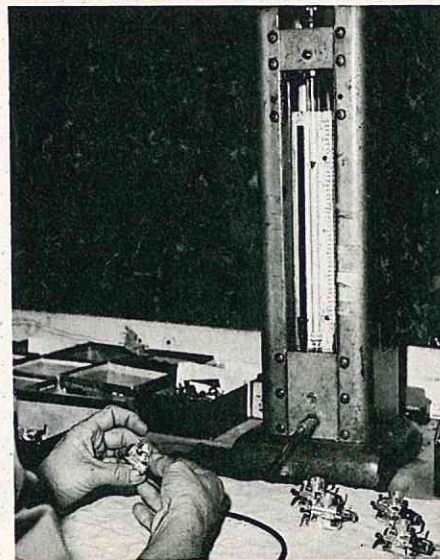
ABOVE: One of many massive automatic screw machines turns out spinners (arrow) from solid aluminum bar stock. **RIGHT:** Only one of many precision grinding machines.



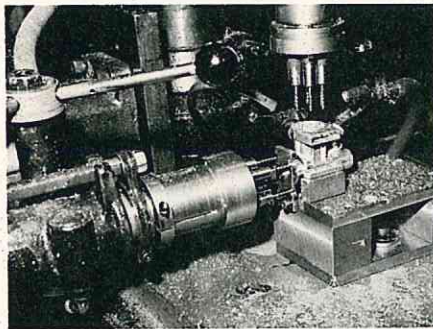
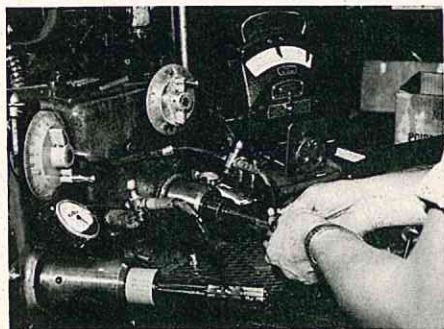
This maze of plumbing, shaving, and cutting oil is really an automatic machine turning out crankshafts.



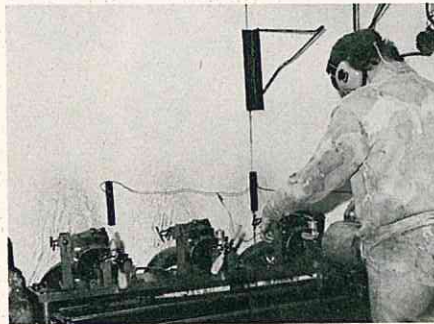
Duke Fox's engine assembly operation is performed with lots of Tender Loving Care.

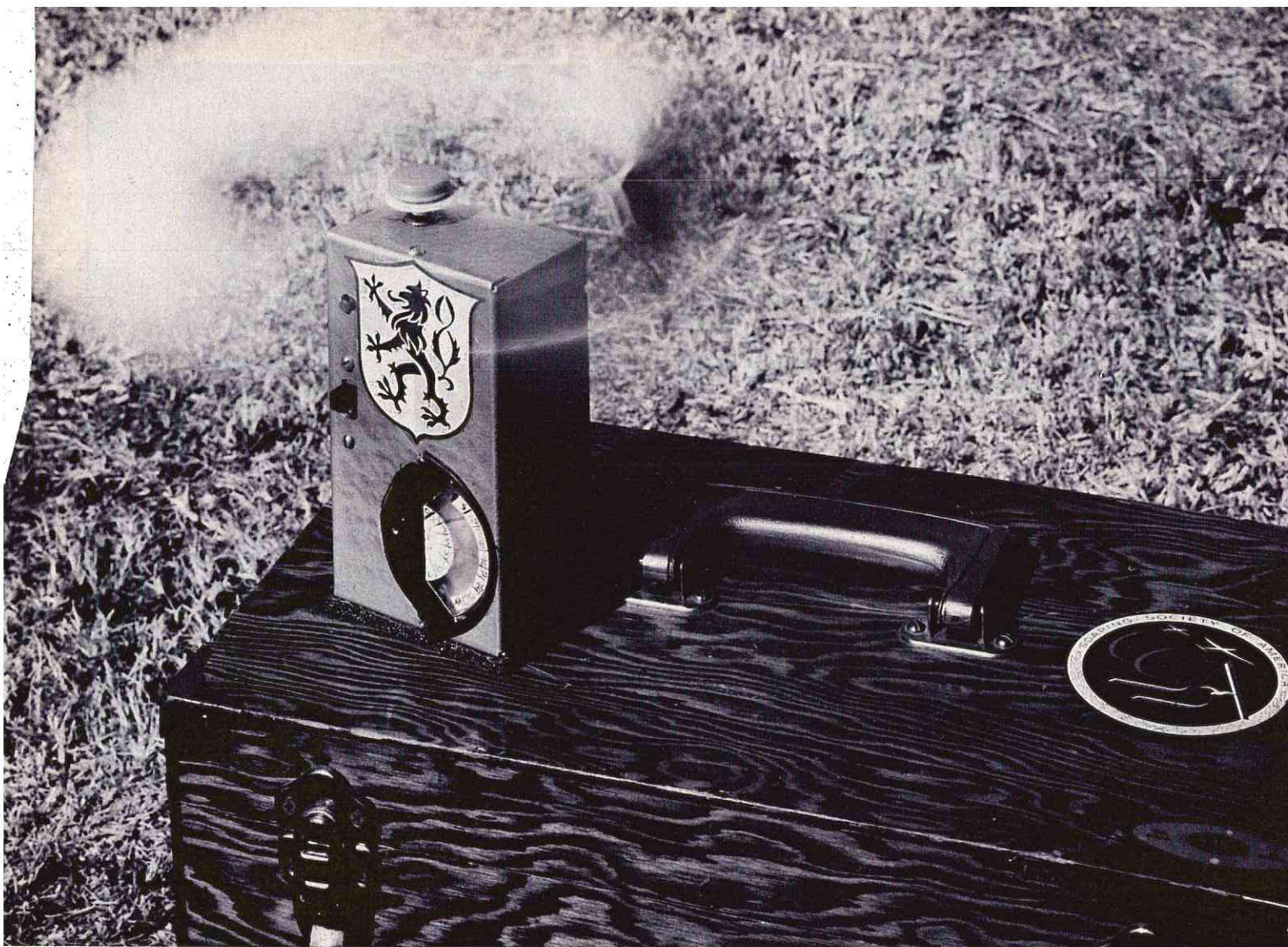


All Fox carburetors are individually checked with air gauges.



TOP ROW, LEFT: Cylinder liners are hand honed to exacting tolerances and are checked on precise measuring equipment. **RIGHT:** Special custom designed machines do their thing to mass produce crankcases. **BOTTOM ROW, LEFT:** Spot welding glow plug elements is an exacting task capably performed at Fox Manufacturing Company. **RIGHT:** Each and every Fox engine is run in a test cell before shipping. Strobe flash stopped props in this photo. Note ear muffs on technician.





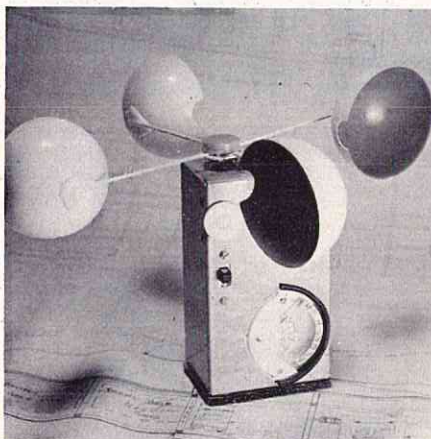
The completed RCM Wind Meter in operation, simple and economical to construct.

RCM WIND METER

An easy-to-build wind speed meter for the soaring pilot.

BY KEVIN FLYNN

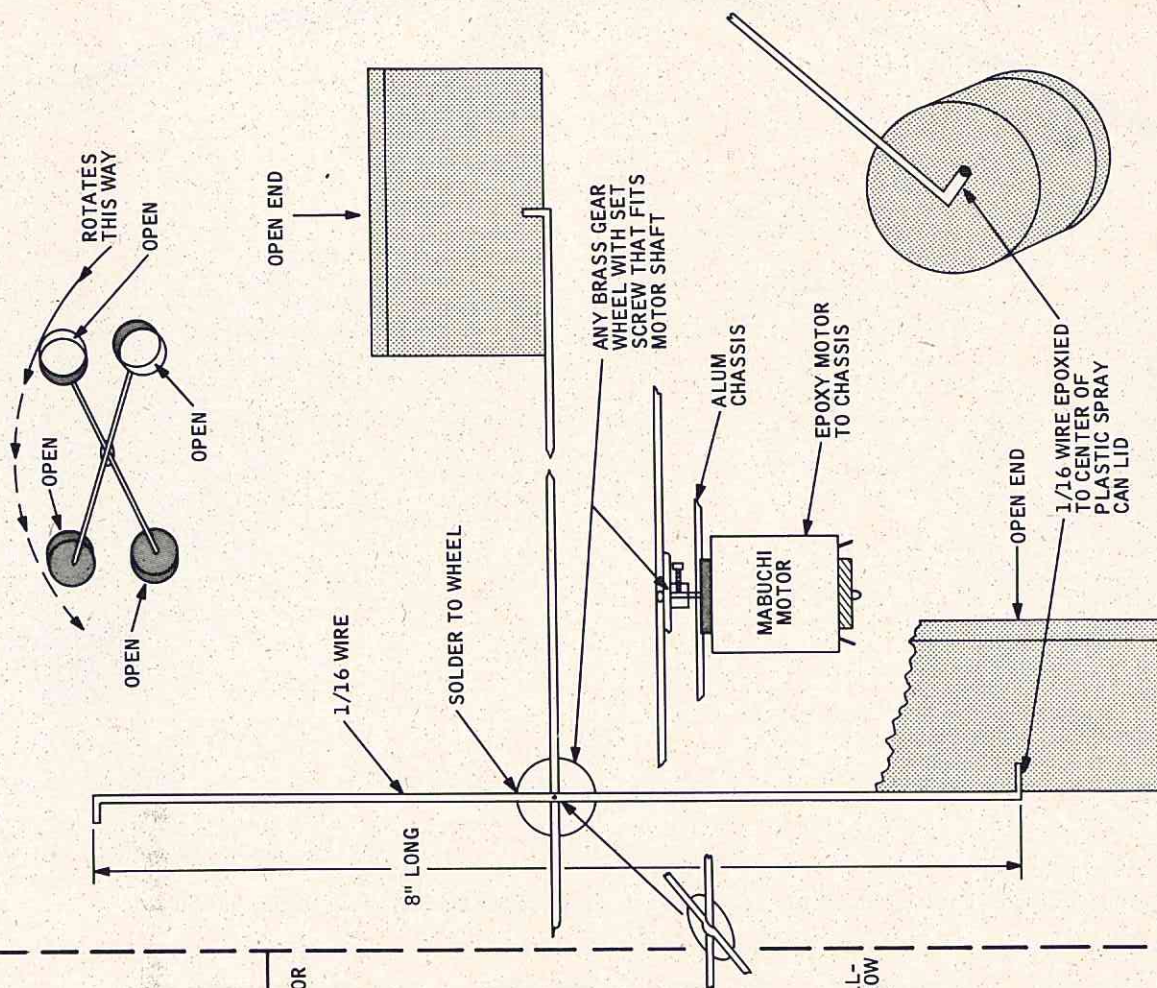
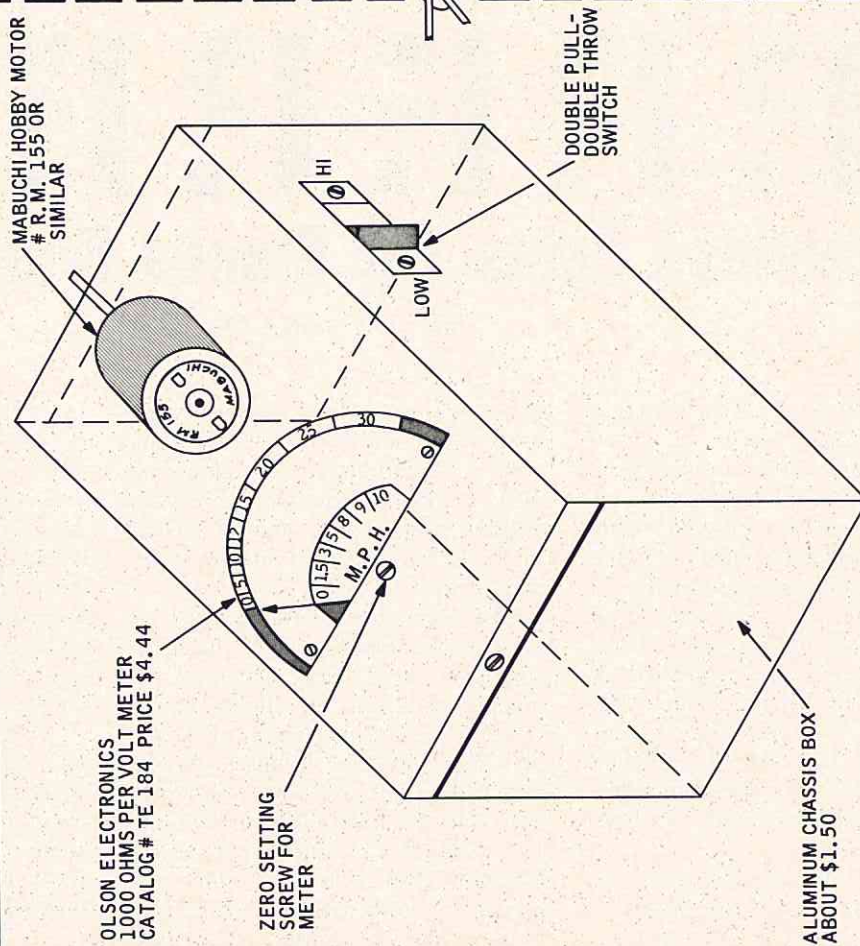
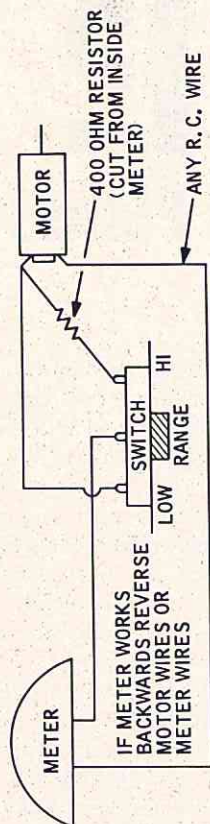
If you are a devout soaring pilot, you've got to rely pretty heavily on the prevailing wind. Therefore, it is a definite asset to know the wind speed exactly as this will tell you whether or not you can fly and, if you can, what ballasting will be necessary. The RCM Wind Meter is really a wind driven electric generator which is extremely sensitive, measuring wind velocity quite accurately from 2 mph to 40 mph, a range which covers most sailplane flying conditions. Circuitry for the Wind Meter is quite simple as is the construction of the Meter itself.



The total construction cost for the RCM Wind Meter is approximately \$8.50 and should entail no more than a single evenings work. Most of the parts for the original prototype came from Olsen Electronics in North Hollywood, but they are available at almost any large electronic shop. The following is a list of parts required for the Wind Meter.

- 1) One thousand ohms per volt test meter catalogue #TE184 (\$4.44)
- 2) One double pole, double throw slide switch (45¢)

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THE WIND METER
DESIGNED AND DRAWN BY K. FLYNN

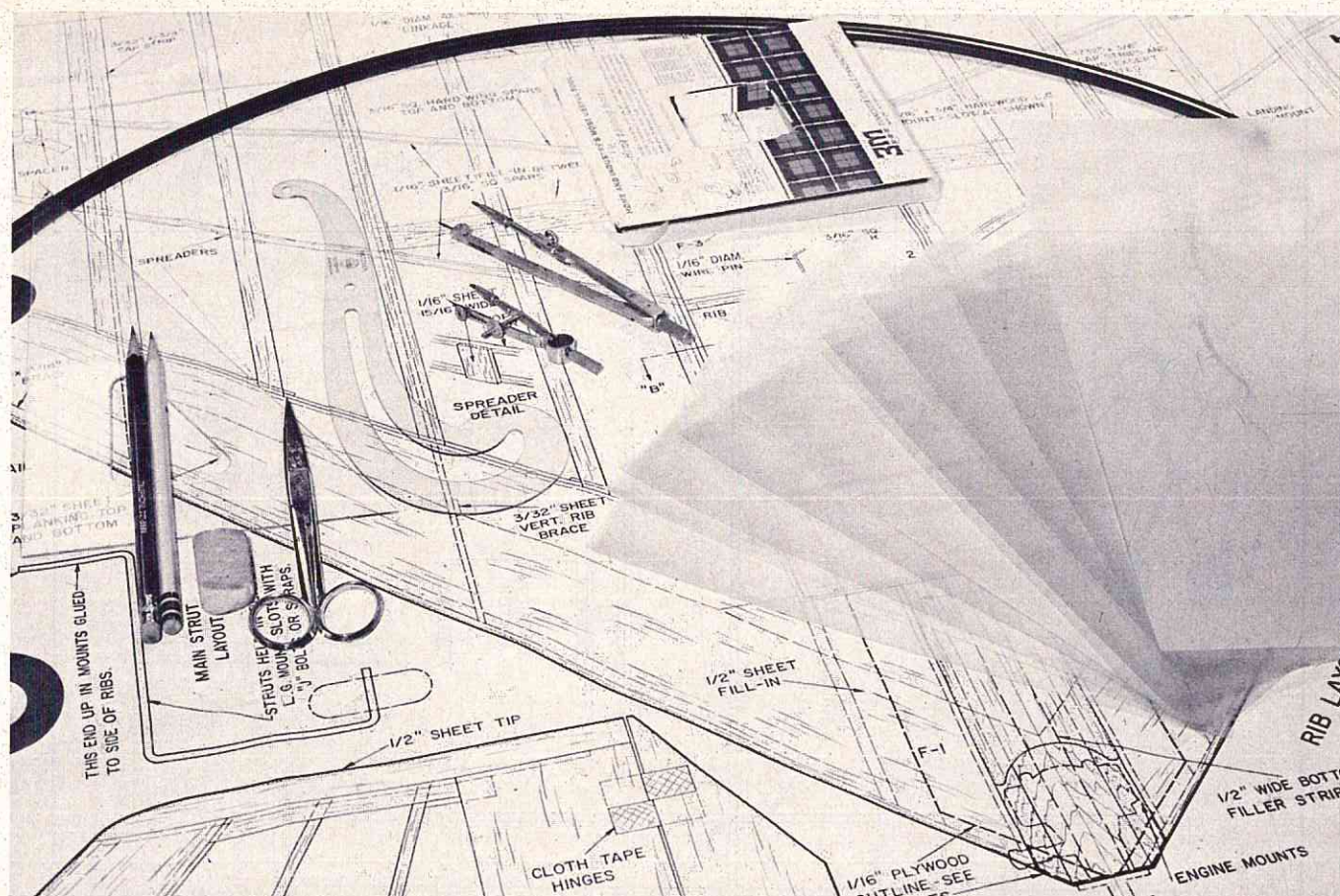


FIGURE 1. The tools for layout on plastic do not have to be expensive. Curves can be drawn freehand, if done carefully.

P.P.P.P.P.

(Painless Parts For Planes From Plans)

BY JIM PHILLIPS

Scratch-building from plans is not always the easiest way to go, what with complicated fiberglass cowls, intricate wire bending, odd shaped cockpit coverings and so forth. But many of us tire of seeing the same models at the flying field every season, with the only difference being the paint jobs so I can tell mine from my buddy's! The Scale, or Stand-Off scale, fan has all too few kits to choose from. Also, most of us, at some time in our modeling lives, feel that we can design just as good a ship as the champions, and are not satisfied until we have tried it.

Another of the trouble spots of scratch-building is getting the shape of a particular part transferred from the

plans to a piece of wood. Some vague ideas have come down over the years, from using carbon paper to gluing the plans directly to the wood and then cutting plan, wood, and all. These methods can be inaccurate, wasteful, and difficult.

For some time I have been using a method that is simplicity itself. It combines speed, ease, economy, reusability as well as the preservation of valuable plans. This consists of the use of a frosted plastic having a ground-glass-like surface or "tooth," on one or both sides, that will take pencil or ink. The material I recommend is called FLEXI-GLASS. It is .007" thick and frosted on both sides. It is available from Studio Specialties, 1623 Palo

Alto, Los Angeles, California 90026, or 409 W. Huron St., Chicago, Illinois 60610. The cost is \$13.95 (including a buck for postage) for a roll 54" wide by 12 feet long. Two or three builders could chip in on a roll, or a club could buy a couple of rolls for selling to the members by the foot. One foot of material, 54" long is plenty to layout almost any large model, or a couple of smaller ones.

Templates cut from this plastic may be used indefinitely to produce new models or to make new parts in the event of a hard landing that requires some rebuilding. Few kits show all parts full size, especially ribs in a tapered wing.

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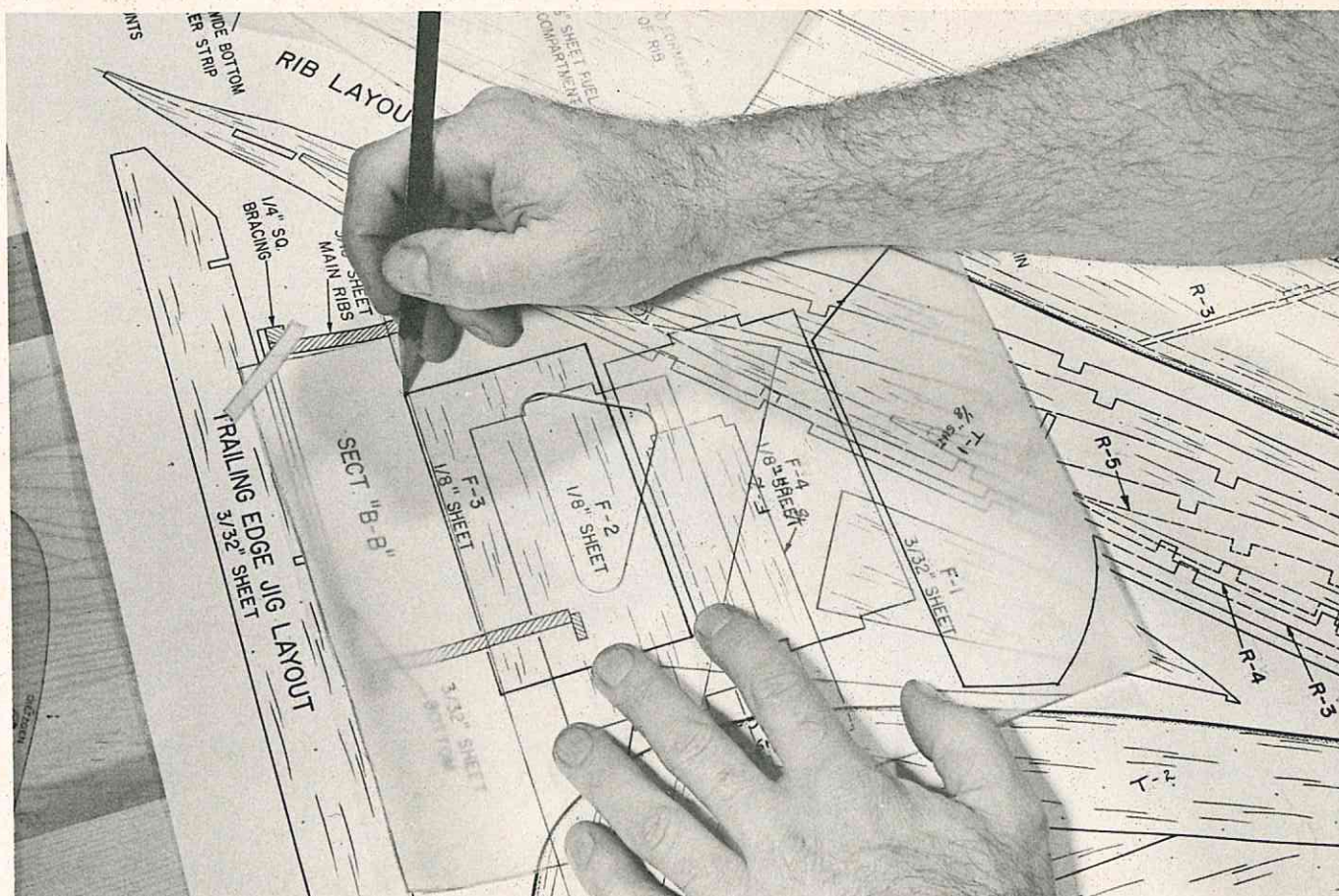
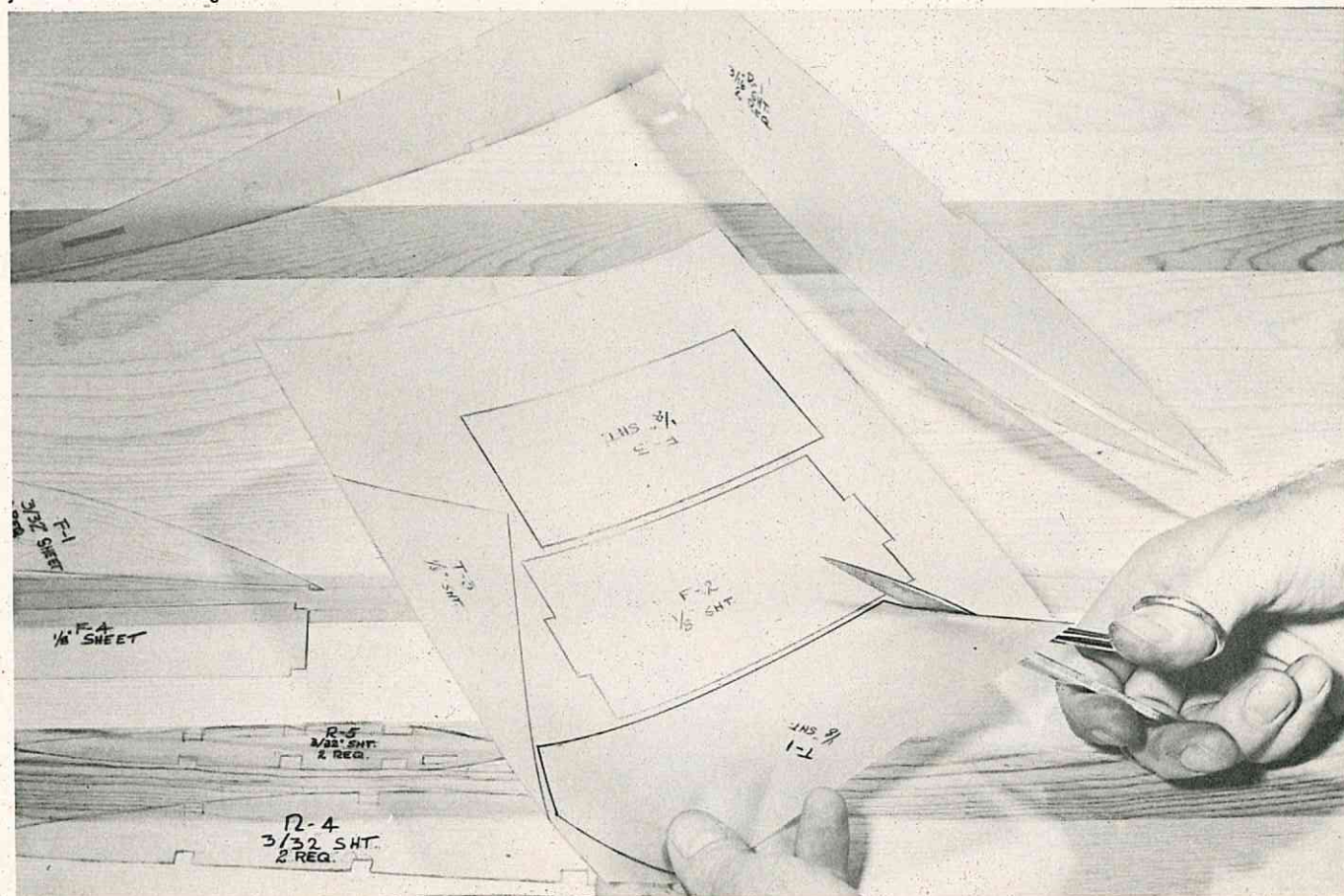


FIGURE 2. Keep your pencil sharp. Fasten plastic to plans securely to avoid shift during tracing.

FIGURE 3. Identify each template as traced, to avoid later confusion. Pattern at top of photo shows how two or more pieces of plastic are joined for easier storage.



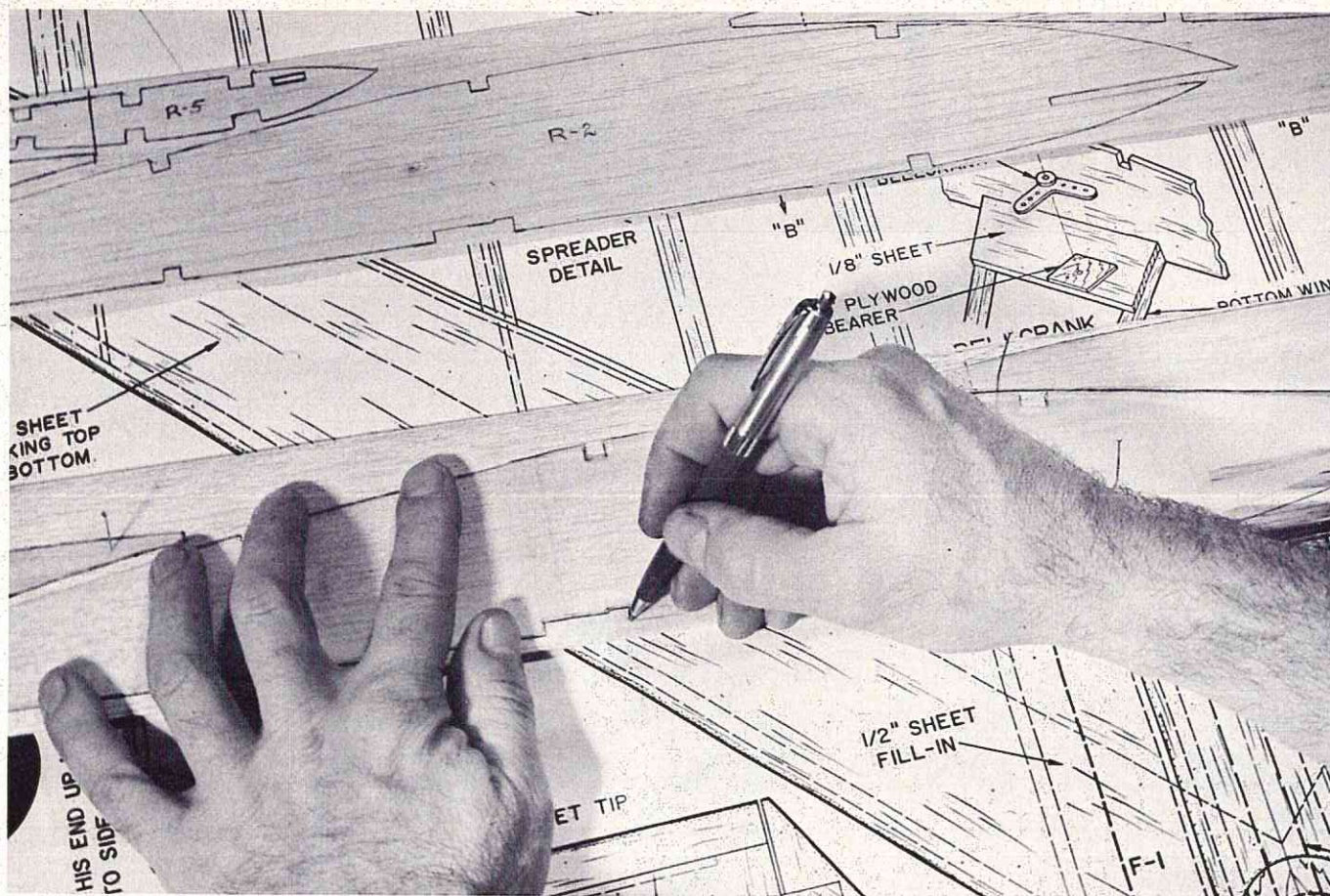
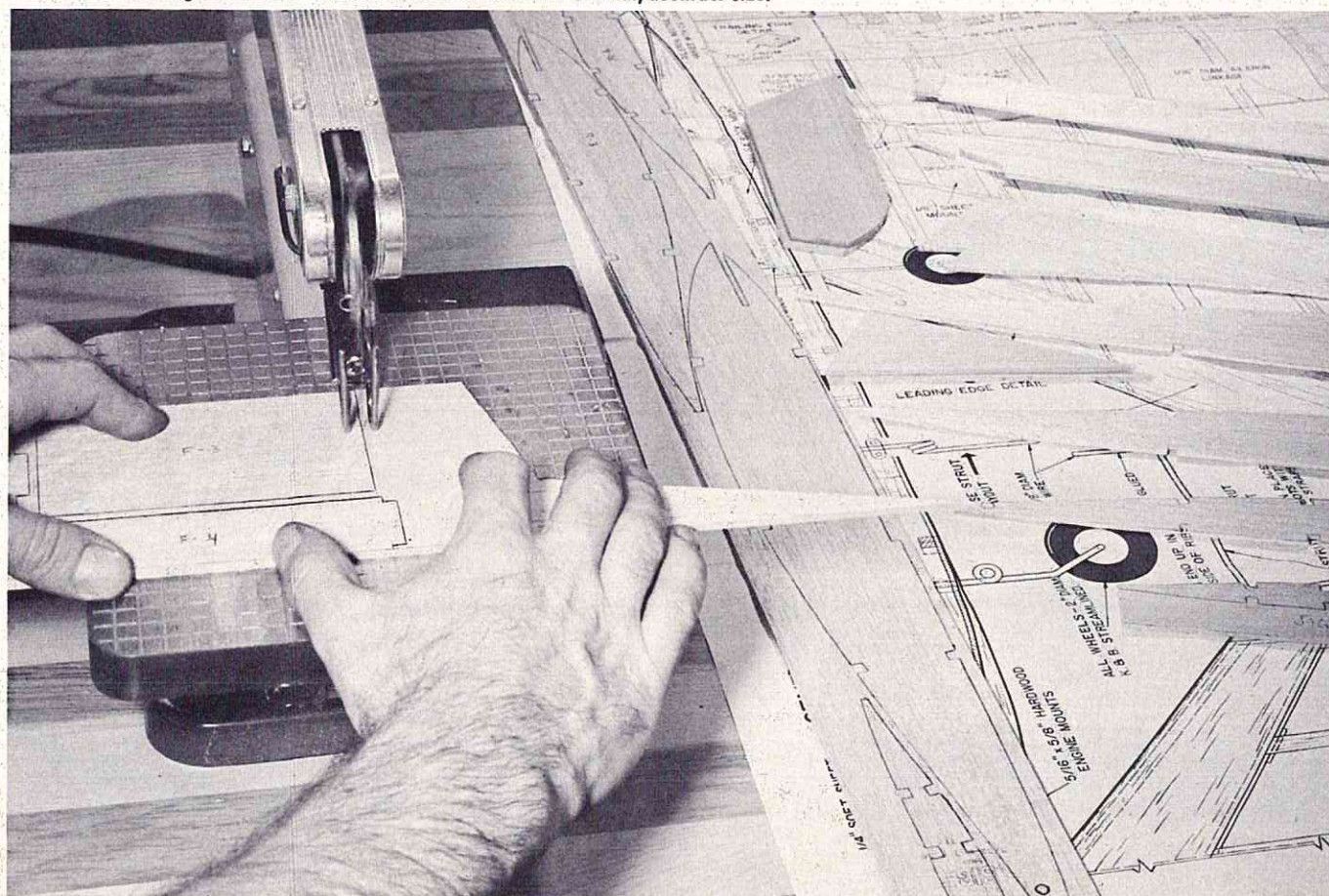
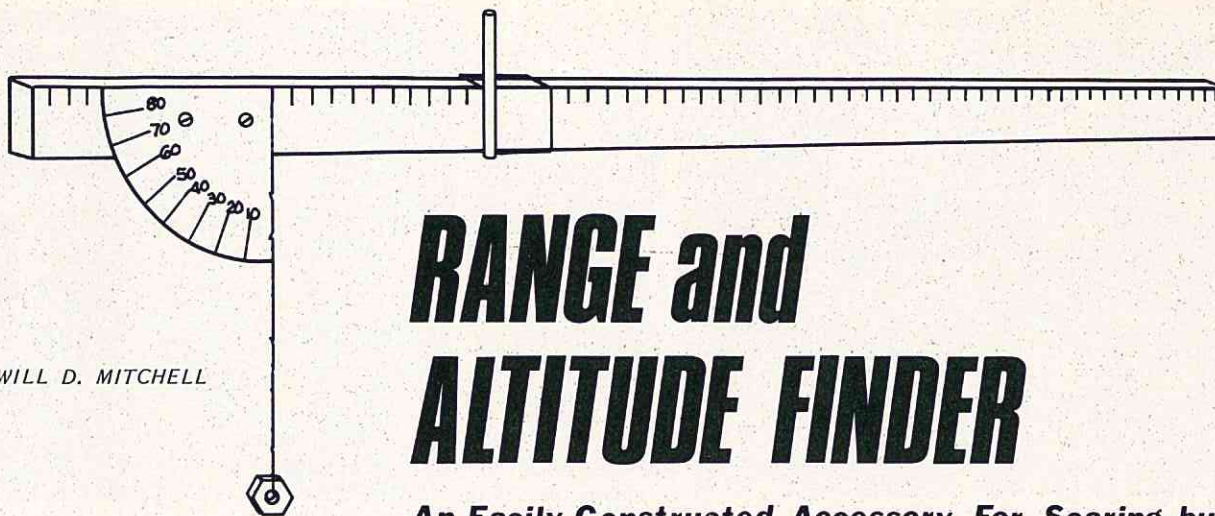


FIGURE 4. A ball point pen is best for tracing part onto wood. Number part as soon as traced.

FIGURE 5. Tracing is over-size — cut on line and sand down to final, accurate size.





BY WILL D. MITCHELL

RANGE and ALTITUDE FINDER

An Easily Constructed Accessory For Soaring buffs.

You're thermalling under two sparrow hawks, when the inevitable question comes from the neighborhood kids you brought along. "How high is it now? It sure looks tiny up there!" "Oh, it's hard to tell," you say. "About a half mile, I'd guess."

It could be 1000 or 4000 feet up, and the eyeball wouldn't really know, you think. We don't get much practice measuring such distances accurately.

Raid the ice box for a beer (for its can, of course). Find a couple inches of .040" wire, an old yardstick and a dime store protractor. A piece of twine and a small weight complete the bill of materials.

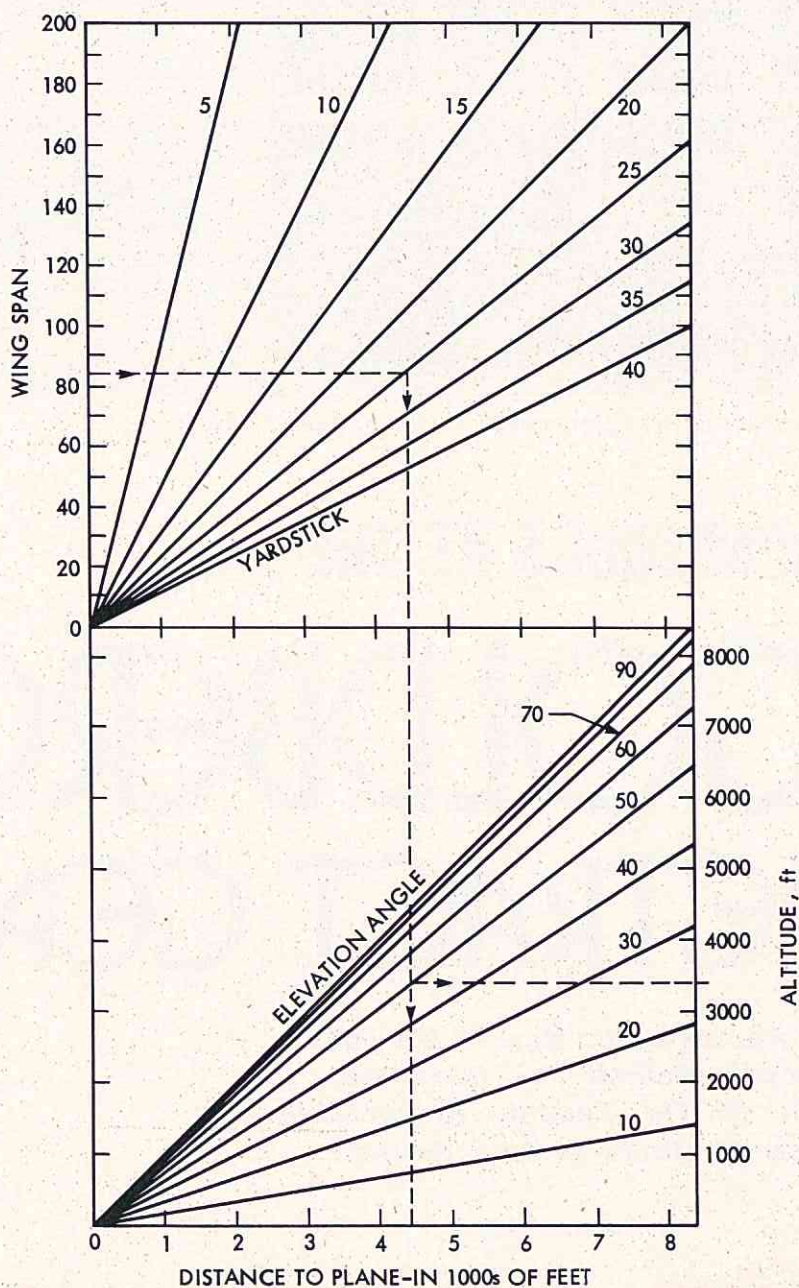
Bend a strip of beer can around the yardstick, and epoxy the .040" sighting pin at one edge. Install the protractor to the yardstick so the weighted string will indicate zero degrees on the protractor when the yardstick is level, and 90 degrees when the yardstick is pointed straight up. Install it around the five inch mark as your eyes can't focus that closely, anyhow. You're done!

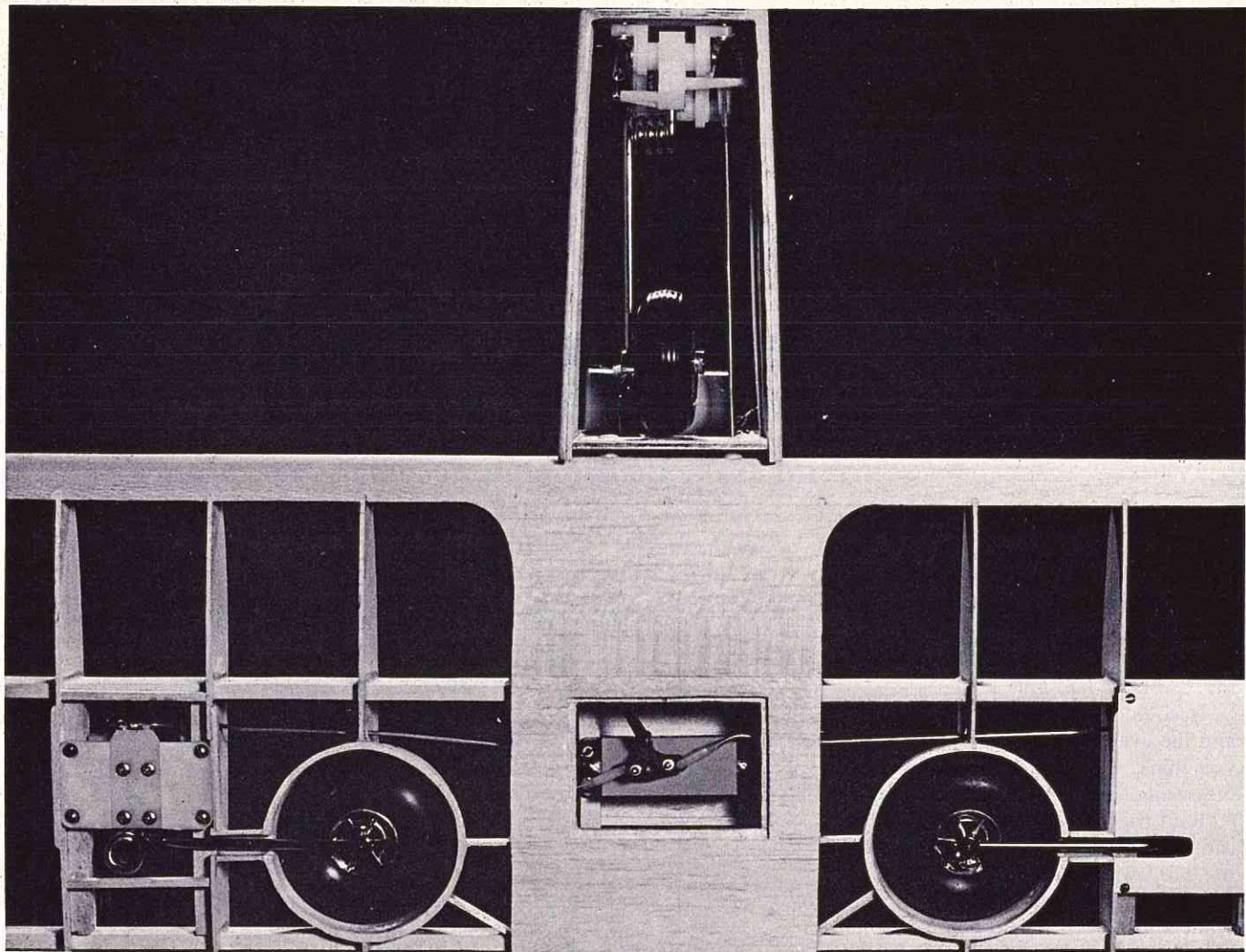
To use the finder, place the zero end of the yardstick next to your eye. Then slide the pin out until the .040 inch diameter just covers the wing span of the plane. Be sure the plane is headed directly toward or away from you, so that you obtain an accurate measurement. Read the position of the pin, in inches away from your eye, and also read the elevation angle of the plane.

Then, enter the chart with your wing span. Proceed horizontally until coming to a line corresponding to the yardstick reading. Proceed straight down until reaching the line corresponding to the plane's elevation angle. Then proceed horizontally to find

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RANGE AND ALTITUDE FINDER
(FOR .04" PIN)





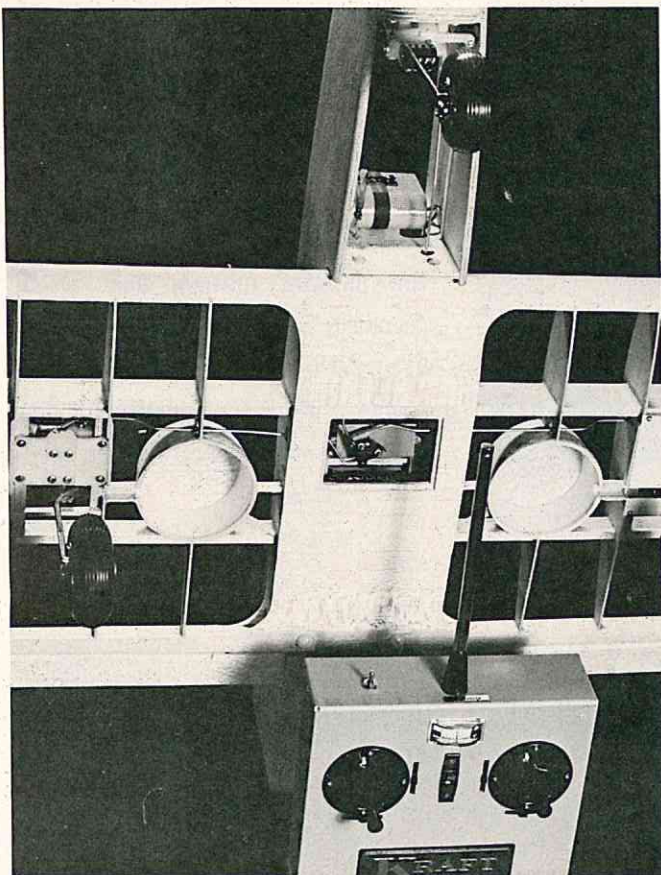
The Goldberg retract gear completely installed in an aircraft mock-up.

RCM LOOKS AT THE GOLDBERG RETRACT GEAR

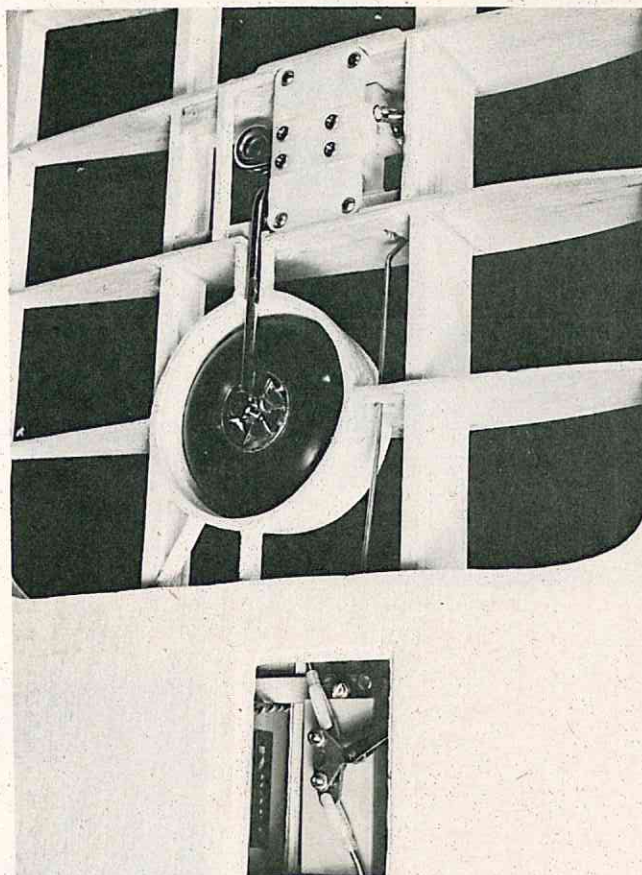
A Photographic How-to On The Proper Method For Installing One Of The Leading Retractable Gear Systems In Your Aircraft.

Retracts are here! If you want to pull up the wheels to clean up your aircraft for racing, pattern competition, scale or just because it looks good, your friendly hobby dealer can provide several excellent retract gear systems to do the job.

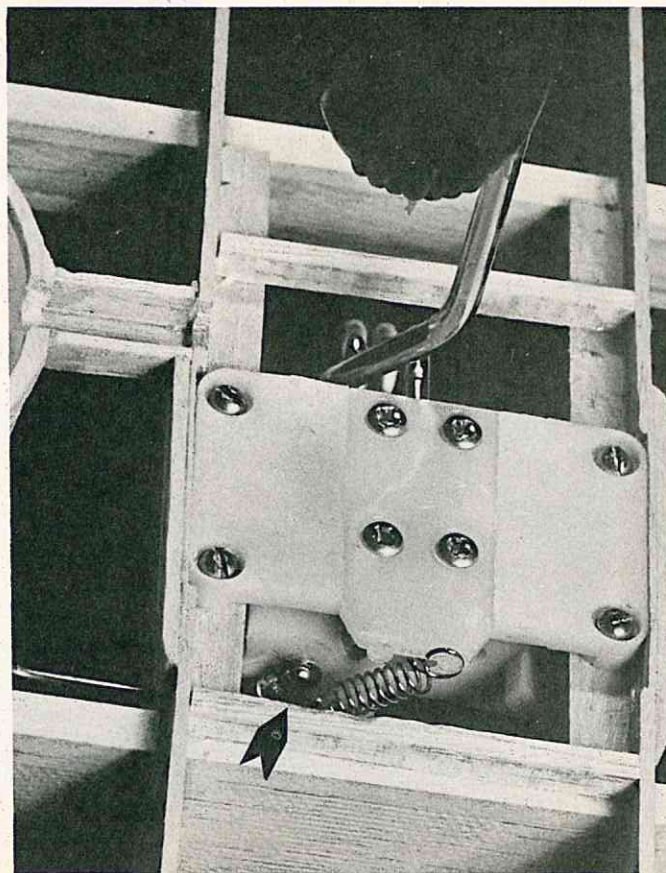
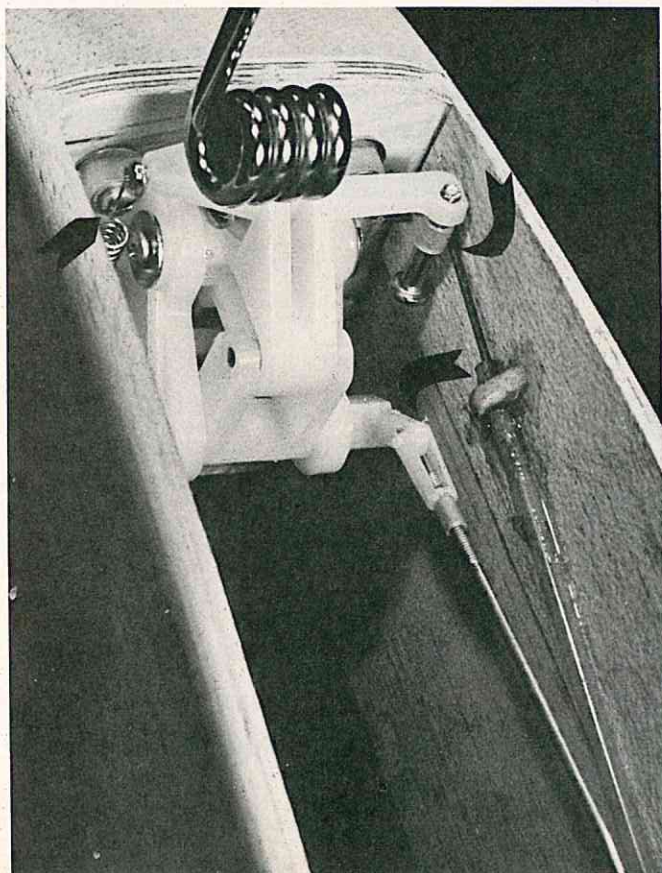
Since the Goldberg gear is one of the most popular, RCM will point out some of its significant installation considerations. A bit of philosophy is required before we start to bolt it in place. The ingenuity of Carl Goldberg has come through with a clever sliding mechanism that automatically locks in both up and down positions and is spring counter-balanced to reduce the operating power requirements. Operating power is an option of the modeler who may provide pneumatic, radio servos, or whatever he prefers. The gear is extremely versatile in its installation potential; the only limitation being the design capability of the modeler. The most important factor, however, is the travel distance of the power source. The photos on these pages tell the rest of the story. □

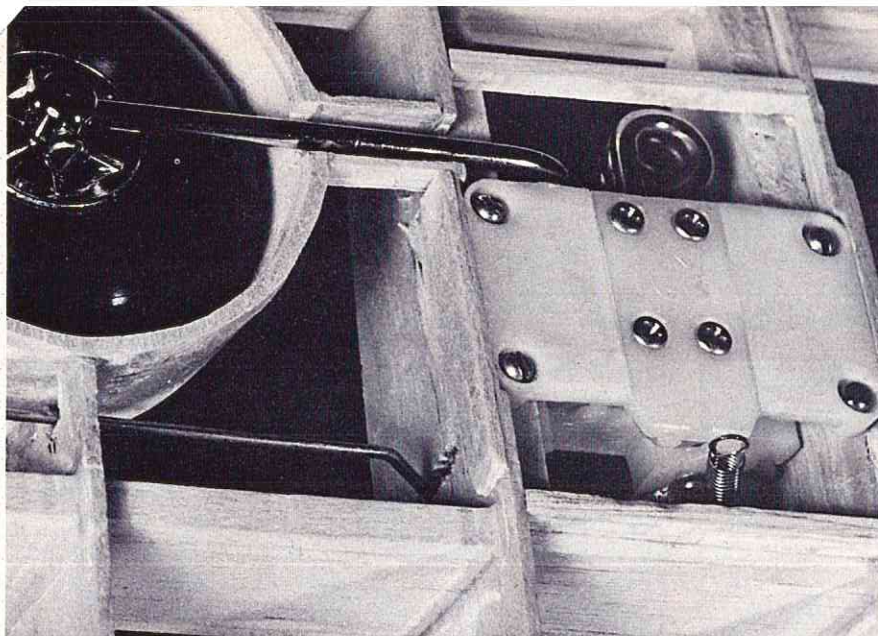


ABOVE: Overall view of trike gear installation. Note retract switch on top of transmitter. BELOW: Nose gear has 3 vital installation considerations: (1) Retract arm must pass center for down lock (lower arrow); (2) Steering link must be on forward side of slide pin (top arrow); (3) Mounting screws must not warp nylon bracket against firewall.



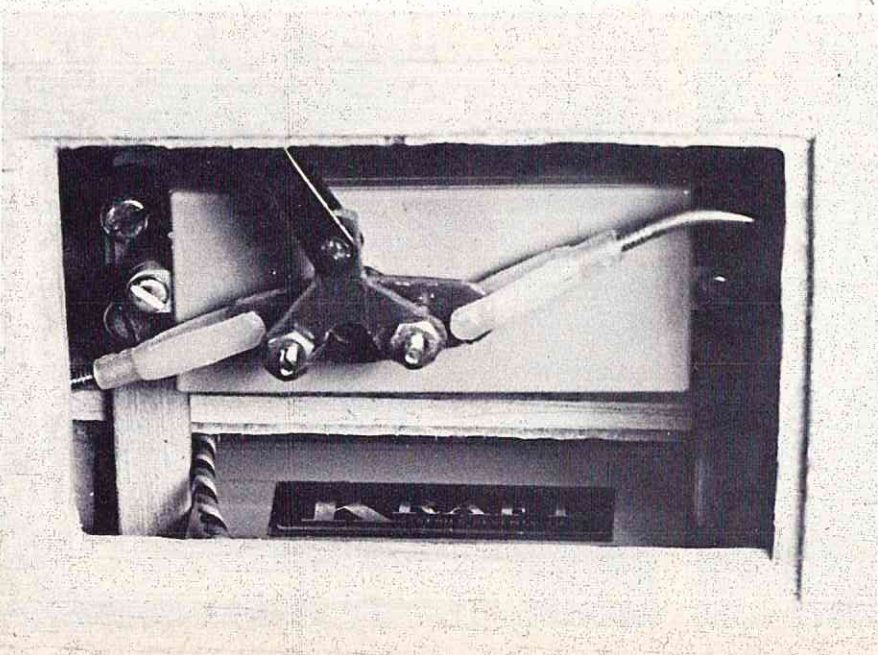
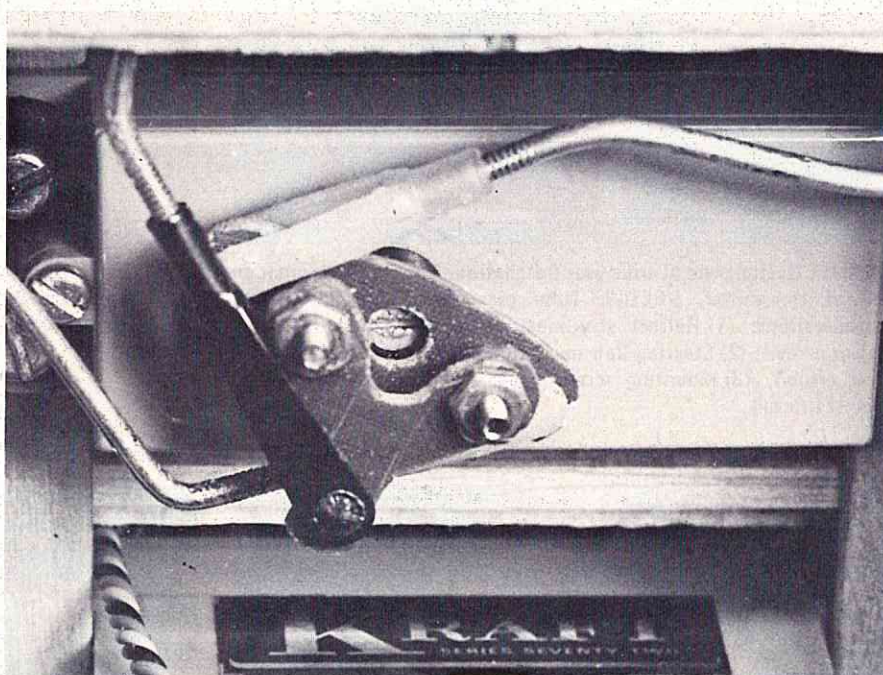
ABOVE: Note that a styrofoam cup has been used as a lightweight wheel well — simple and neat. BELOW: Access is required to remove the screw from the pushrod end for removal of the main landing gear (note arrow).



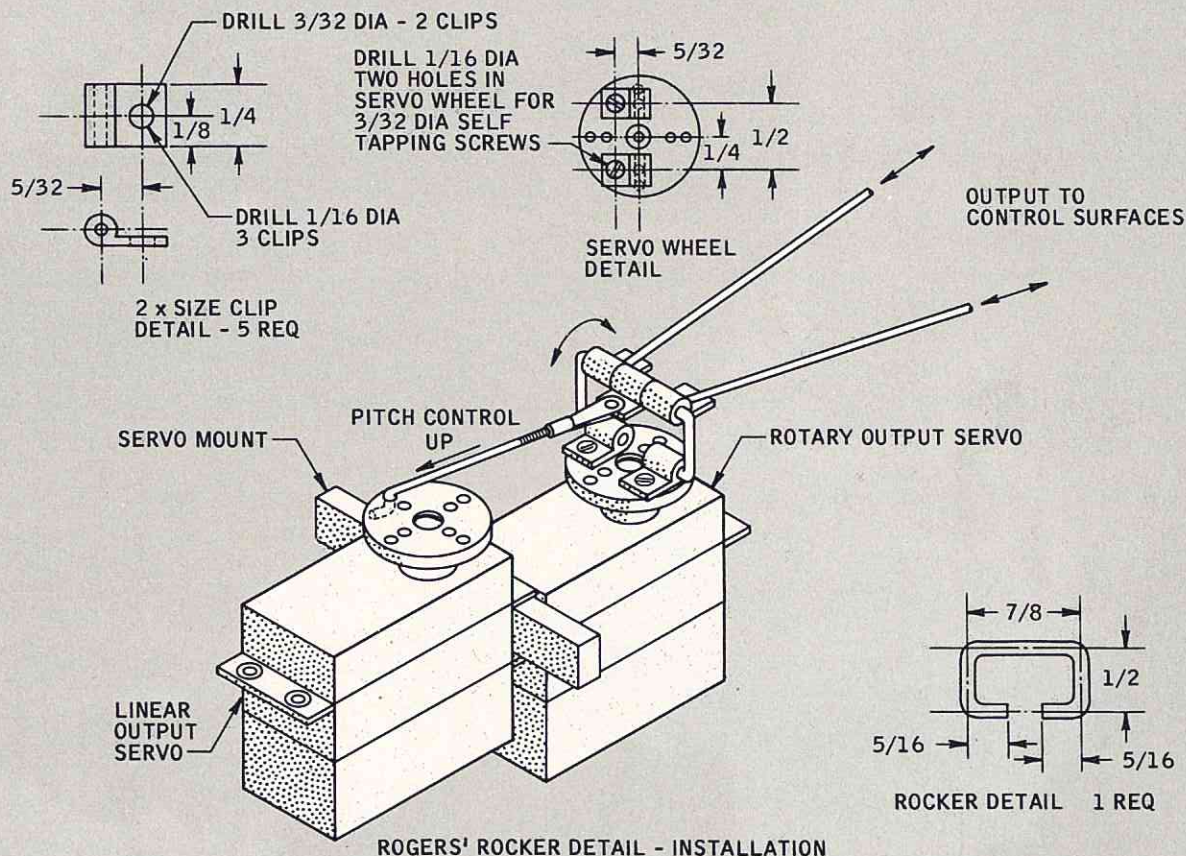


The pushrod routings and overall clearances should be established and set up before the sheeting and covering is applied if it is at all possible on your individual installation.

The adapter arms and pushrods must be tailored to your individual aircraft. The pushrod shown in the photo with a black clevis is for the nose gear.



In this installation, the phenolic output arm adapters have been fitted to a one hundred and eighty degree rotation servo.



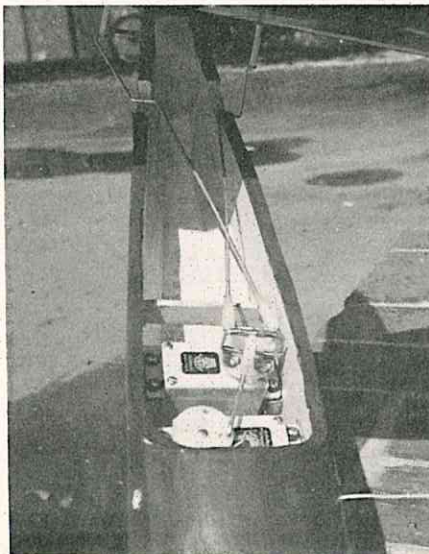
ROGERS' ROCKER

The Simplified Two-Control Mixer

BY BURLYN ROGERS

Many fine model aircraft have been designed which require the mixing of outputs of two primary controls and now here is your opportunity to acquire a control mixer which doesn't involve fancy, delicate linkages or troublesome sliding servo arrangements. It can be utilized in any system requiring the mixing of two servo outputs such as flaperons, elevons, ruddervators, etc.

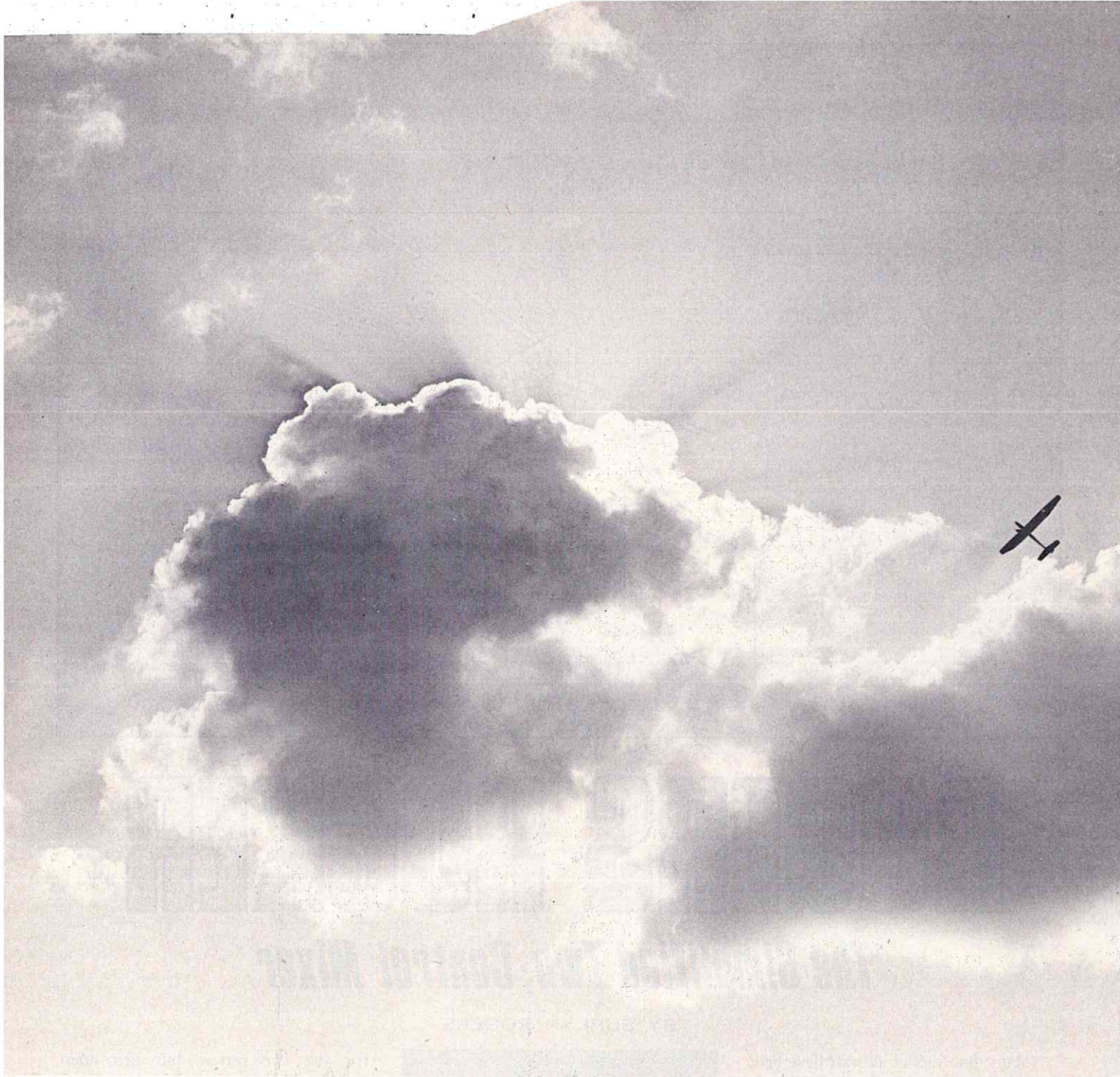
It consists of a simple wire rocker bracket and 5 small clips (plus two servos, of course) and what could be easier than that? The linear output servo is mounted forward and slightly above the rotary output servo as per the sketch. It is not necessary to use the common beam mount as shown



for the two servos, but this does conserve space and pays off if your installation is pretty cramped for space. In addition to being simple, this gadget has the asset of easy availability of material. The clips may be made from any small cabinet type hinge having a suitable pin diameter to match the diameter of wire used for the bracket. The fit of the clip on the bracket should be free, but snug. A little sloppiness here will be detrimental to good control response.

And now a word to some of you sharp engineer types who have noted the off-center location of the pivot for the linear output servo. This was a compromise on my part to enable the

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R/C Sailplanes are generally easy to fly, and provide a good way for the novice flier to gain confidence in his ability. The experienced flier will discover the unending challenge and new skills gained by flying on silent wings. If you are new to this hobby there are several excellent books available at most hobby dealers which explain the basics of flight and introduce the beginning enthusiast to flying R/C models, and we suggest you study one of these. The magazines which are a vital part of our hobby also regularly publish articles which will be very

helpful in gaining more information. We hope that these notes will help you to share the pleasure we have enjoyed in developing and flying these designs.

SLOPE SOARING

In this type of flying the model is launched from the crest of a hill or slope directly into the wind, and is supported by lift generated by the upward flow of air against the face of the slope. The amount of lift generated is dependent on the angle of the slope and velocity of the air blowing

on it. The hill need not be large or particularly steep to generate sufficient lift to support a light model. We realize that some areas are perfectly flat and that slope soaring is impossible, but feel that in many places potential sites are overlooked. The face of a dam or rolling countryside with rounded hills will provide excellent slope lift if the wind direction is suitable.

A wind velocity of 2-15 mph will be most enjoyable for most slope flying with our designs. Higher winds require more skill since the lift is quite

BORN FREE

THE ART OF FLYING R/C SAILPLANES

BY LEE RENAUD

PHOTOS BY ED OKIE

air is smooth. It is a real challenge to fly the model a few feet from the ground, picking up the whispers of lift from a dying breeze as the sun sets.

For the first flights the model should be balanced on the point of the large arrow shown on the plans. Make certain that the control surfaces are at neutral and that the wing is properly aligned. Toss the model directly into the wind in a nose down attitude with the wings level. **Don't point the nose up!** If the lift is strong the model will rise rapidly and you should be prepared to apply down elevator to gain penetration. Use transmitter trims if necessary to achieve straight and level flight. Turn model into the wind and fly along the face of the slope. Turn again into the wind and fly back in the opposite direction. The normal flight pattern is a Figure Eight with both turns into the wind.

Watch the model closely and adjust transmitter trim if necessary to prevent excessive climbing. If the model continues to climb with full down trim we suggest that you land and add ballast to the nose. If the model turns to one side constantly then land and check alignment of the tail surfaces. Be sure that there are no warps in any surface.

Landing on a slope site requires special technique and concentration. As you fly behind the slope the lift vanishes and severe down-drafts and turbulence are common. Start the landing approach high and turn directly into the wind. Keep the nose straight into the wind, diving slightly to maintail speed. Use the elevator control to adjust the rate of descent. Flare out 2-3 feet high and tap down elevator to land. If the model is too high or turns off to one side let it fly out over the slope and try again. It's better to make a new approach than to dump the model into the ground with disastrous results.

THERMAL SOARING

In this type of flying the model is launched by various methods to an altitude of several hundred feet. The model is then flown in a search pattern to find thermal lift which extends the duration of the flight. The rising air present in thermals is the result of unequal heating of the air mass and the resultant lift can carry the model upward out of sight. Unfortunately there are no visible indications of thermal activity and the flier must detect their presence by observing the model in flight, and learning indirect physical events which indicate the likelihood of thermal activity. This is a very challenging sport, and the thrill of finding a strong thermal with a long flight will remain with you a long time.

Launching

There are four different methods usually used to gain sufficient altitude to hunt for thermals. **Hi-Start — Power Assist — Winch — Hand Tow.**

Any of these is suitable for our models and the choice is largely a matter of individual preference. For most situations we prefer the Hi-Start method as it is quiet, convenient to use and permits you to fly alone. If noise is not a factor then we suggest the use of power assist. Winches are generally awkward for a single flier, but if you have the skill to build one, or can use one, give it a try. Hand towing will give excellent results if you have the physical stamina necessary to run at full speed and a helper or stand to hold the model before release.

To use any of the line launching methods your flying site must permit extension of the line over relatively smooth and flat ground 700' to 1000' long into the wind. High growth or shrubs will snag the line making launching the model difficult. If such an area is not available then use the power assist. We have found it helpful

strong and the air becomes excessively turbulent, making the model difficult to handle. For these conditions a different type of model is more suitable for most fliers. We have flown the Olympic and Esprit series in winds up to 30 mph successfully but have not found it relaxing — and do not recommend these conditions to the inexperienced flier.

These models are excellent for marginal slope conditions and will stay airborne when others fall out of the sky. We particularly enjoy flying in the early morning or late evening when the



to S-Turn into the wind when using power as more altitude will be gained by using the wind to assist in climbing. The engine sizes recommended have been successfully used on our test models and provide adequate power to climb quite steeply. Don't use more power as excessive speed will build up tending to loop the model, and to make it difficult to handle.

Flight Trimming

The success of your model, and your pleasure gained flying, is directly related to how well you trim the model for flight. No matter how well the design is tested and parts fabricated and assembled, each model is unique and the flier must learn its characteristics to derive the full potential of his craft. Each step should be thought out carefully and adjustments made one at a time to see their effect. Trimming is normally accom-

plished in two stages but may continue for hundreds of flights, particularly for competition flying.

STAGE I - PRELIMINARY TRIM

If you have built the model carefully and completed the pre-flight checks this stage should go smoothly. We do not recommend hand gliding to verify trim since it requires skill to launch the model and to interpret what is happening with short hand glides. It is easy to damage the model if launched incorrectly and only rough trim can be established due to the influence of ground effect. One of the advantages of radio controlled flight is that you can fly the model in an untrimmed condition and we suggest you "go for broke" on the first flight. If you are using an engine, use enough fuel for a run of about one minute, and adjust engine for smooth power, slightly rich from the peak needle

valve setting. Launch with the nose level and with the wings level with the horizon letting the model fly out of your hand. **Don't push!** It should go straight ahead for 25 to 75 feet then start climbing. Kill any excessive climb by applying down elevator but keep the nose up. The model will probably have a slight left turn which can be eliminated with right trim. Try to establish a straight climb with the nose up 1-20° using trim or the stick until the engine quits. Don't worry about getting maximum altitude yet.

For Hi-Start flying stretch the rubber back at least twice its relaxed length if using surgical tubing, or as recommended by the supplier of the Hi-Start. Don't be afraid to extend the rubber as a weak start will prevent the model from climbing. Release with the model slightly nose up and with the wings level. Correct any turning tendencies with opposite rudder control

and use elevator to control climb angle. If the wind is very light you may need to hold up elevator to maintain the climb. This may cause a tendency to weave back and forth, which can be corrected by opposite rudder commands or releasing the stick. If the model does not release at the top pulse full down elevator to drop the towhook. Launching with a winch or hand towing is similar.

O.K., there you are starting to glide. Let the model settle down from the launch which is faster than normal glide speed and may cause slight zooming. Correct any violent attitudes with appropriate control. The model should be flying straight ahead in a slight nose down attitude. Get the nose straight into the wind and check for any turning tendency, correcting with trim if necessary. If the model appears to be in a shallow dive add up trim to flatten out. If it flies in a series of roller coaster dips with the nose rising and falling (stalling) add down trim. Aim for a straight smooth glide using the trim controls plus stick commands if necessary. Don't worry about how flat the glide is yet but start thinking about your landing approach. Give yourself plenty of room and line the model up with your landing area. Don't worry about hitting a spot but concentrate on keeping the wings level and making sure the nose is slightly down. Let the model fly into the ground — don't try to flare out as with a power model.

Don't touch the transmitter trims until you have adjusted the tail surfaces. If you have right and up trim on your transmitter then adjust the clevises to move the rudder slightly right and the elevator slightly up. Launch the model again remembering that any control adjustments will affect the launch. Repeat if necessary until the model is gliding with neutral trim at the sticks. This completes stage one.

STAGE II — FINAL TRIM

At this point your model is flying successfully and you have gained confidence in your ability. Now you are ready to improve the glide and start hunting thermals. Fill the tank or pull the Hi-Start back further to get more altitude. Establish the glide path as before then start feeding in up trim. Watch carefully for stalling tendencies. Adjust trim until the model just starts to stall. The model should now be flying more slowly than in stage one and coming down much slower. This is

minimum sink trim and will give the greatest duration from a given altitude. If the air is perfectly calm the transmitter trim lever should be almost full up on most systems.

Add ballast to the nose if necessary to achieve this condition. Adjust for a slight stall in full up trim and add turn to kill the stall. The nose of the model should be slightly down at this trim. Be careful not to trim for a flat mushy glide where the model looks as if its gliding flat but comes down quickly. The best way to check this is to time several flights while adjusting trim slightly each flight for maximum duration. Since most flying will be done while some wind is present these trim settings will not be suitable for general day time flying. As the wind velocity increases more down trim will be required to maintain penetration and avoid stalling. Also, remember that turning will reduce stalling tendencies very effectively. In high winds the model will require full down trim and perhaps down elevator to fly upwind. For general flying neutral trim with occasional elevator commands will work out well.

If local conditions, or your preference warrant, the above suggestions should be modified to suit. Obviously if its usually windy when you go flying then a forward balance point and neutral trim will give best results. If your flying is only on calm evenings then move the balance point rearward with neutral trim. Experiment with balance, control positions and throw until the model is set up to your taste.

FINDING LIFT

In most instances lift is the result of warm air rising. The intensity of lift varies from the strong rising currents which carry your sailplane swiftly upward to conditions where the flight lasts an extra minute with no visible activity, such as on late summer evenings. By studying the weather and surrounding terrain while observing your model in flight you can learn to find lift.

Thermals are strongest over dark surfaces surrounded by lighter colored areas. Large asphalt areas such as parking lots or roads in the midst of fields or wooded areas will almost always develop lift. The thermal is easily visualized as a large inverted funnel with the narrow end near the ground. Often fleecy white puffy clouds called cumulus form at the top of the funnel, and these clouds always indicate thermal activity. Early in the

day the thermals are well defined and quite localized. As the day progresses they tend to merge and become larger. Later in the day large masses of air rise without strong local thermals, finally the air cools and the rising air disappears. The strongest lift will usually be found between 10:00 A.M. and 2:00 P.M. The funnels of air will be distorted by wind and tend to lean downwind. Also they break loose from the ground and re-form, often at regular intervals. If you are standing in the middle of a field and feel a sharp warm breeze that dies down and then repeats this cycle, those are thermals and it's time to be in the air.

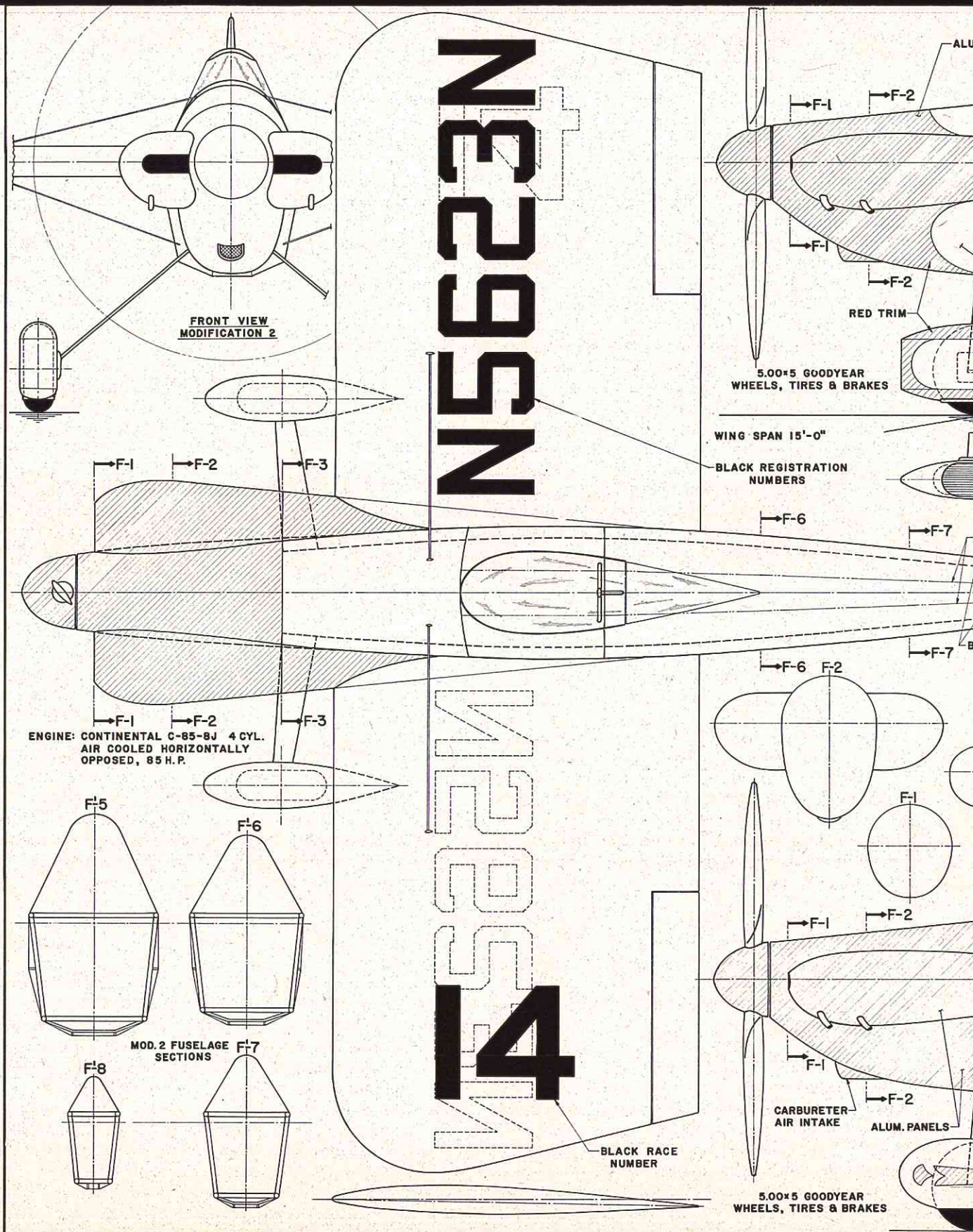
If the model is properly trimmed it will provide strong indications when it flies into rising air. Most often it will suddenly turn sharply without any command. Immediately turn the model BACK in the opposite direction and maintain a tight flat circle, using elevator if necessary and watch it go up. The wings may rock once or twice without turning the model. This is also indicative of lift, and try turning in both directions if necessary to find the thermal core. Sometimes the nose will suddenly bob up and down, also an indication of lift. Remember to turn tightly so that the sailplane stays inside the thermal.

Soon you will latch onto a strong thermal which carries the model upward quickly. BE CAREFUL! It is very easy to fly up out of sight and to lose the model, which is quite frustrating to say the least. You must fly out of the thermal before the model gets hard to see, and it requires conscious effort to do this. Usually if you turn and fly straight upwind the model will fly out of the lift and start down. If not, then apply down trim and down elevator to set up a shallow dive. Your pullout must be smooth and slow as hard up elevator after a dive can turn your sailplane into an unguided missile with the broken wings floating slowly down. We have also had good luck by applying full up elevator and looping the model down. In windy conditions a long slide-slip set up with rudder and elevator against the wind will bring the model down safely.

These words only brush the surface of the thrill and challenge of R/C Sailplanes. There is no substitute for flying, and directly experiencing the pleasure of seeking those elusive currents of air. Flying your sailplane often and in varying conditions is the best way to master this sport.

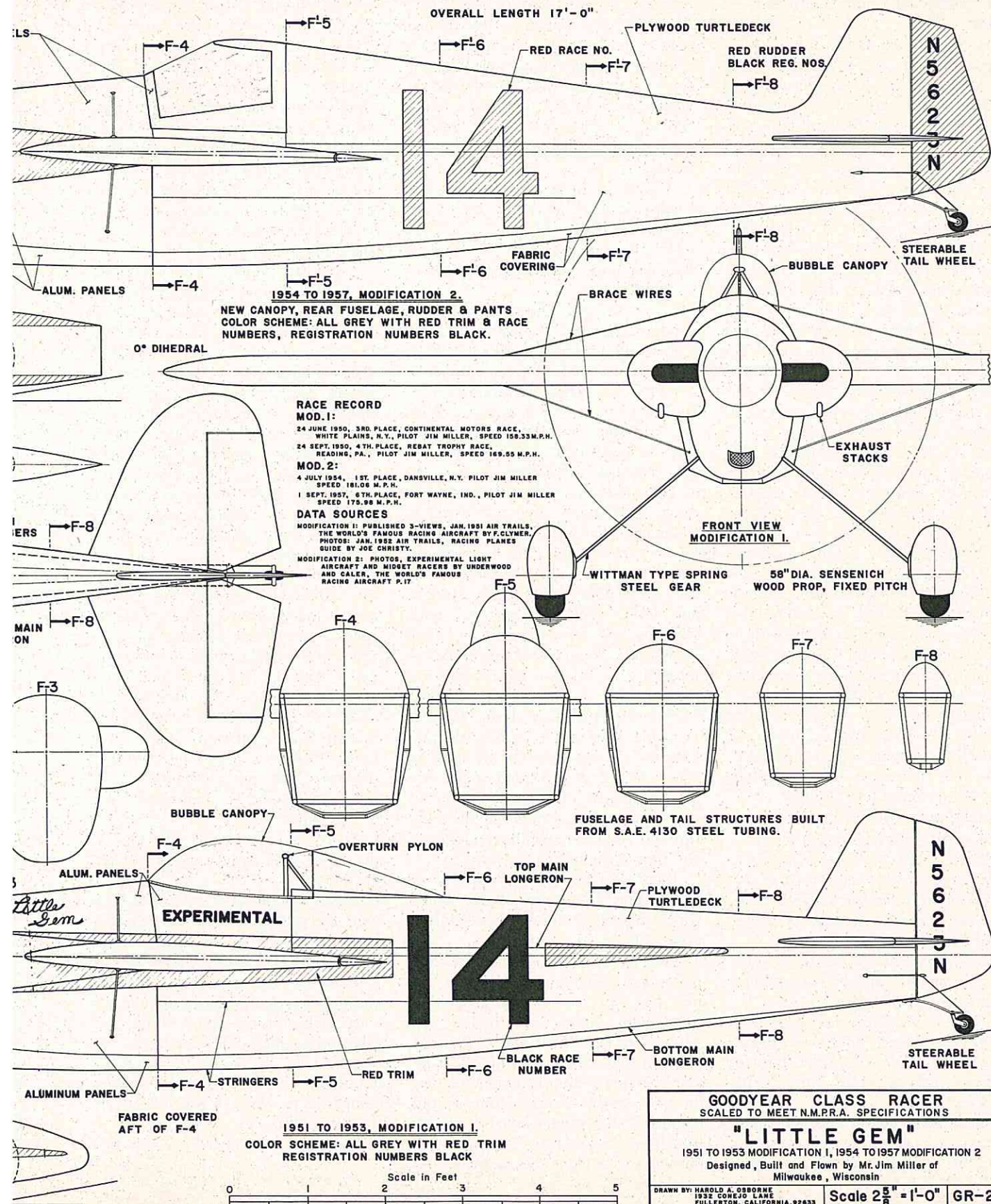
Good Flying. □

MILLER "L"



PRINTS OF THE DRAWING ARE AVAILABLE IN TWO SIZES; TO GOODYEAR RACE SPECS. PRICE \$3.00 POSTPAID, FIRST CLASS ADD \$.50, AIR MAIL ADD \$.75. TO QUARTER MIDGET RACE SPECS. PRICE \$2.00 POSTPAID. FIRST CLASS ADD \$.25, AIR MAIL ADD \$.50. ORDER FROM HAROLD OSBORNE, P.O. BOX 2033, FULLERTON, CALIFORNIA 92633.

"LITTLE GEM"



SUNDAY FLIER

KEN WILLARD

Dammit, I hate to complain, but if they keep it up, they're gonna' ruin our hobby of radio control sport flying!

It's our own fault, though. For years now, our over-sensitivity to the image of boys with toys has kept us always on the lookout to prove that our sport has some highly useful capabilities.

Like pleasure cruisers, for example. Used to be that's all they were. But when hundreds of them went across the English channel to bring back thousands of English soldiers and their allies in the retreat from Dunkirk during World War II, they suddenly became rescue craft. And now many pleasure cruisers are part of the auxiliary of the U.S. Coast Guard. So the old man can tell his wife, "Look, honey, I know it costs money to run this cruiser, but you never know when the Coast Guard will need help!"

Of course, I have an excuse, too. "Honest, honey, I've got to go put a couple of more test flights on this model before I wrap up the design for publication!" And, for you guys, if you haven't already thought of it, you might try, "I've got to check this modification I made to that last design published in RCM; I think they blew it!" You might even get away with it.

But the best reason for going flying is that you're developing something really useful for mankind, rather than just having fun. Take, for instance, the modeler over in Switzerland who used his R/C job to string some communication wires between some mountain tops. Great excuse to go flying!

Then I see an item from UPI:

Mosquitoes Sprayed By Toy Planes
Newark, Del. (UPI) --- King-sized model airplanes are being used at the University of Delaware to find safer and more accurate methods of spraying for mosquitoes.

The remote control planes are used in experimental spraying operations.

Hard to beat that, too.

Then there's Larry Leonard, Bob Smith, Jan Sakert and Dick Riggs, flying their RPV's (remote piloted vehicles) — just like they were flying model airplanes!

Oh, I could go on and on — Ben Gadeborg flying the asymmetric wing model of a supersonic concept, and

another guy who's been seen flying a crazy looking biplane that some kind of research craft might look like. Then there's the development of the thermal sensor for sailplanes, refined into a differential sensor up in the Washington area, so that you not only know when you're in one, you know which way to go to find one.

It's just getting too sophisticated, fellows.

But all of these activities pale into virtual insignificance as the latest scientific enterprise bursts upon us. I refer, of course to the electrostatic stabilizer under development by Maynard Hill.

Now everyone knows Maynard — a good, better than average run-of-the-mill world record holder with about seven records under his belt, which he got for going higher, faster, farther, or staying up longer than the rest of us. All with some well-built, but more or less standard type models which he just made perform better.

Now look at what he's gone and done. Figured out that the world is surrounded by electrostatic charges, in layers yet, which can be used to transmit impulses to sensors, and if you want your model to fly straight and level, stick a sensor on both wingtips, and up in the nose and back in the tail. Then you set the sensors so they all get the same signal level from the electrostatic field and presto! Straight and level it is! Then, you put in some kind of a differential rate between the nose and the tail and you can make the model climb or dive at a pre-determined rate. Or, you can do the same to the sensors on the wingtips and you can make the model bank and turn at the rate you want it to.

Right at the present time, so I understand, there are certain limits which prevail, but just think of the potential!

Let's go back a bit. Remember the old tuned reed systems? A lot of you may not; the receiver had a bank of some eight tuned reeds, and if you pressed one button, it sent out a tone to the receiver, the reed picked it up and operated a motor in one direction on the servo; another tone would operate it the other way. Same with three other servos. Now, as long as you pressed the button, the motor would

run, thus running all the way to the end of the line if you held the button down. But you could push the button until you got just the right amount of control surface movement and, then by carefully pulsing the the button, hold it there.

Actually, the circuits were closed, not by pushing buttons but by operating toggle switches, which were center spring loaded. Thus, you could push the switch to the left, pulse it, let it neutralize, or pulse it to the right if it didn't come back fast enough. Same with up and down elevator, and motor, except motor wasn't centering; you could feed in a little more to take some out. The toggle would come back to neutral, but the engine control would stay put until you moved it in the other direction.

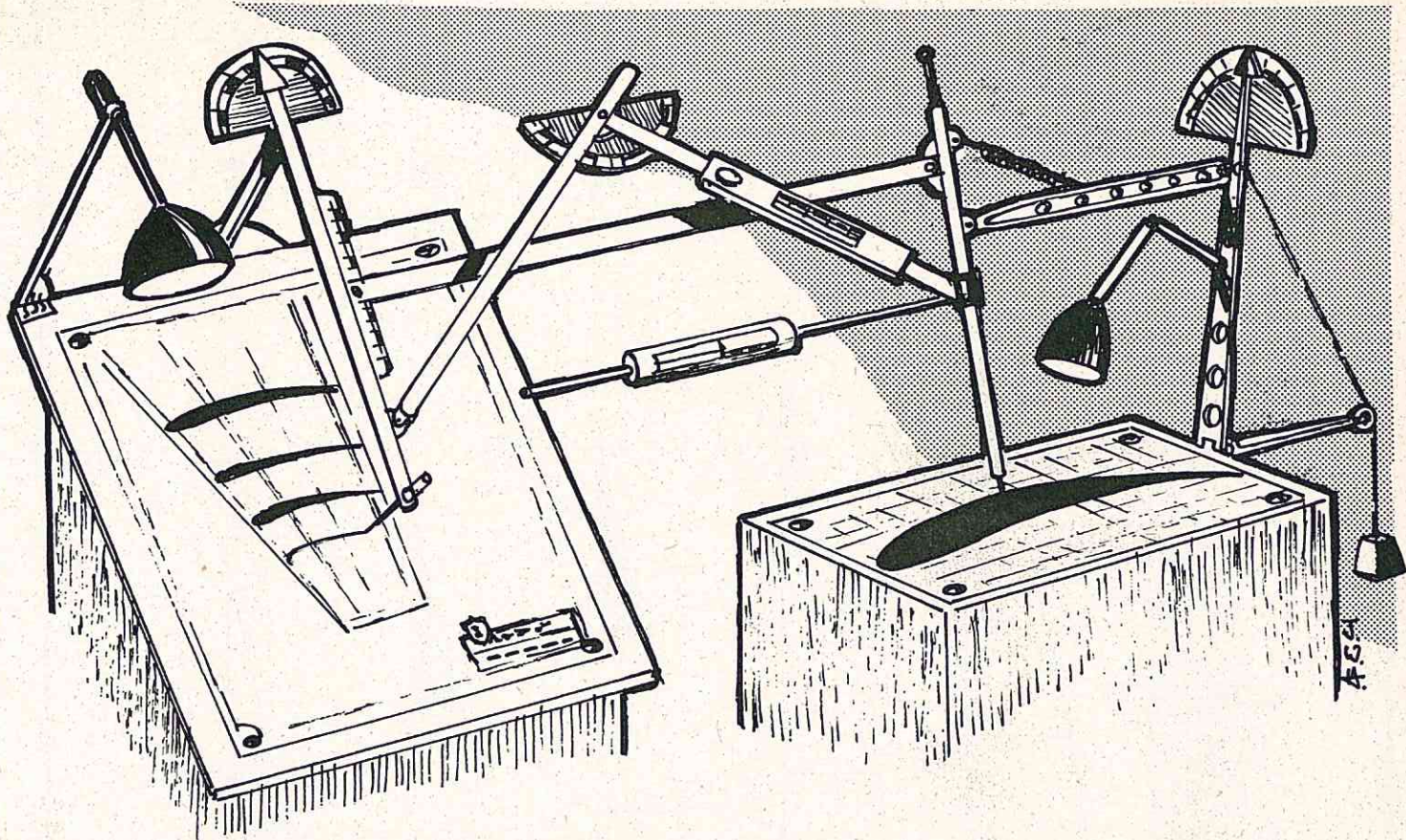
Sound complicated? Yes, compared to today's proportional rigs. But you should have seen Bob Dunham handle it. What a virtuoso! Back in 1959, at the Nats, where they had a monitor to check interference, you could hear the pulses. Bob played his transmitter like it was a percussion musical instrument; the pulses, coming in eight different tones, played a tune like you've never heard before or since. Bob was so smooth that you'd swear the plane was controlled by proportional, except that you could hear the staccato tones on the monitor.

At the time it gave rise to a great idea. Have Bob fly the full pattern, and at the same time, tape record the tones as they came beeping out of his transmitter. Then, with the tape, rig up a feedback system so you could play the sequence back into the transmitter, then send it out to the model. Instant Nats champion! Make a fortune selling tapes. As a matter of fact, the music Bob put out sounded a lot better than some of the junk you hear on the radio.

Of course, there was a slight flaw to the idea. The wind might not cooperate.

Now, though, take a look at Maynard Hill's development. The electrostatic field, in layers, isn't blown around by the wind. Think of the possibilities. The rate of development of control systems seems to increase with each passing year — along with other technological developments. The electrostatic sensor of today is undoubtedly crude and rudimentary compared to what it will be, say, in the year 2000.

So let's look ahead to the first
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DRAWING TAPERED WING RIBS

A Simple Graphic Technique For That Tapered Planform.

BY J.W. HEADLEY

Plotting wing ribs is such a pain in the neck (to me anyway) that my models usually end up with parallel chord wings, and even getting that one solitary rib drawn is enough of a nuisance. Of course there are other ways of getting varying sizes of wing ribs; you could make up a photograph negative of the basic shape then enlarge it to various sizes, or you could use the Rube Goldberg 360/65 Rib Reducer shown in our heading! But these are expensive methods, so why not try the simple graphic technique we've just developed, and which is illustrated on the opposite page. This method will work for any straight tapered wing.

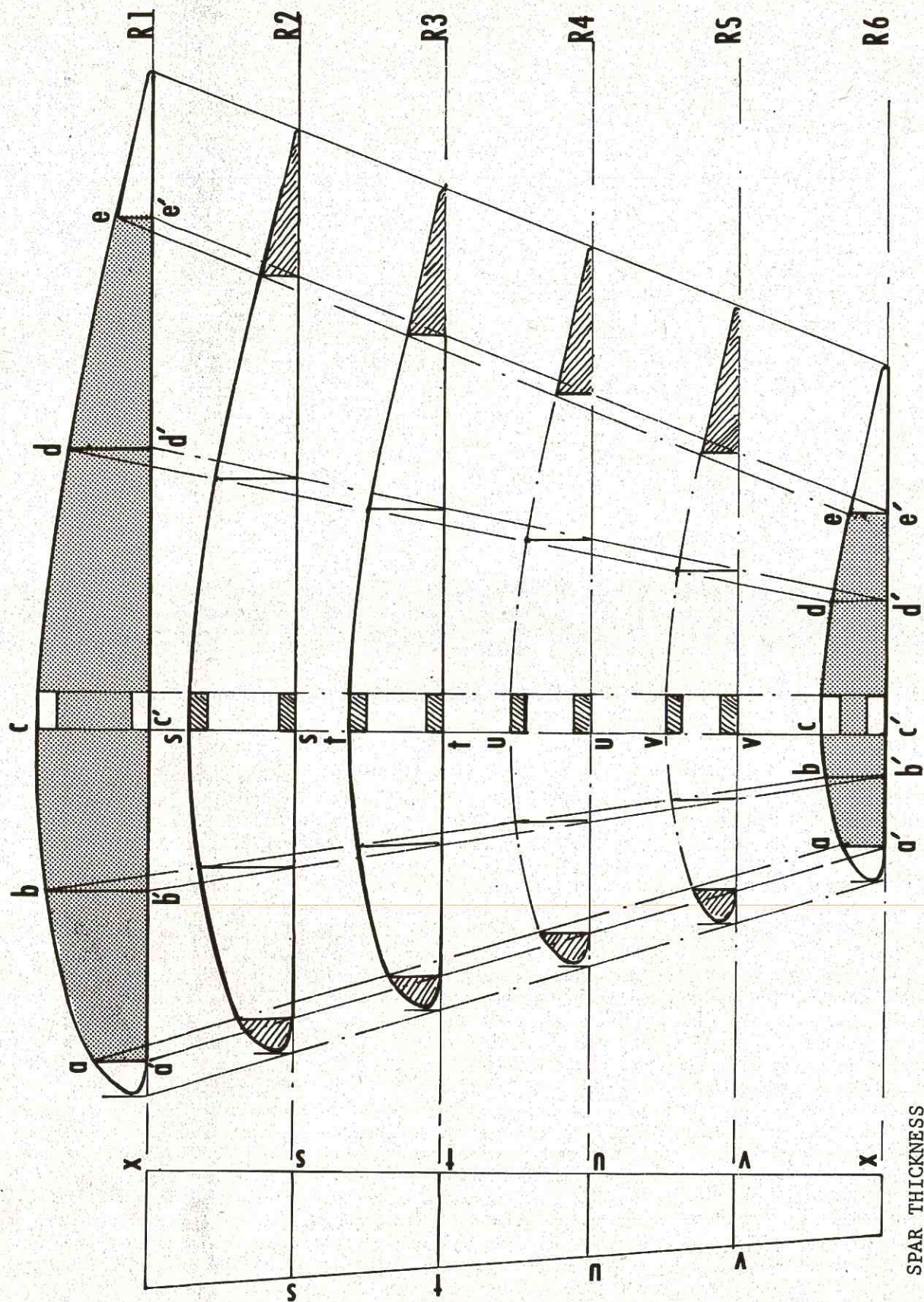
As an example we've drawn a wing that has six equally spaced ribs, a $\frac{1}{4}$ " thick leading edge, two $\frac{1}{8}$ " x $\frac{1}{4}$ " main spars, and a $1\frac{1}{4}$ " trailing edge. The airfoil we've selected is our old friend Clark XYZ. We start by laying out what is essentially a squashed plan of the wing, where all the dimensions are true except the

distance between each rib, which is made equal to one inch. Plot out the root and tip airfoils R1 and R6 on this plan, and then fill in on these ribs the leading and trailing edge pieces, and the spars. The trailing edge can now be drawn on all the other ribs, as it is $1\frac{1}{4}$ " for all cases. Now for the thickness at the spar station. Here we have to draw an additional diagram, as shown on our illustration. Measure the thickness at the spar for the root and tip ribs (c-c'), and lay these out at each end of a line drawn from R1 to R6 (X-X). Join the ends of these lines, and then extend the base lines of each rib across this figure. These cuts give the required spar thickness at each rib station, i.e., S-S is for Rib R2, t-t is for Rib R3, etc. These dimensions can now be transferred to the main sketch, and the spars drawn in place.

The leading edge comes next. Join points a-a, and a'-a', and then draw small vertical lines from the base line (a'-a') to intersect the line a-a. These vertical lines give the airfoil thickness

at the back of the leading edge. A couple of other sections are also required to fill in the contours on each side of the main spar. As with the leading edge we join b-b and b'-b', draw up from the base line to intersect with the top line and this gives the local thickness. Repeat this for d-d and d'-d'. If required a few more of these sections can be included to give a better representation for the intermediate sections. Now we can join up all these various points with a french curve to give Ribs R2, R3, R4, and R5. Slight modifications may be necessary to give a better looking family of airfoils, so don't do the final fairings until all the sections have been completed.

If you've managed to read this far you might wonder if all this draftsmanship is necessary to draw out a few wing ribs, however, it's much easier to actually do the drawing than it is to read (and write!) about it. A set of ribs can be drawn out in a surprisingly short time. □



SPAR THICKNESS

How to buy modeling materials with an eye toward saving money...

CUNNINGHAM ON RC



think. If anyone gives it a try, send some pictures along with the results. Of course, the same idea has been utilized on experimental short take-off light planes, one that used the nose elevator was an aircraft called the "Wren."

Last month I said that this month we would take a look at saving money while enjoying this sport. Well, saving money seems to be uppermost in everyones mind these days, because not only is the individual usually short of cash, but most businesses are, too. A lot of thought has been given by industry toward saving money while still trying to make a profit. Some of that type of thinking can be applied to our use. One of the reasons for my repeating the articles from other magazines is to point out that information that can be of help to us can be found in many other sources. Money saving ideas can be found by using materials or techniques borrowed from other places. Epoxy glue is a pretty good place to start. Now, I like to use both Hobbypoxy 4 and Devcon 5-Minute. One of the problems with Devcon is that it comes in such small tubes. Some of the mail order hobby shops found that it also comes in tubes of twice the size, and the price is somewhat less than the cost of double the small tubes. But... did you know that this same fine epoxy glue can be had in two eight ounce cans for about five bucks from industrial supply houses? You tend to waste a bit when you buy it like this, but when you compare a 1/2 ounce package for \$1.25 to a one pound package for five dollars, the savings is obvious.

Another place to look for a bargain is balsa wood. This great substance has enjoyed a price rise that outstrips almost anything that you can use as a measurement! Most of the cost has come about because of the high cost of labor in the sawing operation. Also, the amount of waste in sawing up a piece of balsa is quite high. But, by looking around, you will find out that balsa can be purchased from some special lumber yards in blocks that are roughly 4" x 4" x 4' long. The price is quite reasonable, about sixty or seventy cents a board foot. You can run these big blocks through a table saw to make thick sheets for nose blocks, wing tips, or most anything where you are going to do the finish sanding later. You can invest a few bucks at the local Sears store and buy

to page 69

Before we get started this month a couple of small articles in trade publications caught my interest, and I think that they would be of interest to you also. The first is taken from the magazine *Industry Week*: "A novel pilotless plane shaped like a 3 foot flying saucer can fly 3 hours at 150 mph, says Short Brothers & Harland Ltd., Belfast, Northern Ireland. Called the Sky Spy, it takes off vertically and lands in a net. It is powered by a two-cycle engine only a little larger than a lawnmower engine." Frankly, I hope that someone reading this will have some further information, and will pass it along to me, because it sure does sound interesting.

The second article that interested me was from the magazine *Iron Age*: "A high-lift, low-drag airfoil design promises improved performance and noise reduction. Application of the design to a variety of products, from sailplanes to racing cars, is being studied. Since the development by R.H. Liebeck, aerodynamics researcher for the Douglas Aircraft Co., division of McDonnell Douglas Corp., was announced last March, it has prompted much interest.

"Manufacturers of a variety of products have applied for data to evaluate the probable gains resulting from unique characteristics of the Liebeck airfoil. Applications under consideration include sections for aircraft propellers, marine screws, jet engine fans, hydrofoils and air conditioning blower fans.

"Airfoils designed by this method provide very high lift with very low drag. Drag is minimized by avoiding separation of the boundary layer, which creates a thick turbulent wake behind conventional high-lift airfoils. That turbulence is also partly responsible for the noise generated by propellers and fans. In one novel application, the design method has been used to improve airfoils on Indianapolis type racing cars. During a recent

time trial, two cars built by Dan Gurney set lap speed records in excess of 200 mph. Gurney credited the airfoil with giving his cars a decided advantage on turns."

I would like to see a cross section of this airfoil. It sounds as if it would be a natural for either Formula 1 or Quarter Midget designs, and I can almost see the glider racing pilots frothing at the mouth now! Again, if anyone has any information that they can send along, please do so, and we will share the information with all.

One more article caught my interest and, although I can't locate it now, the main theme was that a new method of controlling aircraft surfaces has been developed. It is called 'flying by wire,' and was developed for control of the space capsules. The beautiful thing about the control method is that it allows the placement of the control surfaces in an aircraft to be relocated. The article that I read pointed out that with this system it was now possible to put a moving vane at the nose of the aircraft to aid in making the turns, and to put a small forward wing at the nose to control the ascent or descent of the aircraft when coupled with the elevator. By use of the elevator and the forward control, the aircraft can change altitude in an almost vertical movement. Rather than pointing the nose up, the whole aircraft rises vertically. Keeping this idea in mind, we have the control systems now that will enable us to do the same things with models, so here is something for the experimenter to try. I don't think that I would try it on a super hot pattern ship, but on a trainer, it would be interesting to fit both a forward fin, and a forward elevator. I think that you should be careful in hooking up the controls to start with, as well as limiting the forward elevator movement at first until you work it out. Remember, that to go up you probably want to move the rear elevator up, and the front elevator down... I

BASIC SAILPLANE DESIGN

from page 16

The induced drag, the other part of total drag, is the part which is caused by the wing bending the airstream to produce the lift which keeps the model up. Thus, as you can imagine, it is a function of the amount of bending, represented here by C_L and by the amount of airstream over which the bending is spread out, or Aspect Ratio. This coefficient is the same for every airfoil operating at a given C_L and AR. If the airplane, itself, had no parasitic drag at all, the induced drag would remain at all C_L other than 0, which is a vertical dive. The formula for induced drag is:

$$C_{di} = C_L^2$$

$$\pi k A R$$

where k is a constant expressing the "effective Aspect Ratio," or the departure of the wings from a theoretically perfect elliptical distribution of load. In full-size airplanes, k is about equal to .9. In models, the fuselage-to-wing junction reduces the lifting efficiency of the wing root, so you have to subtract about 3 inches from the span and then multiply by .09 to get the effective AR. This problem can be reduced by a pylon wing mounting, by large and smooth wing fairings, or by an extremely small fuselage cross-section at the wing root. The first two solutions are practical, but the third is not too practical in R/C work (though it is standard in Nordic ships). This is one of several reasons why a 120 inch model flies so much better than a 72 inch, even though the loading, etc., may be similar.

Now we have all the elements for some sample calculations of sailplane performance. Table I shows the theoretical forward speed and sinking speed of my Cumulus and my Olympic 99, based on published airfoil data and confirmed by empirical tests.

We can say now go on to calculate the characteristics of just about any design extant, but there is one more point which is of great importance and has to be considered when looking at airfoil data: Reynolds number.

The Reynolds number is easy to compute. It is the product of the chord $\times$ the airspeed $\times$ a constant which has to do with the air density. At sea level,
 $R = 6300 C V_f$
 V_f in feet per second

C in feet.

So an Olympic 99, with an average chord of about 8 inches (.66 feet) and traveling at 20 fps will be operating at an R of 84000. For most R/C sailplanes, R will fall in a range from 50,000 to 150,000. Unfortunately in

this range dramatic changes in airfoil performance take place. The air keeps getting detached from the wing surface, especially the top, and all sorts of major changes in profile drag take place at relatively small changes in angle of attack or speed. The greatest

In Tables I and II, span and area dimensions shown are exclusive of fuselage.

PART 2 - TABLE I

OLYMPIC 99 (NACA 6409)							
SPAN 96.00 AREA 765 WEIGHT 45.00 Est. Cdp = .022 AR 12.05 OZ/SQ FT 8.47							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.90	.020	.024	.066	13.526	23.310	1.723	2:54
1.00	.024	.030	.076	13.107	22.114	1.687	2:57

CUMULUS (Clark Y Thinned to 9.5% at Tip)							
SPAN 107.00 AREA 753 WEIGHT 56.00 Est. Cdp = .019 AR 15.20 OZ/SQ FT 10.71							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.80	.022	.015	.056	14.206	27.800	1.956	2:33
.90	.023	.019	.061	14.663	26.210	1.787	2:47

PART 2 - TABLE II

LIL T (Thinned Clark Y)							
SPAN 71.00 AREA 460 WEIGHT 33.00 Est. Cdp = .022 AR 10.96 OZ/SQ FT 10.33							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.90	.025	.027	.074	12.115	25.742	2.124	2:21
1.00	.028	.033	.083	11.949	24.421	2.043	2:26

WINDWARD (Thinned Clark Y)							
SPAN 69.00 AREA 532 WEIGHT 24.00 Est. Cdp = .023 AR 8.95 OZ/SQ FT 6.50							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.80	.024	.026	.073	10.895	21.652	1.987	2:30
.90	.026	.033	.082	10.915	20.413	1.870	2:40

WINDFREE (Thinned Clark Y)							
SPAN 96.00 AREA 555 WEIGHT 30.00 Est. Cdp = .022 AR 16.61 OZ/SQ FT 7.78							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.70	.022	.010	.054	12.780	25.337	1.982	2:31
.80	.024	.014	.060	13.318	23.700	1.779	2:48

MONTEREY (Eppler 387)							
SPAN 96.00 AREA 625 WEIGHT 32.00 Est. Cdp = .022 AR 14.75 OZ/SQ FT 7.37							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time from 300 ft.
.70	.022	.012	.056	12.471	24.659	1.977	2:31
.80	.024	.015	.061	12.936	23.066	1.783	2:48

CIRRUS (Clark Y with aerodynamic washout at tips)							
SPAN 115.00 AREA 808 WEIGHT 53.00 Est. Cdp = .019 AR 16.37 OZ/SQ FT 9.45							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time from 300 ft.
.80	.022	.014	.055	14.493	26.108	1.801	2:46
.90	.023	.017	.059	15.008	24.615	1.640	3: 2
1.00	.027	.022	.068	14.666	23.352	1.592	3: 8

KESTREL (Eppler 385)							
SPAN 112.00 AREA 672 WEIGHT 52.00 Est. Cdp = .019 AR 18.67 OZ/SQ FT 11.14							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time from 300 ft.
.90	.020	.015	.054	16.433	26.735	1.626	3: 4
1.00	.024	.019	.062	16.009	25.363	1.584	3: 9

TYPICAL NORDIC (Gottingen 342, Beredek 7406F, etc.)							
SPAN 84.00 AREA 441 WEIGHT 14.75 Est. Cdp = .019 AR 16.00 OZ/SQ FT 4.82							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.90	.023	.018	.060	14.860	17.577	1.182	4:13
1.00	.025	.022	.066	14.944	16.675	1.115	4:28
1.10	.030	.027	.076	14.336	15.899	1.109	4:30

MISKEET (NACA 6412)							
SPAN 150.00 AREA 1008 WEIGHT 64.00 Est. Cdp = .019 AR 22.32 OZ/SQ FT 9.14							
C_L	C_{DO}	C_{DI}	C_{DT}	Glide Ratio	Speed (ft/sec)	Sinking Speed (ft/sec)	Theoretical Still Air Time From 300 ft.
.80	.020	.010	.049	16.212	25.686	1.584	3: 9
.90	.021	.013	.053	16.951	24.217	1.428	3:29
1.00	.024	.016	.059	16.902	22.974	1.359	3:40

single problem facing the model aerodynamicist is hampered by the lack of data about the behavior of bodies in air at low speeds and low R. This subject will crop up in our discussions of specific design features (e.g. wing loading, AR, etc.) but for now all I can say is use only data that was gathered at an R similar to the R for which you are designing. If you can't find low-speed tests on a given airfoil, use a different airfoil. Laminar flow airfoils, for example, are literally a drag at R below about 800,000.

The point I was starting to make is this; when we plug in data for planes with very small chord wings, or with wings whose taper results in low R toward the tip, the proper allowance has to be made for the lost lift and/or increased drag thus generated. With that in mind, we can run down a list of current designs, knowing their design parameters, and estimate their performance in still air.

Some notes are in order here. The glide ratio results seem quite low, and we all know that many models can travel 50 to 100 yards on a good hard heave. But at a fixed trim, without any acceleration or deceleration, no landing flare, etc., these figures will prove out.

In addition, the airfoil coefficients and estimated parasitic drag coefficients appear pessimistic. However, they are based on low Reynolds number NACA tests (cf. NACA report 586). Maximum C_L used may seem low, but they are based on angle of attack measurements and on a C_L about .1 below the low R stall. These estimates have two grand advantages:

1. They are internally consistent, and consistent with each other, and;
2. They are in extremely close agreement with practical still-air test data. □

CUNNINGHAM ON R/C

from page 67

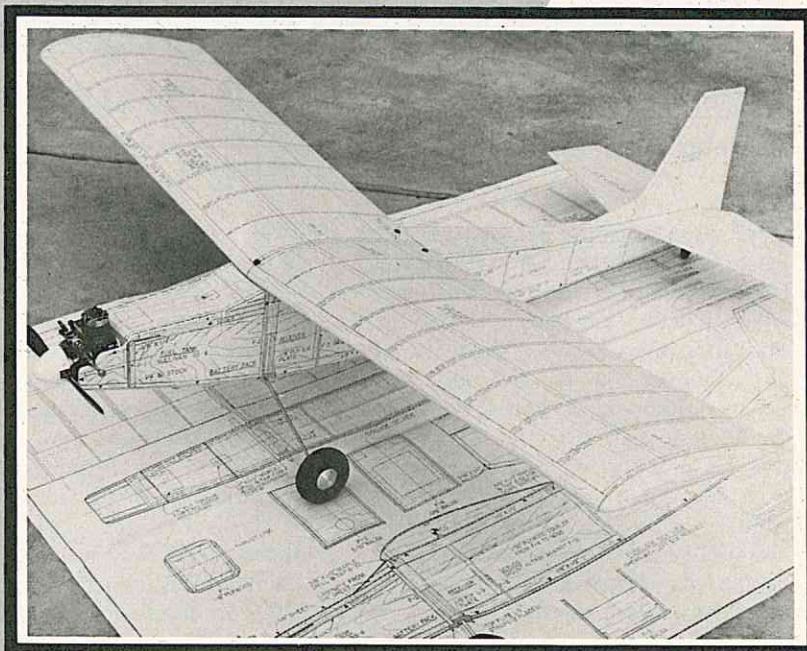
a Carbide surfaced blade for your table saw that will cut through the log and give you a sanded piece. You have a lot of waste this way, and you sure do get covered with balsa saw dust, but you can save money. If you buy a hollow ground saw blade for your saw you can slice up the block with very

to page 80

R/C MODELER MAGAZINE'S

VM1W

CONTEST



1st Place winner Dean Copeland's remarkable VM1W, ruled with India ink.

1ST PLACE

The winner of the Kraft three-channel proportional system is Dean Copeland, 7817 Seward, Omaha, Nebraska 68114.

Powered by an O.S. Max .15, Dean's VM1W is covered with paintable MonoKote, then painted with Aero Gloss flat to achieve a paper-like finish, ruled with India ink and a final coat of flat clear. Radio used was a 1969 model Orbit proportional system. 16 hours building time, 6 hours ruling. Total weight, 2½ lbs.

2ND PLACE

ALAN W. HARPER, 155 Williams Avenue, Lynn, Massachusetts 01902. Enya .15 powered VM1W, Kraft radio with KPS-9 servos, MonoKote finish. Flying weight 2¾ lbs. Total building time, 30 hours.

3RD PLACE

MYRON DANIEL FREEMAN, 1925 South Temperance, Indianapolis, Indiana 46203. O.S. Max .15 powered VM1W, MRC F-710 radio, Solarfilm covering. 30½ hours total building time. All-up weight, 3 lbs.

COMING NEXT MONTH !

A Step-by-step How-to On The DU-BRO HUGHES 300

ROGERS ROCKER

from page 53

same clip design to be used all five places, and, in the end, everything will come out alright, as you shall see. What actually happens here, is the off-center pivot causes a slight bit of pitch control to be fed into the system. However, if you have made the hook-up as shown, the extra pitch will be nose-up and this is exactly what the doctor orders for turns of anything more than just a trim condition and we are home free. Now, back to the workbench and let's get this thing constructed. A word of caution, though, lest you find yourself in a dead end alley: Fit the clips on the rocker before making the bends.

Let's go. ☐

RANGE AND ALTITUDE FINDER

from page 49

altitude.

I recently measured my Altius at 25" on the yardstick, with an elevation angle of 50 degrees. Altius has an 84" wing span. Entering the chart with the 84" span, proceeding over to the 25" yardstick line, down to the 50 degree elevation angle line, then over to the altitude scale, shows an altitude of 3420 feet. The chart also shows that the plane was 4450 feet away from the transmitter.

Actual measurements show that the chart is accurate to about 10 feet, and the yardstick device is accurate to around 100 feet. That's certainly better than the eyeball can do un-aided! You could improve on the

method a bit by purchasing a split image range finder, and using only the bottom half of the chart to correct for elevation angle, but for pure fun flying, the chart and yardstick cost about 25 cents or so! That's hard to beat these days.

CHART CONSTRUCTION NOTES:

1. The formula for the top chart is
Range — Span X Yardstick Distance
Pin Diameter
2. The formula for the bottom chart is
Altitude = Range X sine of Elevation Angle.
3. The yardstick lines, along a given wing span line, cut "distance to plane" lines whose values are directly proportional to the yardstick measurements.
4. The elevation angle lines, along any given "distance to plane" line, cut altitude lines proportional to the cosine of the elevation angle.
5. To use a sighting pin of a different diameter, multiply altitude by .04 and divide by the new pin diameter.
6. For a fixed wing span, measurements of altitude can be written in by the inch marks on the yardstick. Then only elevation corrections must be applied. ☐

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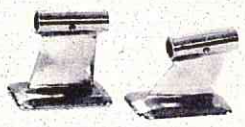
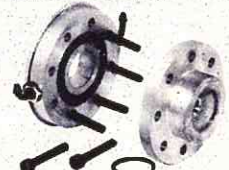
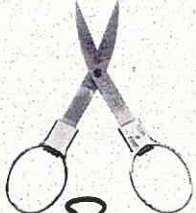
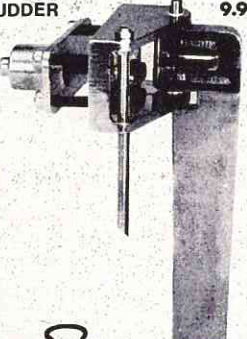
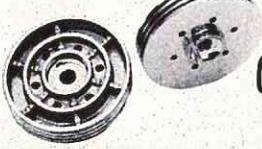
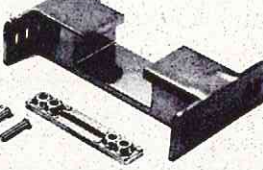
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from page 46

For long templates such as fuselage sides, use several pieces 10 to 12 inches long, overlapped and fastened together with frosty cellophane tape on the top side only. This permits folding the pattern for easy storage in a large envelope with the plans, without creasing or breaking the material.

A few pointers will help make the job easy. A sharp #1 pencil is best for drawing on the plastic. Figure 1 shows the tools I use. If you have drawn any plans you probably have all the equipment you need. Curves can be drawn freehand, if done carefully. Secure plastic to plans with narrow masking tape to insure accuracy. Before removing plastic from plans, indicate within the traced part, its number, how many pieces needed, whether balsa or plywood and its thickness. When all parts are traced use sharp scissors to cut out on the lines. (Figures 2 & 3).

Trace templates onto the wood with a "fine" ball point pen. The pen will pick up dust from the wood, so wipe it on a tissue frequently to avoid smudges. Fasten templates to the wood with pins to avoid slipping. Again, mark part number on the wood to avoid confusion later (Figure 4). The tracing on the wood will be slightly over-size, so cut on the lines to allow for sanding, and they will be as accurate as any method short of die cutting (Figure 5).

The next time you build from plans, try this method and enjoy parts layout for a change. ☐

RCM WIND METER

from page 44

3) One Mabuchi (or similar) hobby motor #RM155 (\$1.00)

4) One aluminum chassis box which should be as small as possible (approximately \$2.00)

5) Miscellaneous: A length of R/C hookup wire; one brass gear wheel with set screw (to fit Mabuchi motor shaft); 18" of 1/16" diameter piano wire or welding rod; four spray can tops 16-18 oz. size (plastic); one set of epoxy glue.

CONSTRUCTION

First, remove the meter from its plastic case and mount it in the aluminum chassis box. Next, mount the switch and motor. Cut and bend the 1/16" wire arms and epoxy the plastic spray can tops to the arms,

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G65 6-CHANNEL, 4 Servos. 27MHZ \$325.95 / 72MHZ \$339.95

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then solder the latter to the gear wheel. Follow the diagram and complete the wiring and the construction is virtually finished.

The Meter could be built on the top of your model box if you like, but you will have to extend the motor shaft so that the windmill will clear the box as it rotates. You can calibrate the meter by having someone drive you at a pre-selected fixed speed while you hold the meter out of the passenger window, marking the speeds off on the Meter dial. The best time to do this operation is late at night when there is no wind blowing so you can get a true reading. □



Fox also uses latest bookkeeping and accounting equipment.

RCM VISITS DUKE FOX

from page 42

than 50,000 square feet. If the building size is impressive, you should see the vast array of machine tools on the inside! Over a dozen automatic screw machines lined up on an aisle is only one example. Operating and maintenance costs can only be justified by large production runs; lots of up to 40 thousand pieces bring the unit price down and the real benefactor is the modeler. Standard machine tools such as lathes, grinders, drill presses, etc., are supplemented with specialized machines either to perform unique operations or to increase production output.

Engine assembly is performed by people exerting such care that you might think they were going to use them in their own models. Assembling,

Will Don Dewey come unfinished?

Hi there!

I want to tell you about the true story of "How the West Was Won." Won over to Hobbypoxy's new QUICK-PREP Polyester Resin and QUICK-SPRAY fast setting gloss hardener, that is. But why should I struggle over the way to tell you when good friend Don Dewey, fearless Editor of RCM (the West Coast's answer to G-8 and His Flying Aces) has put it all in print.

Here's what Don says about QUICK-PREP:

"Our test consisted of taking several panels of balsa wood, sanding them fairly smooth, and applying a brush coat of prepared QUICK-PREP Resin and allowing it to dry. When we rough sanded our coated test panels using a 180 grade silicone carbide paper, we noticed that the QUICK-PREP Resin sanded quite easily and "powdered-out" quite well. In fact, one coat of QUICK-PREP filled the wood grain better than any resin we had used to date. We flowed on a second coat and allowed it to dry approximately 2 hours. This was then sanded out with 400 wet-or-dry paper, used wet, and an extremely glass smooth surface had been obtained on all test panels. It was our observation that this material had filled the wood grain better than other finishing resins which we have used and a close examination evidenced better penetration with less brittleness than the faster drying surfacing resins."

And on QUICK-SPRAY Gloss Hardener:

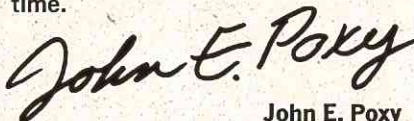
"In order to give the new Hobbypoxy paint a rough test, we picked a high humidity day (not recommended) and used a very inexpensive aerosol can-and-bottle type spray unit. We decided to use this non-adjustable unit to find out just how good this new Hobbypoxy material really was. Thus, with two strikes against it, we sprayed on one heavy coat of white Hobbypoxy which had been mixed with the new QUICK-SPRAY Gloss Hardener. The outside temperature at the time

was 90 degrees with about 40% humidity. To our amazement, it was almost impossible to make the material run despite the heavy flow coat we had applied. We deliberately sprayed on an extremely heavy coat on the vertical fin allowing it to build up into a run and then laid it on a level surface to dry. We found that this material tack-dried within minutes and even in our dusty shop, no dust particles were picked up. In addition, within a very few minutes, the build-up of paint on the fin had leveled itself out. The coverage was excellent and it was readily apparent that a second coat was not even necessary.

In conclusion, we can say that the new Hobbypoxy QUICK-SPRAY Gloss Hardener will give you one of the most beautiful and durable finishes you can achieve and one that can be easily sanded and rubbed out to a point that will exceed your best efforts with any type of paint finish. In addition to its fast drying time and its complete reluctance to pick up any dust residue during the drying process, the material is very easy to sand and rub out, whereas many competitive epoxy paints resist the sanding and rubbing procedures completely. There is no tendency towards brittleness with this new paint and it seems to have a good degree of flexibility.

"At the conclusion of our tests of Hobbypoxy's QUICK-PREP and their QUICK-SPRAY Gloss Hardener, we can unequivocally state that we were more pleased with the finished results than with any similar products we have tested to date. These products have been thoroughly Tested, and are Approved and Recommended by R/C Modeler Magazine."

And so ends the story of Don "Quick-Paint" Dewey, a legend in his own time.



John E. Poxy

Hobbypoxy Products

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checking out and adjusting carburetors with air gauges to close tolerances is only one of Duke's quality assurance procedures. Each engine is started and run to specified performance in the test cell, thereby guaranteeing that the modeler can install the engine in his model right out of the box and fly it.

Fox glow plugs have long been known for their quality and reliability. Watching the assembly and testing of glow plugs is rather fascinating, but when we think about the skill required and the expensive materials involved, a glow plug is one of the biggest bargains we can buy. Besides, if I tried to do that precise, delicate work I'd go right up the wall!

Another product wearing the Fox label is a complete line of fuel. Facilities adjacent to the factory are used to store, mix and package the fuel. The quality and performance of his fuel is a matter of considerable pride with Duke.

Fox has also become deeply involved with accessories during the last few years. A heavy investment of time and money has been made in the development of good, practical silencers that work. Another example are his quality machined motor mounts that are strong yet do not weigh much. Spinners that are sturdy, lightweight and run true are machined from solid bar stock and are available at a low price only because of manufacturing methods involving those automatic screw machines.

The Fox advertising motif has recently been directed toward a background of red, white and blue. Along with the stars and stripes "Buy American" theme is Fox's latest pride and joy, "Duke Fox's Eagle." This is a .60 cu. in. displacement engine incorporating all the good things Duke considers necessary to win the big size engine market with an American product. This is not a product report so we will only say that if you are interested in a big engine, investigate the Eagle — you will be more than pleasantly surprised!

We stopped at Fort Smith and found a large well-equipped factory turning out quality products. It was nice to see the employees inserting that little extra TLC into their work. Yes, Duke got out of the big city all right, in fact, he pointed out to us that his property runs way back to there and next Spring he plans to put in a couple of control line circles and probably a runway for R/C. Can you imagine that happening in Los Angeles? No way! □

Paul Harvey News

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from page 60

World's R/C Championships of the twenty-first century.

It's a few days before the contest. Canbee Mound, top contender, needs to put a few final touches on his FAI Pattern routine. It's Saturday afternoon, and Notre Dame is playing Southern California for the national collegiate football championships. Canbee likes to watch it on his three dimensional color TV; it's fun to watch the little guys run around on your living room rug gridiron which comes with the set for a slight extra charge. So, Canbee heads for the icebox, builds himself a ham on rye, and picks out a bottle of Coors (absolutely no technological advance ever devised will improve on that combination!) and sets down to watch the game. First, though, he activates the control console alongside his contour chair.

It's a good game, moving fast, so midway in the second quarter Canbee turns to the console, and presses the button labeled "Pre-flight." Then he returns to watching the game.

Meanwhile, pre-flight sequencing is in process. The manipulators in Canbee's workshop carefully stow the R/C model in the carrying compartment of his non-polluting electric station wagon. As the manipulators return to their rack, the workshop door lifts open, the wagon backs out, waits momentarily until the collision sensor lets a car go past then continues backing into the street, where it picks up the guidance impulse for the flying field, which was previously programmed into the self-contained on-board computer. Smoothly the station wagon proceeds to the flying field, slides easily into its assigned stall, and the field manipulators lift the model out and place it on the transporter to the runway.

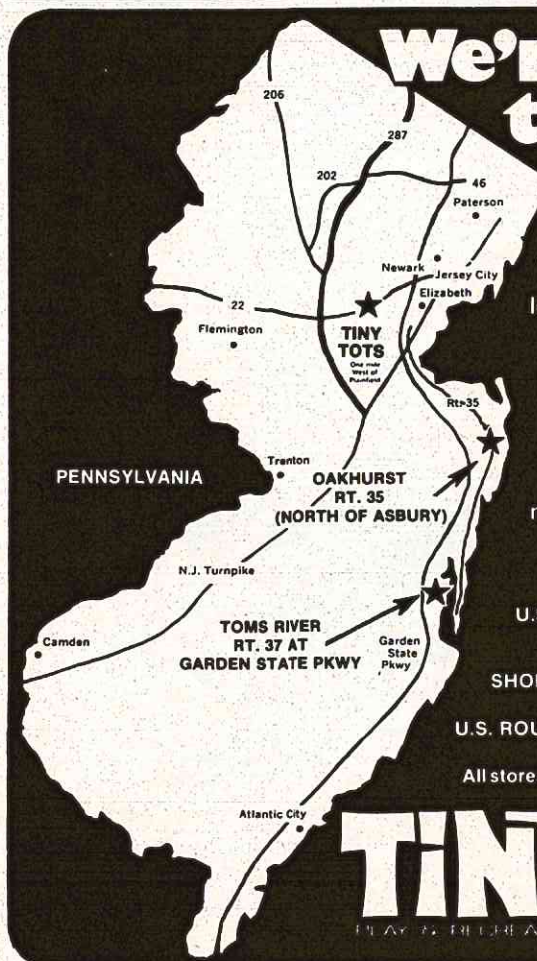
On arriving at the runway, the self-contained starter activates the model's motor, computes the needle setting for full range performance, adjusts the muffler baffles for 53 decibels, and then returns to the ready position. As it does so, a brief signal is sent to the console by Canbee Mound's side.

During the commercial, Canbee glances at the console. There's a minute left before the end of the first half. Just right; he pushes the button marked "Rendezvous."

The airplane, out at the field, picks up the signal, and the motor goes to full throttle. The electrostatic sensors

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adjust to climb, the gyro compass heads the model, and at 399 feet altitude the plane cruises to the rendezvous setting. As it enters the field strength reading, another signal lights up on Canbee's console.

The first half has just ended. But a couple of cute pom-pom girls are dancing up a storm. Canbee, intrigued, hastily pushes a button marked "Orbit." (Shades of Bob Dunham!)

The model circles lazily, awaiting further instructions.

The pom-pom girls wind up with a round-off and a twisting back flip, the crowd roars, and Canbee turns to the console, presses the button marked "FAI Pattern" and looks up. The skyhatch in the roof opens up, and there, in the rendezvous area, is the model.

Through an intricately programmed series of variations in the electrostatic sensor rate detectors, the model begins the gyrations called out for the FAI Pattern. It hasn't changed much since the old days of the mid 1970's. Matter of fact, the main change is that the events are now judged for both precision of path and time (Cuban Eights start at fifty feet, top out at 200 feet, and must be completed in exactly eight seconds).

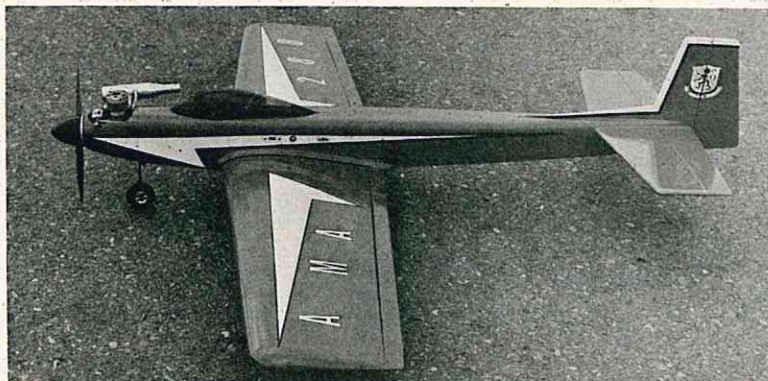
Canbee watches the model carefully, notes a small variation in the vertical position of the eight point roll, the knife edge, and the crossover. At the conclusion of the Pattern, as the aircraft loiters, he makes a slight adjustment on the console. Once again he presses "FAI." This time the pattern is perfect. So, contentedly pressing the "Return" button, Canbee goes out to the refrigerator, gets another Coors, and settles down for the second half. The airplane departs, the skyhatch closes, and a short time later the station wagon pulls into the workshop.

The electrostatic sensors, now highly sophisticated, have kept pace with other technological developments like the manipulators and the road guidance systems. And practicing for the World R/C Championships, here in the twenty-first century, is an arm-chair exercise in sensor adjustment.

So now you know what I meant when I said they're gonna' ruin our sport! Uh-h, I gotta go now, fellas. These two guys just came by in their nice white jackets. They want me to teach them how to bend bamboo over a candle.

That's what they said, anyway. Figured I'd understand that. ☐

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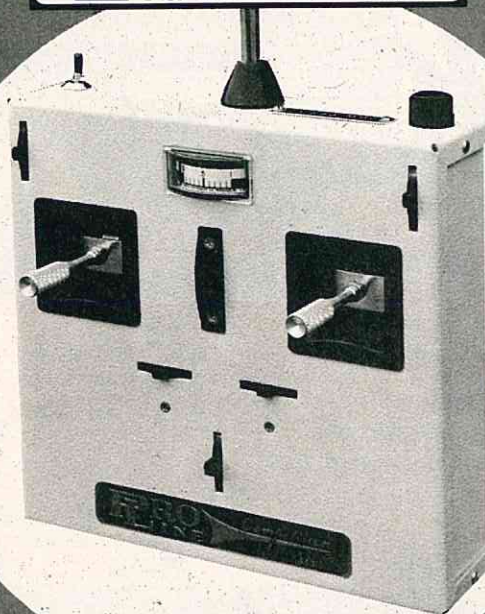
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CUNNINGHAM ON R/C

from page 69

little waste. Frankly, for the finished pieces on an aircraft, such as the fuselage sides, buy the pre-sanded pieces, but for all of the rough stuff,

try a balsa log. Another method that I first used on the Show Off biplane back in 1965, and is now used by Johnnie Casburn in his fine Super Lucky Fly kit, is to use a foam block for top blocks and to cover this block (once it is hot wired or carved to shape) with light cardboard. This really is an inexpensive method, it is easy to do, and

saves a lot of weight.

For quite a long time I have been urging fellow modelers to save money by using foam wings with cardboard covering. Every once in awhile I mention this in one of my columns and I suddenly get letters asking what I'm talking about, and how do you go about cutting a foam wing, and then



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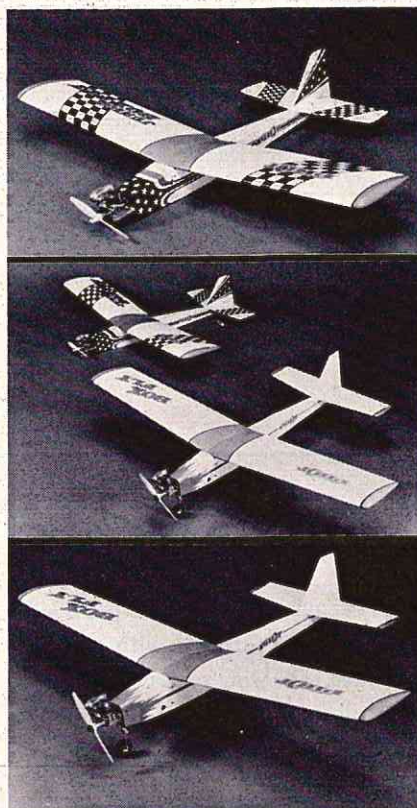
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The Sr. Box Fly incorporates the features of the Jr. Box Fly with the exception that it does have steerable landing gear. Also has a die cast aluminum engine motor mount and is slightly bigger than the Jr. Box Fly. Pilot uses the same wing casting in both kits but cuts down the span of the Jr. Box Fly a couple of inches. This is an extremely air worthy little plane and should be reviewed in RCM and Model Airplane News by this reading. Like the Jr. Box Fly, the Sr. Box Fly is an excellent beginner's project. Price \$29.98.



WORLD ENGINES

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covering it with cardboard. RCM has a very good book for sale by J. Alexander telling you how to cut your own foam wings. If you want to use this type of construction, I suggest that you order this book (RCM Anthology Library Series, 'Foam Wings'). If you don't want to cut your own, then several brands of wings are sold commercially. Now, as to the covering: If you cover your foam wing with a skin of 1/16" balsa, you will invest about eleven or twelve bucks in balsa wood. If, on the other hand, you cover with cardboard (the type found in most art stores, slick on both sides and about 1/32" thick); you can cover that wing for about sixty cents. The glue that you will use will cost you about the same. The cardboard covered wing will be a little heavier than the balsa wing, but not by much and, it will be every bit as strong. For finishing, you can paint it with any of the epoxy paints or enamels or, for a simple and beautiful job, cover the wing with Solarfilm or MonoKote. With the super smooth surface of the cardboard under the plastic film, you will really have a slick looking wing.

The next money saving thought is one that always gets me into trouble with the hobby shop dealers around the country. This idea is one that each of us uses every day of our lives. **Buy Carefully!** First, don't buy everything that you see, or want, on the spur of the moment. Think it over. Is that new goodie what you really want, or will it gather dust in your workshop? Sure, it's great to keep up with the Joneses' but is it really necessary? The second of these thoughts is the same --- **Buy Carefully.** But, this time, spend your money with care. It's a dead cinch that your wife tries to buy the family groceries from the store that will give her the most value for her money. The same should hold true of your 'shopping.' Once you have decided to make that new purchase, see what the best price is to go with it. You don't need to bargain and haggle on everything that you buy, but some merchants base their business on a high volume, low profit margin operation, and if it's to your benefit, then buy where you get the most for your money. This one thought, well used, will save you quite a bit over a years time. Couple the two together and buy only what you need, and at the right price, and at the end of the year you will have saved enough gold to start out buying more for next year.

Saving money is really a lot of

common sense combined with a lot of will power to say 'no.'

Another bit of reading gleaned from a trade publication, this time **Purchasing Magazine**, lists the ten commandments of cost reduction as used in the purchasing department of North American Rockwell in Los Angeles. Some of the commandments don't apply, but some do:

1. **Value Analysis;** The systematic study of all parts, materials and services.
2. **Comparative costs;** Compare costs with similar projects.
3. **Competitive bids;** Minimize single sources, review case files.
4. **Substitute standard items;** Use off the shelf items verses new designs, etc.
5. **Analyze function;** Is the function worth the price? Search for alternate functional approach.
6. **Question design requirements;** Question unnecessary complexity.
7. **Enlist Supplier Assistance;** Use their talents.

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SLINGSBY T-53B

from page 40

company later going into bankruptcy. It is known that six T-53B sailplanes were imported into the U.S. prior to the fire, but none display the colorful markings that one sees on the ones used by the RAF. More data and one photo is contained in the 1970 U.S. Sailplane Directory, Part II, which is the April 1970 issue of SOARING.

The model has attracted spectators and fliers alike wherever it has flown — ranging from the 1970 NATS Soaring event near St. Charles, Illinois, to the fabulous LSF 1970 R/C Soaring Tournament in Livermore, California. However, the most memorable flight I can remember was the 1 Kilometer goal-and-return flight last Summer. This flight was one that I had been trying to make for months as a part of the Level III LSF Soaring Accomplishments Program. The stumbling block, as with most flights, was that there was never quite enough lift to get out and back. Flying out of a small High School athletic field in the heart of a large city is just not the best place to hook into a "strong" thermal and go cross-country with the promise to return to the launching point.

During the third round of a contest one Sunday, I managed to hook into a

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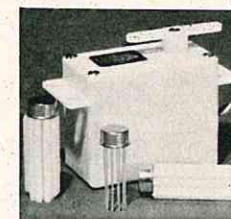
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8. Disseminate comparative costs to design groups.
9. Review tooling, manufacturing and test costs.
10. Utilize systems approach in procurement; Compare costs on basis of complete systems, groups and individual components.

I told you the wording would be a bit stilted, but the ideas behind the words are the same.

The very best word of advice towards saving money in this hobby/

sport is to 'crunch' your pride and joy as infrequently as possible. To help yourself avoid that unpleasant contact with the ground, practice some of the hints that have appeared in earlier columns. Such things as checking the condition of your batteries often; making sure that your radio is vibration proofed; making sure that your wing is strapped on tight to the fuselage; being sure that the wing structure is strong enough to withstand violent maneuvers; and getting lots of help your early flights if you are a beginner.

Earlier I mentioned Johnnie Casburn's Super Lucky Fly kit. I am currently "putting one together." 'Building' is not the right word, since most of the building has been done for you in this outstanding balsa almost-ready-to-fly-kit. It goes together easily due to the fine engineering and the semi-finished jig-built fuselage. The completed aircraft is a very fine flying airplane, and I can recommend it to you as both a good pattern aircraft and a fine sport flier.

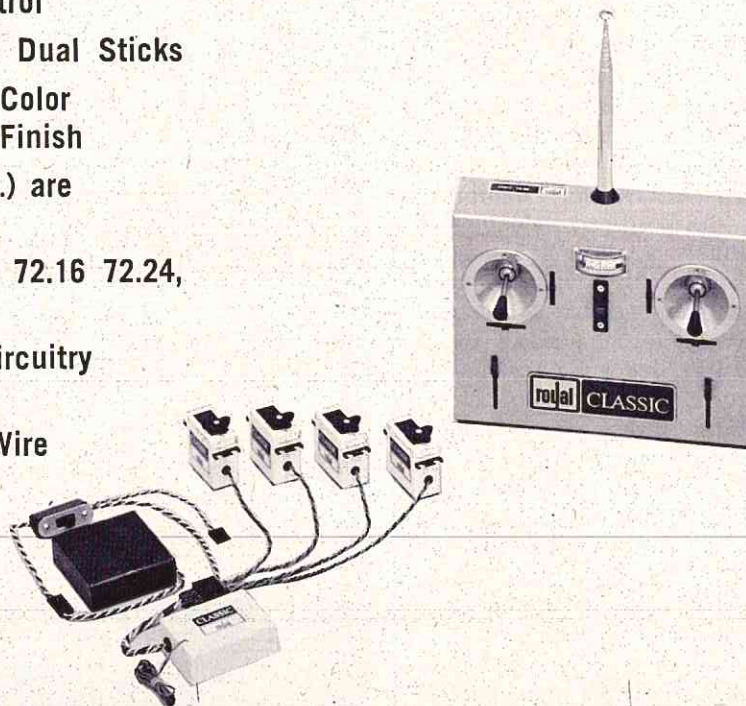
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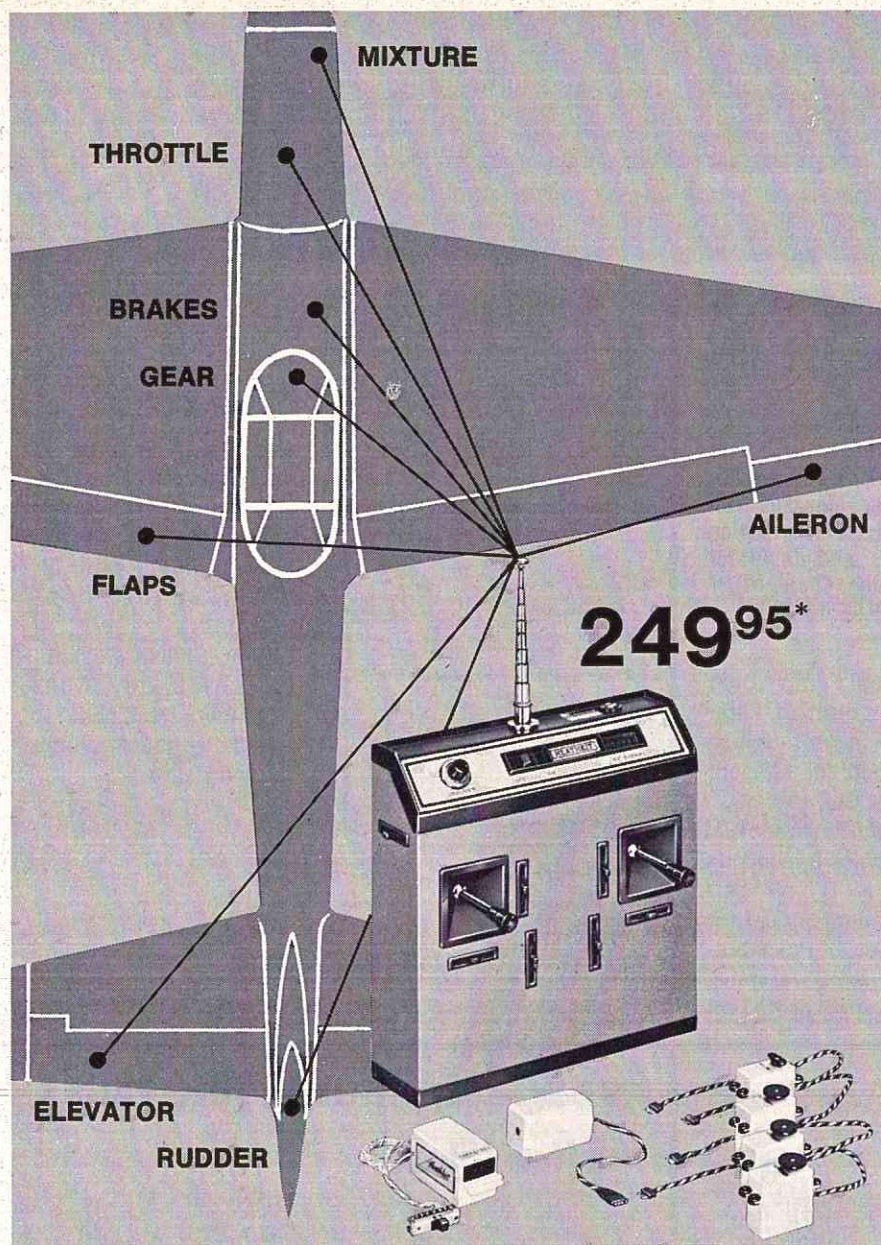
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GX-270

strong one and, in two or three minutes, was up to the base of our "city-bound" inversion layer at 1200 ft. With much prompting from most of the other contestants, plus the fact that I wasn't scoring well enough to win a first place, anyway, I decided to go for that elusive goal-and-return. Three of us jumped into a convertible parked near the field and scrambled upwind toward the goal, the hamburger stand almost 3/4 miles away. One kilometer is .624 miles.

With its nose tucked down slightly, the T-53B was penetrating nicely, but the receiver, which was monitoring the output of my telemetering variometer, gave forth a low tone, indicating I was out of that thermal and losing altitude. By that time I had reached the street on which the hamburger stand was located upwind and there were no stop lights between the goal and my fast driven conveyance. Then, quite suddenly, the tone on the receiver became excited and went into high pitch, indicating a thermal! I eased the stick back slowly and up she went. There was no time to let it circle and drift down wind again . . . I was going the other way!! So I let it ride up into the wind until the lift played out, then continued on the same heading toward the goal again. My luck held. I managed to hit two more small thermals, generated by the roof tops of the houses that went by unnoticed, until I reached the hamburger stand.

After making it to the goal point, we (the car and the T-53B) turned around for the return leg. Anxious moments followed as the T-53B was out of the lift and losing altitude slowly, but surely, I wasn't helping by "dumb-thumbing" (just you try to fly a sailplane from a moving car sometime). But, as if the course was on a wire, the same three thermals were not too far from where I left them on the way up, so they, in turn, were used to the fullest on the way back.

Much to the amazement of the crowd of spectators, aloft at about 300 feet was an RAF trainer, with no one in apparent command. Sailplanes can fly at angles across city blocks, convertibles must surely follow the streets. Within 30 seconds the puzzle was solved, however, as the three of us appeared from around the corner behind the school buildings and parked. I guess coming over the school buildings had given the T-53B a bit more altitude. I got out of the convertible and leisurely (like I knew it all the time) walked across the street

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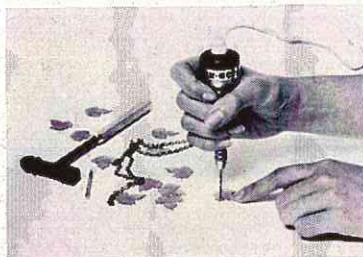
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to the athletic field and landed the plane well inside the required 200 meter radius of the launch point!

Congratulations were offered all around and I was pleased with my T-53B. Most of the spectators and contestants hadn't dreamed this type of flying could be done with a model sailplane. The most rewarding congratulations were from the more experienced fliers who knew (and had experienced) the real challenge of cross-country flying in a city with traffic lights and long square blocks, and even more so, with a scale sailplane.

There is no reason to dwell too much on the construction as the plans are very complete and detailed. As you can see, the fuselage is a simple box. Just use soft balsa for the top and bottom and sand most of it away to get the half round section top and bottom. The bulkhead sandwich ply should be laminated with Titebond, clamped, and allowed to dry. Then cut the formers to size and you'll be amazed because they are extremely light in weight and very strong. A soft balsa block can be tack glued to the front of the fuselage and both sanded together to form a block for pulling a canopy.

The elevator pushrod tube must be glued into the fin during construction. Before sealing it over, exercise it to eliminate as much drag (friction) as possible. Make the bend in the tube with as large a radius as possible, then insert it into the fuselage, holding it in place while cementing the fin in place. The wing and stab construction is self-explanatory. While I did not install ailerons, some scale fans may desire to do so. With the fuselage and wings completed, insert the wing wires into the fuselage holes, slip each wing panel on, and wiggle them for proper alignment. Equal lengths of balsa, or non-stretch thread, when touching both the wing tips and the end of the fuselage, will help establish the correct alignment. Now reach inside and, with four dabs of epoxy, fix the rods in place. When cured, carefully take the wing panels off and apply fiberglass to the rods inside of the fuselage . . . simple and strong.

Cover and decorate according to the small 3-views, or copy some other T-53B, add the towhook, check that the CG is properly located, and test glide a few times. Then you are ready to show them all that not only does a Scale Sailplane fly, but it can fly extremely well! □

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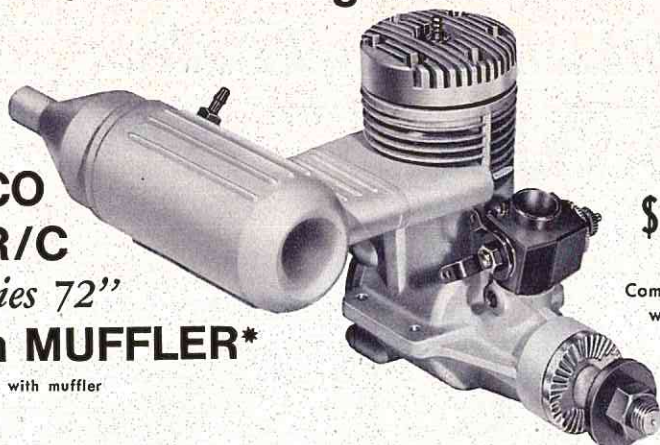
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The Pattern Engine to Watch...

from page 32

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Muffled against noise and engineered for performance, the **New VECO .61R/C** includes a specially designed F-L-O-W T-H-R-U muffler that does not inhibit its performance. It is rugged in construction, contemporary in design and fitted with a pressure tap.

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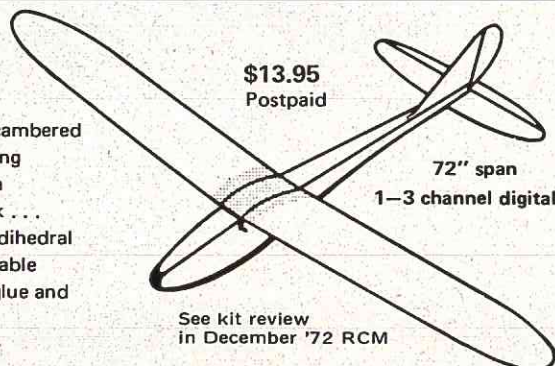
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CENTER SECTION

This is built in a similar manner to the outer wing panels. It is initially built flat, and in one piece, then cut in the middle and cemented back into place at the correct dihedral angle. Begin construction by pinning down the trailing edge strip and the bottom sheeting. Cement into place the lower spar, the lower cap strips, and the 1/8" sheet leading edge piece as before. All the R1 ribs are glued into place next, followed by the upper spar, and the webbing between the spars. The wing boxes are made by cementing 3/32" hard balsa sheet, grain running vertical, on each side of the main spar ends. The R2 ribs at these locations are now installed, together with the 3/16" dowels, which help to locate the outer wing panels. The wing is now cut in the middle, and the wing joiner W3 cemented into place. After this has dried the R2 ribs at the center are glued in, and then the remaining leading edge sheeting and the center section sheeting is attached. Glue into place the 3/16" x 3/8" leading edge, the upper rib cap strips, and the center section is finished, except for the wing fairing. This cannot be made until the fuselage is completed. When the fuselage is available, pin it to the center section, with a scrap of wax paper separating the two. Cement into place W1, and then W2, which can be pinned temporarily to F3. Now the fairing is attached. (It's easier to bend if you first soak it in hot water.) Add the 1/16" ply re-inforcing pieces when this sheeting is completed.

WING ASSEMBLY

The wings are joined by hardwood strips 1/4" wide, fitted into the boxes provided at the end of the wings. These joiners must be quite a tight fit, as any sloppiness here will result in too much wing bending at these joints during flight. The dowels provide additional alignment for the outer panels. When the model is being prepared for flight make sure the wing center section and the outer panels line up correctly, then run a couple of turns of masking tape around the joints. This provides a little more stiffness to the joints and, incidentally, prevents the wing parts from separating in flight.

TAIL ASSEMBLY

The tail assembly is simply constructed. The fin, rudder, and horizontal stabilizer are made from 3/16" sheet balsa strips, with ribs from 3/16"

square balsa. Choose some good springy wood for these components. The elevators are from 1/8" sheet balsa joined by a strip of 1/4" x 1/8" hardwood. Solarfilm hinges were used on the original, after covering was completed. Add scraps of 1/32" ply locally where the control horns are attached for added strength.

FUSELAGE

Begin by cutting out the two basic fuselage sides from two similar sheets of medium hard 3/32" balsa, using the pattern shown on the plan. Mark the locations of the various frames and 3/16" square strips onto these sides, and then glue the edge strips, spacers, and sheet pieces into place. When these have dried, join the two sides by means of frames F2 and F10 initially, followed by F1 and F9. Note that the fuselage cross section is tapered, the bottom having the smallest width. Now insert the remaining spacers and the 3/16" sheet in the nose region. Sand all over and particularly the top and bottom surfaces, which should be sanded flat. Now cement into place the first of the 1/4" sheets for the fuselage bottom, after which the remaining two 1/4" sheets, roughly carved to shape, are glued down. Make the nose blocks, and add these, plus the 1/4" sheet wing rails, then frames F3 to F8, followed by the turtle deck sheeting. This can easily be bent to shape if it's first soaked in hot water for a few minutes.

You are now ready to do lots of sanding, especially on the fuselage bottom. Sand away until fair curves are obtained, taking care not to remove too much of the fuselage sides. When satisfied (the plan shows how the finished cross sections should look) cement the fin and horizontal stabilizer in place and drill the holes for the wing attachment dowels. The latter are not installed until after the covering is completed. The skid, if required, is also attached after the covering is finished.

CANOPY AND FRAME

The framework for the canopy is made after the fuselage is completed, but not covered (this way you don't ruin a good paint job). Make the two end frames, C1 and C2, by pinning into place roughly shaped pieces of 3/16" sheet. Sand these to the local contour of the section and then cement onto the rails, which are also 3/16" sheet. This is also best done on the model, using wax paper to separate the fuselage from the canopy framework. When all this has dried remove

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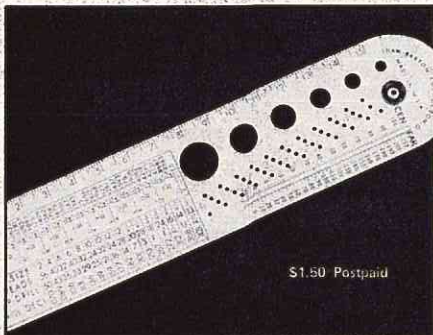
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the wax paper, give a final sanding, and then paint. The original was sprayed matte black. The celluloid canopy can now be shaped, the original being cut down from a SIG 14" teardrop shape. Cement into place and do the final trimming, again on the fuselage. A couple of stubs of dowels protruding from Frame F2 locate the aft end of the canopy, and the front end is latched down with a heavy pin and two scraps of brass tubing, one in C1 and the other cemented into the nose block.

COVERING

The original was covered with Solarfilm; transparent yellow on the wings, and solid red on the fuselage and tail assembly. This was the first model on which I'd tried this covering material, and it proved very satisfactory.

RADIO

Radio installation is quite conventional, sufficient space being provided for any modern two servo system. On the prototype the servos were fitted in the space below the wing, and the receiver and battery pack in the cockpit region. The servos were mounted with servo tape to a false floor, consisting of 1/32" ply cemented to a scrap piece of hard 3/32" sheet which, in turn, was cemented to the local spacers. Be sure to give the plywood a couple of coats of clear dope for a better base for the servo-tape. If the larger type of servos are used, remove the spacers in this region and cement the plywood directly to the 1/4" sheet fuselage bottom. Gold-N-Rods were used to hook up the servos to the controls. The receiver and battery fit in the cabin area. Cut a suitable hole in Frame F2 to pass the wire connectors through. Pack around the battery and receiver with foam rubber, but do not make the final installation until after the model is balanced.

FLYING

Ballast the model so that the Center of Gravity is close to the main spar. Check the rudder deflection which should be at least 30° each way, and also the elevator deflection which should be 20° up and down. The O.S. servos used in the original wouldn't give the required rudder travel, so a bigger servo wheel was constructed out of 1/8" ply, and bolted to the top of the existing control. It's always better to have a little too much control than not enough. Think of the embarrassment of launching a new model and then watching it sail away into the

distance totally unresponsive to the controls!

Try the first flights on a reasonably calm day as the model will fly quite well in very light wind conditions, and also it's quite a big model to hold until you get used to it.

The prototype showed no peculiarities in flight. It flies quite slowly when compared to smaller models, loops well, and has a very flat spin (the latter being discovered accidentally after a mid-air with a Cirrus).

LIFT SPOILERS

After watching landing techniques at the local glider slope, there seemed to be a need for a little more controlled method of making landings, or at least reducing the speed of contact with the ground. This, as has already been mentioned is one of the reasons for making the one piece center section so that a set of spoilers could be investigated, and hopefully a better landing pattern developed. □



Ed Rankin, 1973 NMPRA President, made his inaugural speech at the banquet. Our Pat Crews listens attentively.

1972 WINTER NATIONALS

from page 27

come aboard, guys, and best of luck."

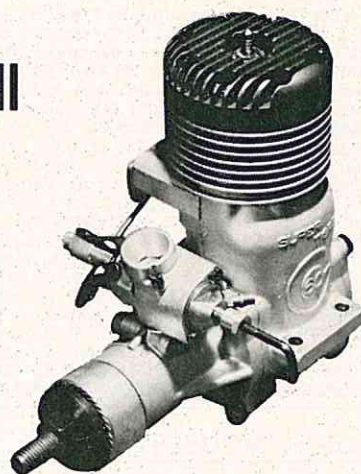
If you have been there you know that the Winter Nats can easily be called the biggest and best contest of the year. While flying home from that Thanksgiving weekend contest with radio manufacturer Bill Cannon in his Mooney Executive and a neat co-pilot named Charla, the thought occurred to me that I sure am fortunate to know and associate with so many nice people in the R/C world — THANKS!

NORM'S ^{SUPERTIGRE} G.60 POWERED MACH II WINS MASTERS



NORM PAGE WITH HIS MACH II

There were three G.60 Supertigre Blue Heads used in the 32 man "Masters Tournament" at Huntsville, September 72. Their users finished 1st, 5th and 8th. The 5th place contestant was young Steve Ellison of Salem, Oregon. 8th place was captured by Dave Brown who supervises the tool room here at



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We are delighted to quote Norm as saying:

"I doubt if I would have placed first if I hadn't switched to the G.60 Supertigre Blue Head two weeks ago! The power made the difference and the engine runs smoother."

World Engines in Cincinnati. Norm's engine was an out of the box stock engine that had only been in use less than two weeks before the Masters. We also think it a tribute to our radio control industry that there were no crashes or radio problems reported.

John Maloney

MASTERS TOURNAMENT: This is the biggest and most important pattern contest in the U.S.A. Our international team is chosen here. Contestants from our Nationals qualify for the masters. We are very proud Norm Page chose to use the G.60 Supertigre.



NORM PAGE 1st, DAVE BROWN 8th, JERRY WORTH, ALLEN DUPLER 12th



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MICKEY MOUSE TANG

from page 22

The 1/4" sheet rear deck pieces, 1/8" sheet front bottom planking, and the 1/2" front top sheet can be glued on now. Bevel the top of the fuselage sides to the line shown using the bulkhead views as a guide to correct bevel. This guide line curves up at the rear of the fuselage starting at the stabilizer leading edge to ensure proper fit of the rear deck side sheeting. Cut the fin slot after gluing on the rear deck top. Fit the 1/2" sheet cowl top and tank hatch and drill to accept 4-40 hold-down bolts and glue in 1/4" square by 1" maple blocks. Bolt this in place and glue on the engine cowl parts. Glue on the cowl nose ring with the engine and spinner back plate in place as a positioning guide.

Make the adjustable and steerable tail gear unit. The eyelets and 1/32"

wire steering arm are soldered to the axle shaft. Other parts are joined with epoxy. Glue the 1/8" plywood mounting plate complete with 2-56 blind mounting nuts to the fuselage bottom. Bolt the wing to the fuselage and build the fuselage portion of the dummy scoop. Using this as a guide, carve and drill the soft balsa scoop front and glue it to the rear of wing. Also, glue the leading edge fairing to the wing. Do not plank the bottom rear of the fuselage until the stabilizer and fin have been inserted. This will provide access for gluing. Do not attach the carved balsa wing fillets until the fuselage has been carved and sanded to final shape.

Remove the engine and wing from the fuselage, cut the rear portion of the Top Flite Kwik-Fli canopy to approximate fit and mark its outline on the fuselage top sheet. Carve and sand to shape the entire fuselage and cowl assembly except behind the wing on the bottom which has not yet been completely planked. Cement the canopy in place (the German cement, UHU Hart, is ideally suited to this job) after finishing cockpit details and drilling an air escape hole in the

cockpit floor. The hole prevents the canopy from collapsing or popping off as the air contracts or expands with changing temperature.

ASSEMBLY

Cut away the 1/4" fill at the rear of the stabilizer slot. Bolt the wing to the fuselage and align and glue in the stabilizer and fin. Complete planking the fuselage bottom and glue on the wing fillets.

The wing must now be weighted to balance the side-mounted engine. For this procedure, assemble the airplane including landing gear and ailerons (use masking tape strips to hold in place) but not the rudder. Drill a hole into the left hand wing tip and fill with glue and solder until the wing is level when the airplane is supported at the engine propeller shaft and the fuselage rear via an axially placed straight pin.

Now, apart from painting and radio installation, it remains only to cut hinge slots, install feed, fill, and vent tubes to the fuel tank, drill mounting holes for rudder and elevator horns and landing gear straps, and to perform other minor detail work on the Mousetang.

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FINISHING

Mask the canopy to the paint line indicated on the plans to protect it from glue, dope and sandpaper. Also, mask off the desired fillet edges around the tail surfaces and fuselage joints. Excellent fillets can be made using a filled epoxy such as Metalset A4 manufactured by Smooth-On Inc., Gillette, N.J. Apply the filled epoxy to the canopy and fillet areas and smooth out with a finger which has been dipped in dope thinner. Remove the masking tape (except that on the canopy) and feather the epoxy into the wood. No further finishing will be required of such fillets, except for a light sanding to remove surface glaze.

For a neater looking job, finish the movable surfaces independent of the fixed surfaces. In fact, since the movable surfaces should not have any appreciable gap between them and the fixed surfaces, it is not possible to do a thorough paint job any other way.

Fill any dents, gouges, and seams in the wood surfaces with Hobbydope Stuff straight from the can. When dry, sand all surfaces progressing to 400 grit wet-or-dry papers. Vacuum clean

the wood and brush on three coats of medium strength clear dope. Let this dry for two or three days and sand down with No. 400 grit paper. Brush on as many coats of a mixture of dope thinner, clear dope, and Stuff (approximately equal portions by volume) sanded between coats as you feel is satisfactory. Spray on a sealing coat of clear dope. Let this dry for several days (if you have the patience) to see if any areas need further attention due to dope shrinkage. If not, spray on a primer coat of silver or light grey dope and then the primary finishing color.

Use cellophane tape to mask colors since it provides a much finer edge than regular masking tape. After paint trimming is complete, remove all masking and wet sand paint edges smooth. Apply lettering and numerals (I use "Letraset") and decals to suit and spray the entire airplane with a few coats of clear dope. The clear dope is necessary at this stage to protect not only the decals and lettering, but also the colored dope. Otherwise, even the mildest of fuels and after-the-flying-session cleaners will eat away at the finish in short order.

The plans are detailed for a K & B .40 R/C series 70F engine with a dMECO universal radial mount and rubber shock absorbing disc. Other arrangements could require modifications to the cowl.

There is ample room inside the airplane for the Kraft Series Seventy One airborne system with KPS-12 servos used in the original Mickey Moustang. Servos such as the KPS-9 will not fit with sufficient clearance. I mounted the rudder, elevator, and throttle servos (two side by side, one across) in a tray at the very rear of the fuselage radio compartment. This gives plenty of room for the receiver wrapped in a long tube of foam. No severe balance problems are encountered with such a scheme yet the extra fuselage room made available allows easy removal of the tank (or battery pack under it) should this prove necessary.

FLYING

Balance the Moustang at the point shown on the plans. Overall weight between four and one half and five and one half pounds will prove to be quite satisfactory for excellent flight performance. Initially set up the con-



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trol surfaces as follows: ailerons — 1/4" up, 3/16" down (such differential is automatically obtained by using Rocket City No. .05 aileron links on the 3/32" wire horn which is vertical when at neutral); elevator — 3/16" up and down; rudder — 3/8" right and left. Such movement is more than ample. Use a 10-6 propeller for preliminary flight trimming.

Take-offs are normal as the Mouse-tang is not strongly affected by engine torque. The tail does tend to come up under full power ground acceleration, though, and up elevator is necessary

for lift-off. As flying experience is gained, try a different propeller such as an 11-5 in an attempt to achieve your goals for aircraft speed, acceleration, and maneuverability. Also, move the balance point further to the rear as you see fit. For dead stick landings use a long approach as the Mousetang tends to glide "forever" without the propeller drag at engine idle.

I would be happy to answer any questions and to hear of experiences you might have regarding Mickey Mousetang. Write me in care of R/C Modeler Magazine. □

VISION AND THE R/C PILOT

from page 8

minutes of arc. Furthermore, with 20/20 vision you should be able to perceive parts of that object which subtend only one minute of arc. If all this sounds improbable, here is another provoking thought — many people have 20/15 or even 20/10 vision! That means if you have 20/20 vision, there are some individuals who

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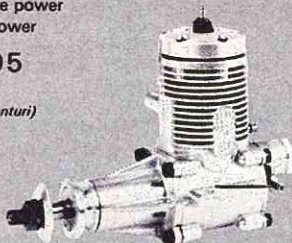
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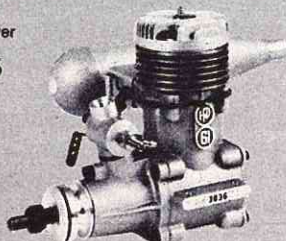
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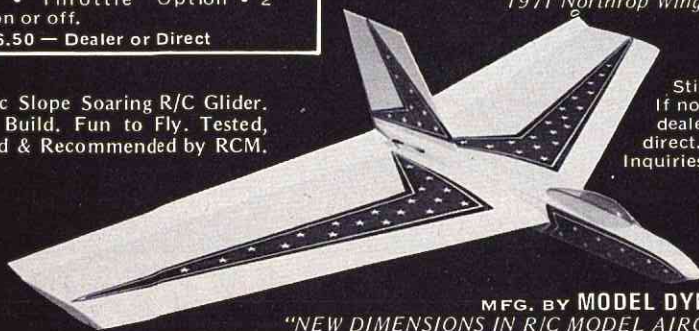
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can see a good deal better than you can! There is a very good possibility that your eye doctor can improve your vision even if you now have 20/20, so make an appointment with him and give him the opportunity to help you.

While he is examining you, he will do a number of other tests which may have a bearing on your flying ability. For one thing, he may find you have defective depth perception, a condition you may never have been aware of, and something that may account for the fact that you are always landing off to the side of the runway, or that you are having trouble lining up your final approaches. One thing that can cause this is an unequal refractive state between the two eyes, such as one eye being near sighted or far sighted to a greater degree than the other eye. Ordinary glasses will correct this immediately. Astigmatism could be present as well, and if you have this in any significant amount, one symptom could be an inability to fly in a straight line or being unable to maintain a constant altitude. Do not count on becoming an expert pattern flier if you are walking around with uncorrected astigmatism. You will never be able to make round loops no matter how much you practice. All of this applies to contest judges as well. Defective vision will certainly hamper a judge's ability to score maneuvers correctly. He may see a perfectly round loop as being oval in shape if he has uncorrected astigmatism. If he is very near sighted, or very far sighted he may not even see the maneuver clearly at all. Determining the winner of an R/C pattern contest is such a subjective matter, and so much depends on how the judge sees and scores the flight, that it should be mandatory that contest judges be required to produce a certificate from an eye doctor stating that their eyes have been examined within the past two years and that all defects are fully corrected. Astigmatism can cause problems in the workshop too. Ever wonder why you just cannot eyeball a straight wing panel, or sand a square corner by eye? What appears straight to you is recognized as being quite crooked by anyone with normal eyesight. So astigmatism is one of our greatest potential sources of trouble, both at the flying field and at home in the workshop.

Have you shot down anybody lately? Especially someone displaying a red or green frequency flag? Perhaps you are color blind, and your eye



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doctor is the only one who can tell you if you are, and how severe the condition is. Perhaps he will not be able to cure your color blindness, but he can give you some very good advice on what color schemes to use on your

airplanes so you will not be trying to follow a gray object in a gray sky.

Do you wear very strong glasses? Then perhaps you should consider being fitted with contact lenses, providing your eye doctor approves. For

one thing, strong lenses in ordinary glasses make your airplane appear much smaller if you are near sighted and much larger if you are far sighted. Contact lenses eliminate this unwelcome side effect and provide you with a normal sized image.

Are you over the hill? Have you turned forty? If so, be prepared for more problems. Most people over forty begin to notice an inability to focus their eyes clearly when trying to read small print or do delicate work on small objects. As the years pass, newspaper print seems to get smaller and smaller, until that sorrowful day comes when one can no longer see anything clearly that is held close to the eyes. Then come the ingenious solutions, such as dime store reading glasses, hand magnifiers, more powerful lights over the workbench, avoiding small airplanes and switching to building big jobs, or maybe even hiring some kid to do your building for you. If you fall into any of these categories you are a visual delinquent, and should waste no time in consulting your eye doctor. He will see that you are supplied with glasses that will restore the microscopic vision of your youth. If you do particularly fine work, such as detailed scale building, you can be given glasses which will let you get within a few inches of what you are working on. I personally know a number of model builders who have several pairs of glasses with lenses of graduated strengths. They merely select the one which is most suitable for the job at hand.

As an optometrist, I can think of very few pastimes which are as hard on the eyes as gazing up into a bright sky for hours on end. And when our own bird is resting peacefully in the pits between flights, we are still intently watching other people fly their airplanes. Even the pilots of full sized aircraft are not subjected to such difficult conditions of constant brightness. Go to any airport where there is a lot of flying activity and observe the pilots coming and going. If it is daylight, you can bet practically each and every one of them will be wearing some kind of tinted lens. And you can be sure they wear prescription glasses, not dime store sunglasses. Right here and now I would like to flatly recommend that if you fly R/C, you should wear sunglasses when doing your thing. Furthermore, I advise that you wear either prescription sunglasses obtained through your eye doctor, or that you purchase high quality sun-



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glasses as I will later describe.

Since January 1972, the government has required that all ophthalmic lenses be of shatter-resistant construction. While shatter-resistant lenses are not as immune to impact as standard safety glasses, they will nevertheless provide the R/C flier with a measure of invaluable eye protection. R/C airplanes with their powerful engines and whirling propeller blades are definitely eye hazardous under certain conditions, and protective lenses should be worn at all times. Most target shooters make it a rule to wear some form of protective eyeglasses when indulging in their sport, and we R/C enthusiasts should follow their example on the flying field. After all, if you are going to wear sunglasses anyway, go one step further and see that your sunglasses are at least of the shatter-resistant type. These lenses are also referred to as "case hardened."

One of the most frequent questions I am asked when it comes to sunglasses is, "What is the best color to wear?" Actually, the color is not too important. What we are primarily interested in is the light transmission and ultra-violet absorption characteristics of the various tints. For R/C flying under bright sunlight conditions, it is desirable to have a lens which will absorb at least 50% of visible light rays. Many individuals would be more comfortable with even more light absorption, perhaps 75% or even higher. The obvious conclusion is that only the darker tints can really fulfill our requirements. Table I will explain the absorption qualities of some of the more common tints in use today.

Some years ago the U.S. Government conducted research on various tints in order to determine which was the most beneficial to flying personnel. This resulted in the choice of neutral gray lenses with a high degree of light absorptive qualities. These lenses are now available to the public in prescription form or in over-the-counter non-prescription form. American Optical Company manufactures these lenses under the trademark "True Color," and Bausch & Lomb call their version "G-15."

While other tints have absorption qualities as good as the neutral gray lenses, the gray lenses are superior in their color discrimination. Tinted lenses cannot help but change the appearance of colored objects to some degree, but the gray lenses render absolute color fidelity. They do not

interfere with your ability to see and interpret colors.

Perhaps an improvement in sunglasses is what is known as "gradient density," in which the lenses are darkest at the top (where brightness

appears greatest), and gradually lightening in tint toward the bottom of the lens, where the tint is minimal. This is called "single gradient density." There is another variation available called "double gradient density," in which



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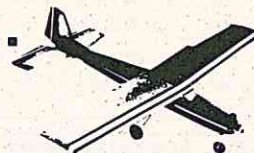
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the lens is darkest at the top and bottom, and lightest in the center. Either of the two is useful for R/C purposes, depending on personal preference.

Another type of sunglass coming into wide popularity today is the photochromic lens. This is a lens which darkens automatically on exposure to sunlight or any source of ultra-violet. The tint is of the neutral gray type, and light absorption varies from 55% to 66%, depending on air temperature. This degree of light absorption is certainly in the comfort range for most individuals, but some people will find they are happier with a darker tint as previously discussed. One possible side benefit of photochromic lenses is the fact that they do retain a slight tint indoors, something which most wearers will find quite restful. However, there are those who will find the residual tint annoying. Recently a newer version of the photochromic lens has been introduced. This

lens darkens considerably more than the earlier type, rendering up to 80% light absorption in sunlight, but there is a drawback in that the residual tint is much darker, in the vicinity of 35%. Therefore, these lenses are not advised for extended indoor use, and should not be worn for certain activities, such as night driving. Actually, no sunglasses should be worn continuously indoors or after sunset, as this could lead to severe problems with light sensitivity. Photochromic lenses, incidentally, are available in both prescription and non-prescription forms.

Some R/C fliers are also target shooters, and a number of these individuals have adapted their yellow shooting glasses to R/C flying. They reason that the haze penetration is better and the airplane will stand out in greater contrast over long distances. To some extent this is true, as the yellow lens does remove 100% of the ultra-violet rays and this results in a haze reduction effect. However, when

flying in bright sunlight with clear atmospheric conditions, the yellow lenses are of no real value. Furthermore, as these lenses absorb only about 25% of the visible light rays, they certainly do not reduce glare problems to any significant degree, and the average R/C flier will probably not derive any great benefit from wearing such lenses. The fact remains that the best way to achieve maximum visibility of your model in flight is to utilize a high contrast color scheme.

Another form of sunglass which may be of great help is the polarized type of lens. These are excellent in their glare reducing properties, and are quite suitable for our R/C purposes. Polarized sunglasses may be purchased over the counter at many retail outlets, but these lenses are usually not made of optically ground glass. The lenses in these sunglasses appear to be made of some form of plastic similar to celluloid, and because of this the lenses often are found to have optical

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aberrations. Present technology limits our polarized material to plastics, and so in order to achieve an optically acceptable glass lens, a rather ingenious solution has been applied. A polarized sheet of plastic is sandwiched between two layers of optical glass. This eliminates the aberrations in the plastic, and even allows an ophthalmic prescription to be ground on the surfaces of the glass. Not all prescriptions are available in polarized sunglasses, but many are, and your eye doctor can tell you if your prescription is available in this type of lens. Consequently, avoid using polarized sunglasses unless the lenses are made of glass with the polarized material imbedded inside. The cost of polarized prescription sunglasses is somewhat higher than ordinary prescription sunglasses, but the quality is high. Polarized sunglasses may be ordered in various shades of green, brown or neutral gray.

An additional desirable feature to have in our sunglasses (and in our regular glasses as well) is an anti-reflection coating. You can order this on either your new glasses or your old ones. The process is quite inexpensive,

and its main advantage is that glare from the inner and outer surfaces of the lens is reduced, and objects appear brighter as a result of increased transmission through the lens.

For those who do obtain their sunglasses from a retail outlet rather than a professional source, certain requirements should be strictly observed. First, the lenses should be produced by a reputable manufacturer such as the two firms mentioned earlier. Second, the lenses should be made of optically ground glass. This is sometimes difficult to determine, so read the label carefully. Third, the color should be in the gray, green, or brown family. Avoid "fashionable" colors such as blue, red and purple.

In summary, it is recommended that:

1. R/C fliers have their eyes examined periodically.
2. Middle-aged and older model builders inquire about special purpose glasses for close-work.
3. Sunglasses be worn when flying on bright days.
4. Impact-resistant lenses be worn when operating model airplane engines.

It is sincerely hoped that this article will, to some degree, make us all aware of the importance of our vision when applied to R/C flying, and that we will all be prompted to assign a high priority to the maintenance and protection of our vision. I will be happy to answer your questions on an individual basis if you write to me in care of this publication.

Here's to better flying through better vision! □



ENGINE CLINIC

from page 10

This past month I also received a phone call from John Perry who manufactures the Perry carburetor. Regular readers of the column know

TABLE I

LENS COLOR	VISIBLE LIGHT RAY* ABSORPTION	ULTRA VIOLET* ABSORPTION
Light Pink	12%	95%
Medium Pink	17%	95%
Light Green	33%	95%
Medium Green	49%	96%
Dark Green	64%	97%
Tan or Brown	79%	97%
Gray	79%	97%
Yellow	25%	100%

* These figures are subject to variations between different manufacturers.

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that from time to time I have run letters from modelers using Perry carburetors who have had trouble getting the engine to run rich enough. This has concerned John considerably. The latest model Perry carburetor has a small hole drilled right in the center of the fuel regulation slot in the aluminum idle mixture adjusting disc. This has eliminated any richening up problem. The first model Perry carburetor to appear on the market had no auxiliary hole at all and in most cases it was not needed. However,

occasionally an engine would come along with higher fuel demands than the carburetor could pass and the inability to richen up problem would occur. A design change was then made to the carburetor and a small hole drilled right next to the slot in the aluminum mixture disc. This cured the problem except that somehow some carburetors got out that had the hole drilled slightly out of position and it did not line up with the opening in the brass spray bar tube, so in effect did no good. Several times in the past I

have explained how to correct this problem yourselves but many of you have been reluctant to make any alterations — then too, best some of you didn't as the results would have probably made things worse. In an effort to correct any manufacturing defects such as this, John Perry will send a new aluminum idle mixture disc, at no charge, to anyone sending in one of the older style discs. So, if you have had any trouble getting your Perry carburetor to richen up into a four cycle, and the idle mixture adjusting disc does not have a small hole drilled right in the center of the fuel regulation slot, send it to Perry Aeromotive, 581 N. Twin Oaks Valley Road, San Marcos, California 92069, and John will send you a new mixture disc. All that is necessary to send is the aluminum idle mixture adjusting disc.

Dear Sir:

I have several Veco .19 R/C Series 71SM car engines. Here is my problem. I use only K & B Supersonic 100 or 500 fuel. My glow plugs are K & B 1L long reach idle bar only. When I disassemble these Veco .19's, the pistons and liners are rust colored. These parts are also quite discolored. I broke both engines in carefully, and gave both engines one minute runs, let each cool completely, then continue. Gradually I increase the runs to two to three minute runs. After about two hours I tore both down to see how polished the crank journals and pins were and there was rust. I also run both engines very rich. Where have I gone wrong?

Sincerely,
Robert N. Bowman
Yakima, Washington

As mentioned earlier in the column, Bob, carbon and varnish are a normal condition in model engines. Quite often the varnish will have a slight rust colored tint, especially if the engine has always been run on the rich side. Lean runs usually mean burnt black carbon and varnish. Also, the Klotz oil used in Supersonic 500 contains a red dye and this will in turn give a red tint to the engine varnish. There is also the possibility that you have gotten water in your fuel by leaving your fuel can open. Water in the fuel will, in turn, cause a rusty varnish. Leaving raw fuel in the engine after it has been run can also result in rust forming on the steel parts. The alcohol in the fuel attracts moisture, so always stop the engine by pulling the fuel line and letting the engine run out dry. Then add a few drops of 3-in-1 or other light machine oil to the intake and exhaust.

Dear Mr. Lee:

Where should the hole or slot in the spray bar be in relation to the venturi? Should the hole face straight down, or at almost 90° from the bottom facing forward? Perhaps at 45°? Is the position of the spray

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bar hole critical? Does it vary with different engines? Is there a position whereby it would improve idle with a small sacrifice at the top end? When going from idle to high rpm, is the opening of the exhaust baffle critical in relation to the opening in the throttle?

Once again thanks for your help.

Happy flying,
Bob Milne
Roxboro, P.Q.

The hole in your spray bar should always be straight down in relation to the venturi or slightly forward a hair. It should never point toward the rear or be as far forward as 90°. The position of the hole IS critical and must be positioned correctly. The position mentioned will give both the best idle and top end performance.

The relationship between the carburetor and exhaust baffle opening is also critical and the reason many fellows have idle and/or acceleration problems. With the carburetor cracked open just a hair the exhaust baffle must always be closed. Many times modelers will have the exhaust baffle go past closed so that, as the carburetor is opened, it can reach 1/3 to 1/2 throttle before the exhaust baffle starts to open. This results in choking the engine and it dies. On the other hand, if the exhaust baffle does not completely close it opens too soon, allowing the glow plug to cool and the engine again dies. So adjust your carburetor and exhaust baffle to open together and make sure that at full throttle, if your engine uses one of the rotary type exhaust baffles (Veco, Enya, etc.), that it does not go past full open. This would result in the baffle opening rate being faster than it should be due to more travel than is needed. Adjust the linkage so that the baffle just closes at low throttle and is perfectly horizontal at full throttle.

Dear Clarence:

I have had relatively little experience with models but I am looking at plans for a .60 powered R/C plane of fairly simple design and construction. The plan calls for the engine to be mounted in the inverted position. I wonder if there would be more difficulty in starting one this way. I have not yet purchased my engine but it will probably be a Fox, Veco, or Enya, preferably with muffler. What is your advice?

Sincerely yours,
Robert M. Birke
Fayetteville, N.C.

As a beginner, Bob, I wouldn't recommend that you start out with an inverted engine installation. These engines can be balky enough upright until you have learned a good starting technique. Inverted engines are always harder to start, due to easier flooding, so best start with an R/C ship that

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does utilize an upright engine, until you do become proficient at starting an engine.

Dear Mr. Lee:

I am writing you in hopes that you can help us in our small fuel problem. That's what we think it is. We live in a small town in the San Luis Valley in Colorado. The altitude is 7,666 feet. We are control line flyers, and our problem is that we can't keep the engine in a two cycle during inverted, sharp turns and outside loops. The engine always wants to sag off or just 4 cycle all the time. But in level flight everything is just great. We have tried different needle valve settings — by this we

mean, leaning it out more on the ground before take-off and also setting it on the rich side.

The engines that we are using are Enya .35, OS Max .40 and .35 and Torpedo .40. All of these engines have been broken in, to the engine manufacturer's specs.

The tanks that we are using have been changed from the standard tank to the uniflo design. (We found this design in Model Airplane News June 1969.) This has helped, but still the same problem.

We have tried different tank settings such as setting the tank higher or lower than the needle valve.

As for fuel, we are using K & B 100.

We have asked different hobby shop dealers in Denver about this, and they say we should use a hotter fuel for this higher

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altitude. What is your opinion on this?

Also, one more thing — what is your opinion on glow plug heat during flight?

Yours truly,
Richard Brink & Bob Bressman
Monte Vista, Colorado

Although this is a U-Control problem, it is also shared by R/C fliers as well. Any time you have trouble with the model richening up during inverted flight, it is due to the fuel tank position being too low. This, in turn, becomes a high position inverted and causes the engine to richen. By setting the mixture a little leaner, to compensate, it is then too lean upright and the engine sags. The only solution is to raise the tank position. Many times I have observed R/C ships richen up badly in outside loops, break back and forth between a two and four cycle during horizontal rolls, etc. The pilot usually swears at the engine, lousy carburetor, etc. In reality it is simply a matter of the tank position being too low. With your particular U-Control model, even though you may have the centerline of the fuel tank exactly on the needle valve centerline, (this pertains to ukie models only — not R/C), the attitude of the airplane in flight may require varying the tank position slightly. In other words, the airplane

may fly tail low upright and tail high inverted, or vice versa.

As far as increasing the nitro content for higher elevation flying, such as you have there in Colorado, this is generally a good idea. A fuel containing 25% nitro-methane will generally work better. Fuels such as Fox Mistlemist and Supersonic 1000 fall in this category. However, increasing the nitro content will not solve the richening up inverted problem. This is tank position.

There is no advantage to glow plug heat during flight, where no idle is intended. If you can notice an increase in power, with the starting battery connected, then this indicates that either, or both, your glow plug and fuel are too cold. With the proper glow plug/fuel combination there would be no need for additional heat to the glow plug. This would also not help the richening up problem.

Dear Mr. Lee:

I have been flying for about 11 months. I want to try a larger engine than I am using now (Enya .15 III). You have probably answered this question many times before, nevertheless, I would like to know the difference between T.V., Diesel, and R.C. engines. One more thing, could you recommend a rear rotor .40 engine for me? I

would be grateful.

Sincerely,
Richard Eingtein
Monsey, N.Y.

Assuming by T.V. you don't mean the boob tube in the living room, T.V. means Throttle Valve and is MRC's designation for their Enya line of throttle equipped engines. The same thing pertains to R/C or radio control engines. These are engines equipped with throttles intended for radio control use. Diesels are engines that do not use a glow plug and depend upon compression ratio alone to ignite the fuel. A special diesel fuel, composed mainly of ether and kerosene, along with lubricating oil is also used. Diesels are not often used for R/C flying due to idle problems, however, there are several small size diesels available for R/C use that do have exceptionally good idle characteristics. Diesels are a little harder to adjust properly, having not only a needle valve for mixture control, but an adjustment for compression as well. It takes a good deal of experience to get on to the trick of adjusting both properly. For this reason I recommend you stick with a conventional R/C, or in the case of the Enya's, T.V. equipped engines. □

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from page 6

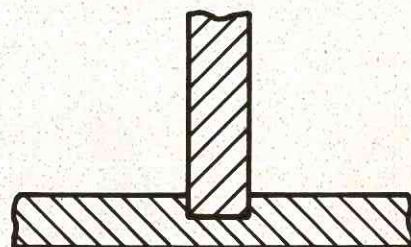
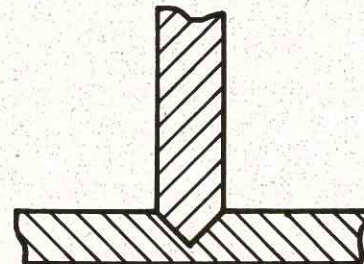
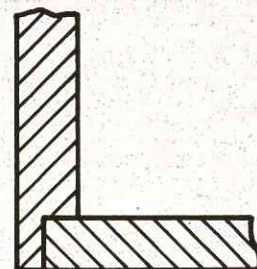


FIGURE 1

the interface between the two parts, the spindle is quickly stopped, and the parts are held in position until solidification occurs.

Another method of welding is using ultrasonics. With this, one part is vibrated against another at very high frequency. The friction of the parts at the joint causes the interfaces to melt, and flow together. Upon stopping the vibration, the parts freeze into one integral part. This method is very expensive due to the exotic equipment required.

This should square you away with the styrenes. You should now be able to identify the General Purpose Styrene, The Impact Grade Styrene, and the A.B.S. (Acrylonitrile Butadiene Styrene) group of plastics.

As we prepare to sail away from this port, our girlfriends want to put on their make-up before we leave so we can see them at their best. We find they are allergic to some of the make-ups (paints). The ones that give them acne are the dopes and lacquers. The enamels, acrylics, and epoxies are their

type of make-up, but they try them on small areas first before they do the complete job. □

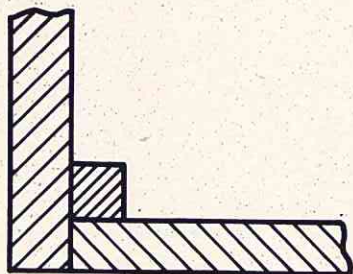


FIGURE 2

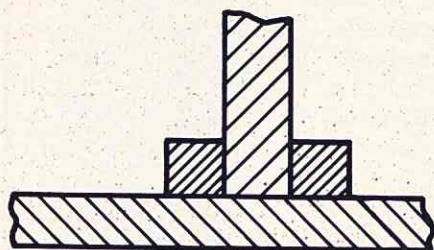


FIGURE 3

FROM THE SHOP

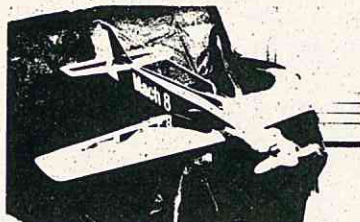
from page 2

FROM THE 1973 NMPRA PRESIDENT

I want to thank the NMPRA membership for the vote of confidence in electing me to the presidency of this dynamic racing organization. I will pledge to do my best to promote racing and to continue with the open line of communication that has been established with the AMA. We want AMA Headquarters and the entire AMA membership to understand that the NMPRA represents the modeler's voice in all matters pertaining to R.C. racing, including rules and the conduct of contests. I can assure you that Bror Fabor and I are in complete agreement on all NMPRA matters; we have coordinated all business items; and a very smooth transition will be made between the 1972 and 1973 presidents.

I do not plan to make any major changes in the conduct of NMPRA business for 1973. However, in my "position statement" made in the October newsletter, I told you that your district V.P. was going to shoulder more responsibility in the NMPRA and he will represent you in the initiation of rule proposals and clarifications in addition to

to page 114



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FROM THE SHOP

from page 111

his other coordination duties. I have already started to implement this goal by asking the V.P.'s for an editorial comment which will be published in the newsletter. This comment will represent the opinion, from his district, on all matters pertaining to rules, contests, newsletter, and controversial issues. So, you as an NMPRA member should sit down now and write your V.P. It only takes a small amount of effort, and unless you put your ideas on paper and send them to him, he can't express a collective viewpoint.

Another important matter that needs immediate attention is the plans for conducting a National Pylon Championship Race which the membership has been wanting for many years. This race would hopefully settle the controversy on how a national and event champion should be selected. National standings would be determined according to how they placed in this race. Here are the plans as of this date:

1. RCM Magazine has pledged to sponsor the race for three (3) years in succession. A renewal agreement can be made at the end of that period.

2. Each of the seven district Vice-Presidents will submit a candidate place, host R/C club, and date from their district. (Members will help the V.P. find candidate spots.)

GUIDELINES: The time should be chosen before school starts, or during Thanksgiving holidays, to give students a chance to attend. Weather should be considered when selecting the candidate place and date. At least three days should be scheduled for the race.

3. Three (3) places will be "drawn by chance" from a hat by the President. Two other drawings will be made to determine the "1-2-3" order.

4. The top 20% from each district will qualify for the Championship race, based on their point standings in their district. The district V.P. will keep records on each individual's point standings. He will determine who will qualify, and standings will be reported monthly in the newsletter.

NOTE: The national point system initiated in 1972 will be continued as a back-up in case these plans fall through. In addition, district champions will be determined in the same way. See the Feb. 1972 newsletter for details on the National Point system.

The 1973 newsletter will have essentially the same format as was used for 1972. This will consist of the following: (1) President's letter; (2) rule proposals; (3) editorial comments; (4) opinion polls; (5) new product reports; (6) contest reports and pictures; (7) National and District point standings. Please send all contest reports and new product reports direct to Ed Hotelling, our Editor for 1973. Please send all editorial comments, rules proposals or general discussions to me and a copy to your district V.P. These items will require your V.P. acknowledgment or approval before they will be published in the newsletter. This system will filter out all "odd-ball," "rebel rousing" press that does nothing for the NMPRA and doesn't represent the viewpoints of the true hard competition pilots in each district. When these items are sent to me be sure you enclose a comment by your V.P. because no official action will be taken unless this is done.

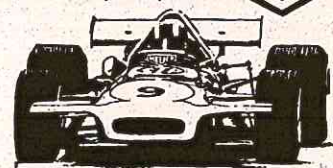
The deadline for V.P. editorial comments will be February 1, 1973, and the deadline for candidate Championship Race

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sites will be March 1, 1973. Please feel free to call me anytime.

See you next month.

Ed Rankin

The following letter was received from the League of Silent Flight representing soaring enthusiasts throughout the country:

Academy of Model Aeronautics
806 15th Street, N.W.
Washington, D.C. 20005

Attention: Mr. John Worth
Executive Director

Gentlemen:

The League of Silent Flight cannot accept the recommendations set forth in Department of Transportation, Federal Aviation Administration Advisory Circular AC 91-34, "Model Aircraft Operating Standards," July 1972.

AC 91-34 is unrealistic, unreasonable and unenforceable. It is reported that this FAA circular was prepared with the full knowledge of the Academy of Model Aeronautics, yet the standards are ill-advised and present neither a solution to an alleged problem nor a rational compromise of quasi-divergent interests.

The importance of air safety is not contested, but the FAA-stated altitude limitation of 400 feet above the surface is prejudicial, is unwarranted, and is completely inconsistent with the level of maturity and responsibility of R/C soaring sportsmen.

The subsequent interpretation by the AMA of the FAA circular in no way mollifies or otherwise corrects a seemingly inept representation of the nation's R/C soaring interests. The AMA release is of no consequence.

Advisory Circular AC 91-34 has been distributed to FAA offices throughout the country. The AMA must now initiate remedial action to obtain either a complete retraction of the FAA document, or a revision which is acceptable to active sportsmen. No item should carry higher priority.

The League of Silent Flight, a body of more than 500 lifetime member R/C soaring enthusiasts, stands ready to serve as advisor and consultant, and to support and endorse a strong, corrective plan of action by the AMA. The League of Silent Flight also is prepared to develop or participate in independent action if such is warranted.

Please advise us of your intent.

Respectfully,
Le Gray
President

The following letter is the AMA's answer.

Mr. Le Gray, President
League of Silent Flight

Dear Le:

Your December 5 letter concerning the FAA's Advisory Circular is fully appreciated. I agree completely that the circular is unsatisfactory in regard to the 400 foot "ceiling" as applied to RC sailplanes. In that regard the circular is ill-advised and unrealistic.

It is also true that the circular was prepared with the full knowledge of AMA, but it is definitely not true that AMA agrees with it. The simple fact is that FAA people advised us of what would be in the circular. They asked us for our opinion and we gave it — that the AMA Safety Code is a much more realistic document and that the 400

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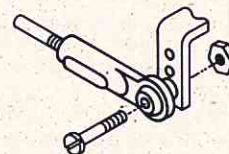
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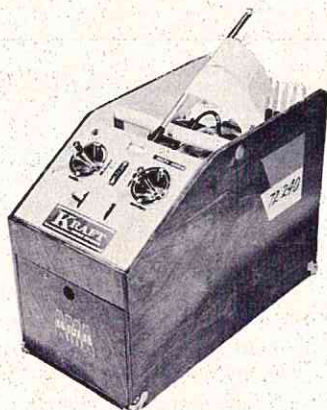
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foot 'standard' would cause problems.

We were told that because the circular is not a regulation it would be issued as is, as an experiment to see what problems develop. We were also told that there would be ample opportunity for our inputs if the FAA decided to move any further in the direction of regulation.

We were also asked to simply let the circular exist for a year or so. The FAA spokesman indicated the circular was intended more to serve political and PR purposes than to regulate. The FAA has been under political and news media pressure to "do something" about the danger of model airplanes hitting full scale aircraft — they were embarrassed by the fact that there was nothing at all in any FAA official documents pertaining to model flying.

The circular therefore is simply something the FAA can point to when questioned about any "incidents." As an advisory circular it does not require compliance — it merely establishes what the FAA considers to be normal and safe 'standards.' This is also to say that the FAA is concerned about any model flying outside of these standards. The important word is **CONCERNED**.

This doesn't mean they object or want to stop it. It merely means that they'd like to know about such flying, particularly if there is likely to be any in the near vicinity of full scale aircraft. So the circular serves as a warning — it says, in effect, what worries the FAA and in turn this suggests what our area of concern and direction of approach should be.

Of utmost importance in all this is the need to maintain friendly and cooperative liaison with the FAA. Without this our chances of getting what we want are reduced considerably. Our many years of dealing successfully with the FCC is a good guide and we are currently planning our future business with the FAA on a similar concept.

We are right now, for example, exploring with our legal counsel what our strategy should be for a long range program of working with the FAA to minimize restrictions on model flying. We are doing this because it is obvious that it's a very delicate matter.

It is also very complicated, because it involves all of sport aviation rather than just modelers. So we are working with the National Sport Aviation Council of the National Aeronautic Association, to produce a coordinated effort on behalf of all interests.

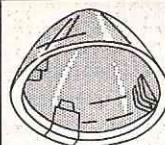
The worst thing we can have at present, as I see it, is several independent actions between modelers and the FAA. A few such situations occurred in our FCC dealings and each time it caused more problems rather than solutions.

What we need to avoid is a hostile FAA. This can nullify our present advantageous position which at least gives us inside information as to what's happening in FAA even if our advice has not yet been heeded. The quickest way to bring on hostility is to demand changes. Protests may help our self-satisfaction about standing up for our "rights," but they would do much to discourage support by those government officials who can help us.

There may be a time, if a calm and cautious approach doesn't work, to holler long and loud. If so, we'll do it. But this doesn't seem to be that time because we're talking about a threat rather than a reality. We should be prepared to deal with the threat and this is why we are arming now. But it will not be helpful to trigger a war before we are ready to fight it.

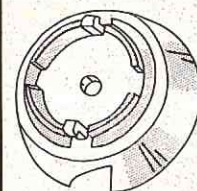
Another preparation step is the formation of a committee along the same lines as the Frequency Committee, which has been

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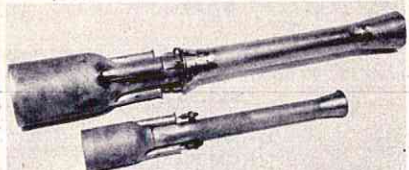
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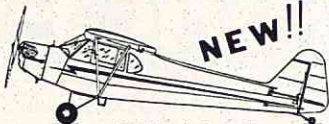
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so outstandingly successful! Such a committee is anticipated shortly. In that regard your letter offering LSF service is appreciated — I'm sure it will be considered.

In the meantime there is a problem concerning national representation of RC soaring interests. We see several soaring groups around the country but as yet no single truly national body speaking for all soaring interests. I suggest, therefore, that something be done about this. Perhaps a new soaring body or council, composed of one representative from each of the existing soaring groups, would be a good step.

In short, there are problems with current FAA thinking and AMA officers are working to remedy this situation. What's needed is for us to organize and coordinate our actions for best long range effect. LSF support is solicited toward that end.

In the meantime, please note that AMA insurance is based on the AMA Safety Code rather than the FAA 'standards.' This is to reinforce our feeling that the AMA way is better. Until we can get FAA appreciation for our approach we suggest that the way to live with the FAA is to follow the guidelines — which are included with each AMA membership license for 1973.

Sincerely,
John Worth
Executive Director
AMA

It is interesting to note that while many people associate hobbies with children, the entire hobby market actually is dominated by adults with the average age of a person buying hobby products in the low 30's. Almost 75% of the money spent on hobbies is spent by adults — that is, persons 18 years or older. Here's the top 10 in the hobby industry as measured by 1971 retail volume:

Craft and art supplies — \$250 million; Plastic kits — \$230 million; Model car racing — \$130 million; Model aeronautics and radio control — \$89 million; Model railroads — \$80 million; Scale model miniatures — \$73 million; Hobby toys and games — \$43 million; Stamps, coins and other collectors' items — \$42 million; Model rockets and science kits — \$41 million; Tools, adhesive, finishing materials, etc. — \$26 million.

It is interesting to note, along with the preceding figures that craft and art supplies were up 70% in the last 3 years while model railroads have jumped 27% in one year and radio control 43% in 1971, passing model railroading for the first time. And, as an indicator of the future, as the work week becomes shorter and the pressure of everyday living increases, the hobby industry will grow even faster as adults seek relief from the stresses of day to day living.

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	PLAN	KIT
61 1/4" P-47 D	\$5.95	\$74.95
60" Stuka JU 87 D	5.95	79.95
60" Hurricane	5.95	79.95 ✓
63" Zero A6 M5	5.95	79.95 ✓
56" Spitfire	4.50	59.95
63" Mosquito	5.95	84.95
62 1/2" Skyraider	5.95	94.95 ✓
56" Gladiator "Bipe"	5.95	79.95 ✓
60" Swordfish "Bipe"	5.95	79.95 ✓
57" Tiger Moth "Bipe"	5.95	59.95
✓ Kit includes fibreglass cowl. All kits include canopy, hardware, handcut parts, nylon cloth, etc.		

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