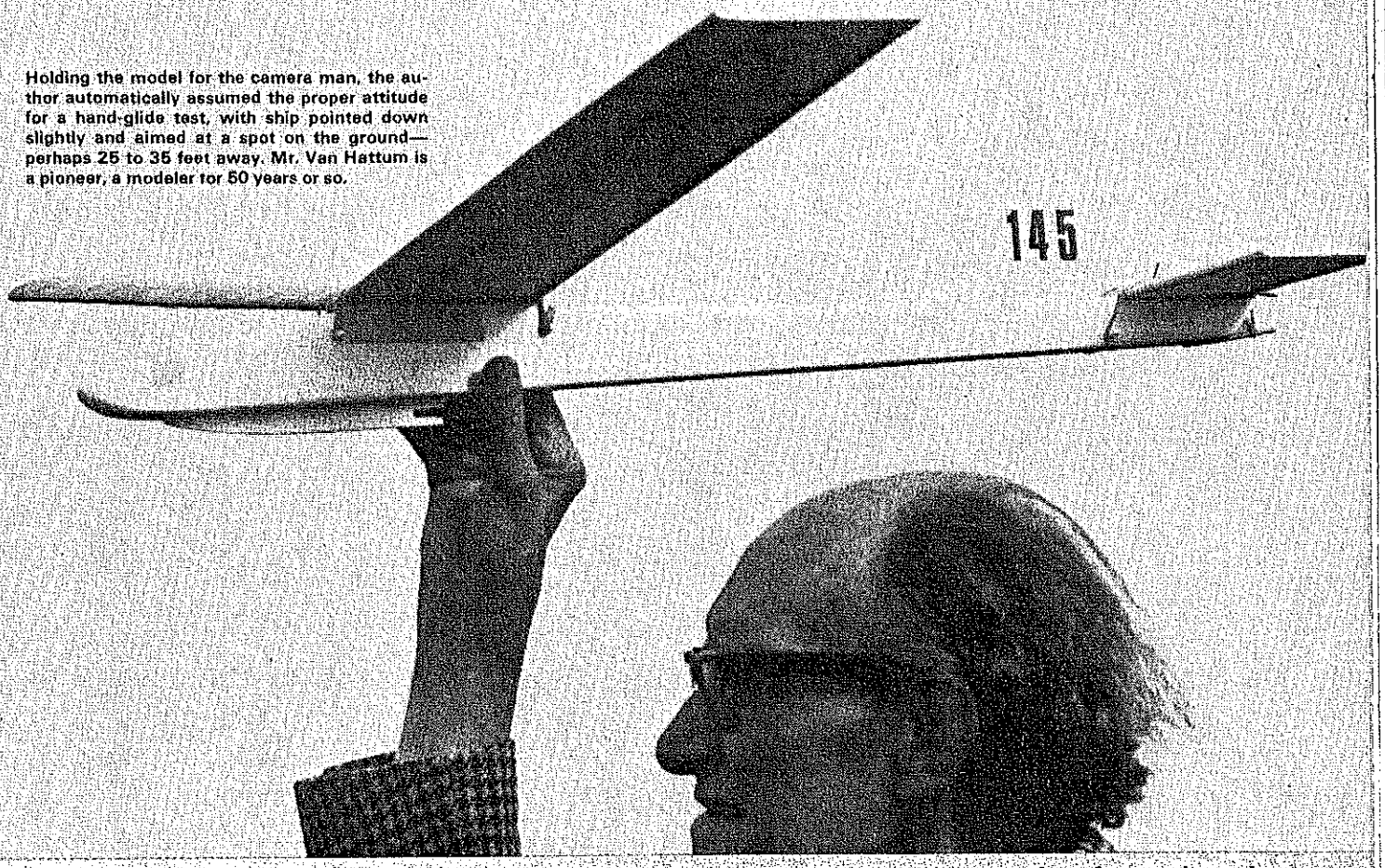
#235



Holding the model for the camera man, the author automatically assumed the proper attitude for a hand-glide test, with ship pointed down slightly and aimed at a spot on the ground—perhaps 25 to 35 feet away. Mr. Van Hattum is a pioneer, a modeler for 50 years or so.

If its prizes you're after it won't bring home the bacon. But will you spring for a sharply designed 40-inch towliner that doesn't require the south 40 for its soaring flights?

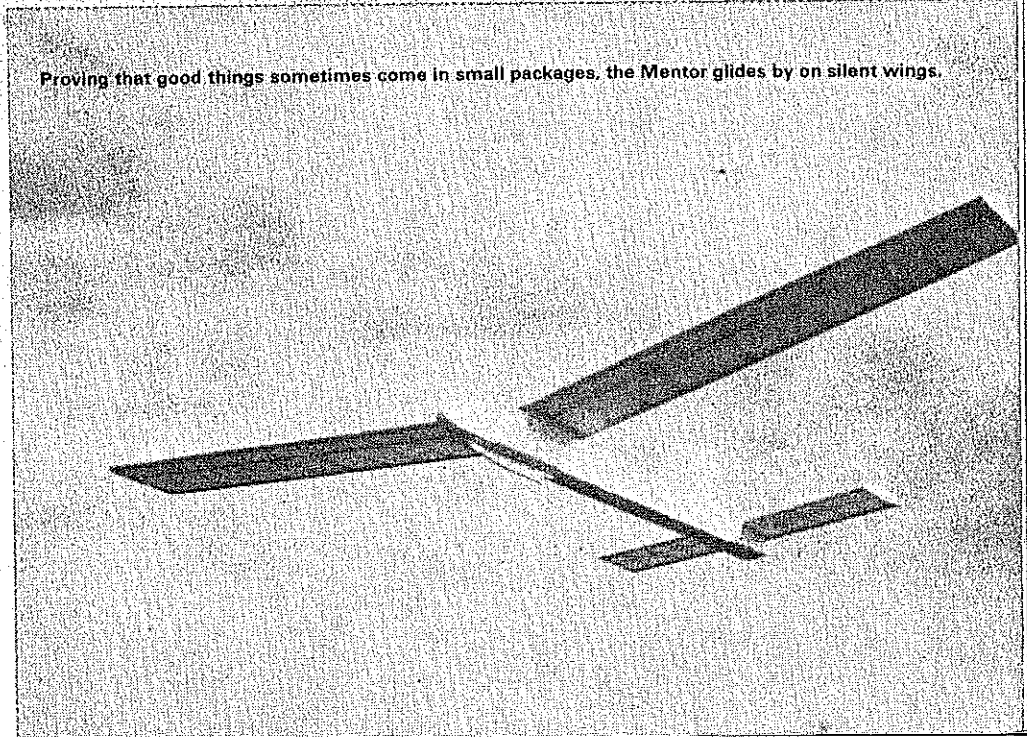
J. Van Hattum

The MENTOR

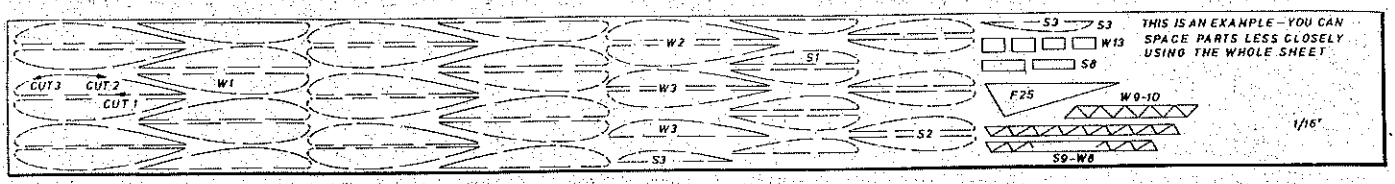
HERE IS a simple glider that is easy to build and still looks good in the air. With its 40 inches of span it is easy to transport, so it does not need a split wing with the structural complications that go with it. Being fairly small it will not fly too far, nor too long, just long enough to whet the appetite to hook it on the towline again and have another go. In fact, it was specially designed for small field work and the object was to avoid those long flights with the model ending up in a built-up area or on a highway.

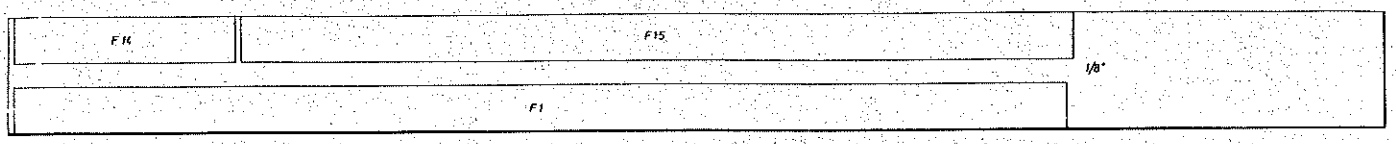
Clearly, no spectacular performance is claimed for it, but its merits lie somewhere in its ruggedness, easy building and repair, simple trimming technique and, maybe that is the most important. The design can serve as an immediate follow-up from the first model you ever made. It could even be that first model if you have the knack to work carefully and systematically.

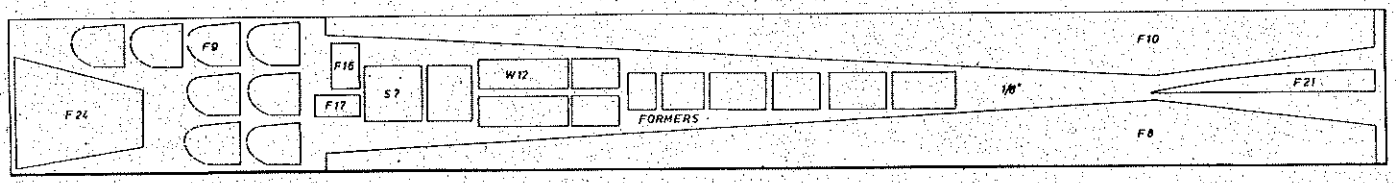
Of course, any model demands attention when building or you're going to have

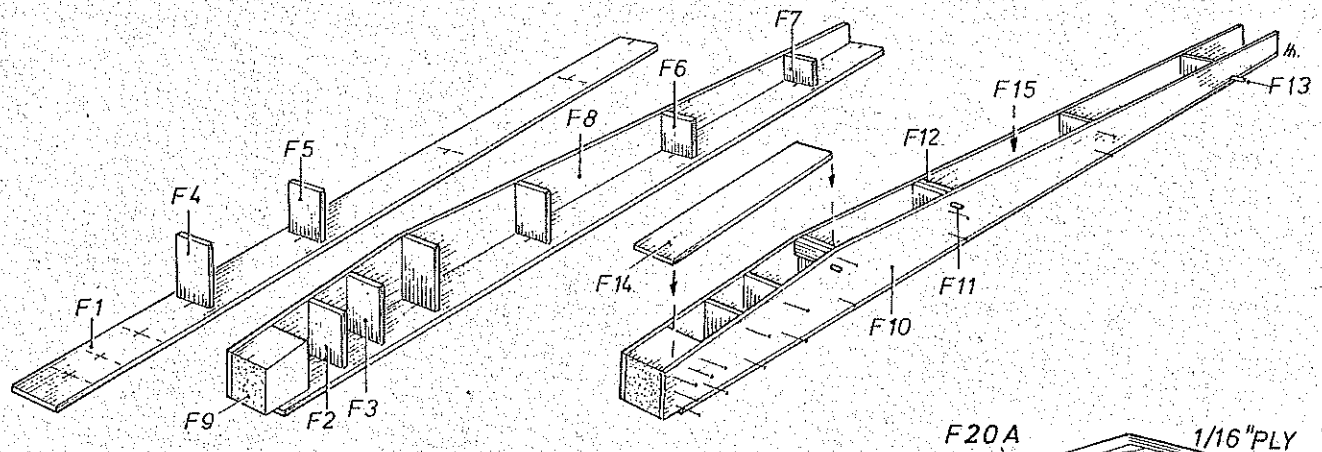


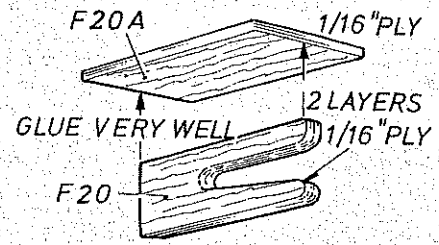
Proving that good things sometimes come in small packages, the Mentor glides by on silent wings.

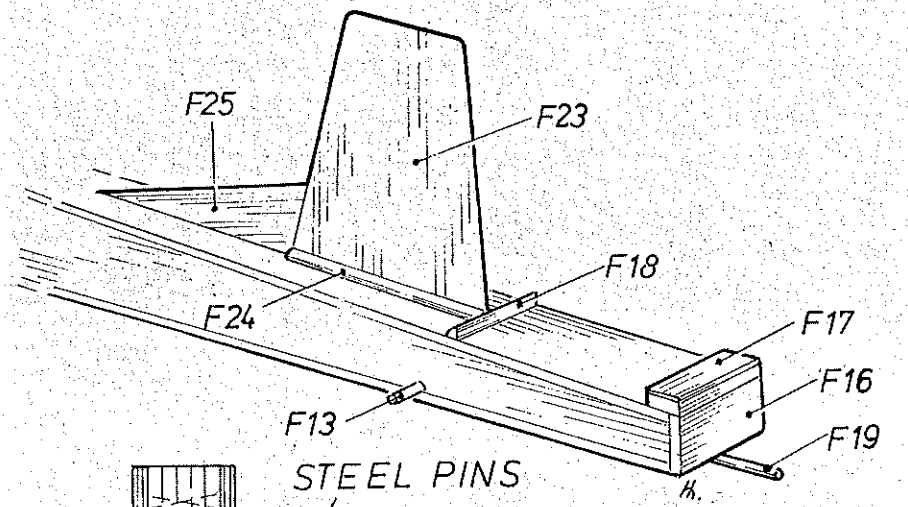

CUT 3
CUT 2
CUT 1
W1
W2
W3
W3
S3
S1
S2
S3
S3
W13
S8
F25
W9-10
S9-W8
THIS IS AN EXAMPLE — YOU CAN SPACE PARTS LESS CLOSELY USING THE WHOLE SHEET
1/16"

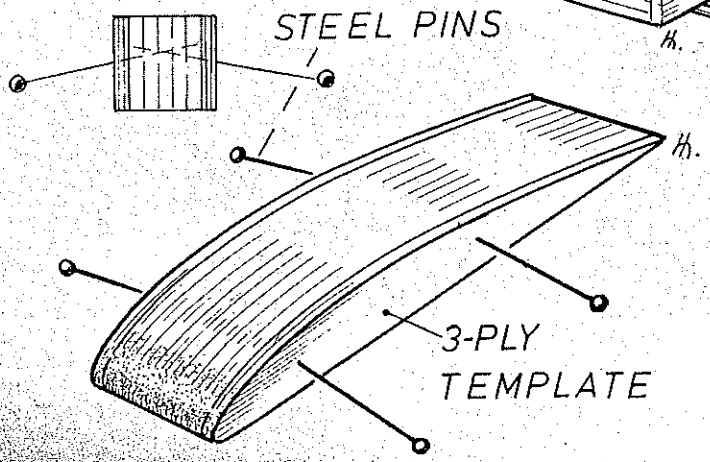

F14
F15
1/8"
F1

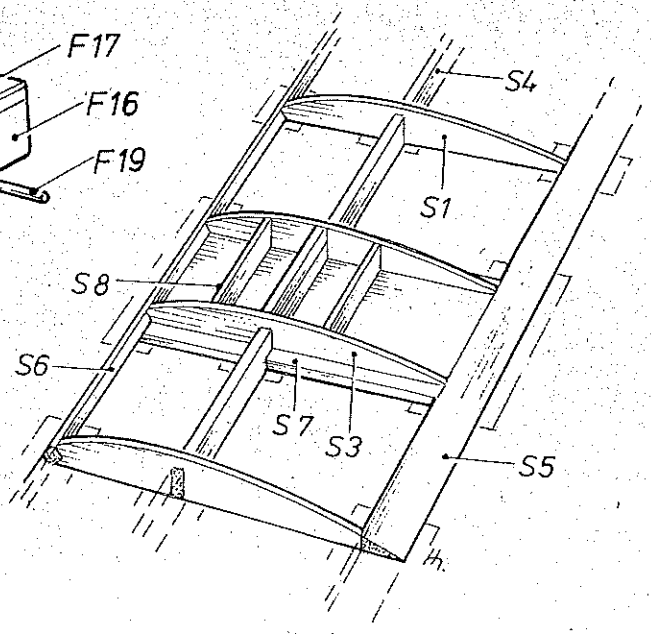

F9
F16
F17
S7
W12
FORMERS
F10
1/8"
F21
F24
F8

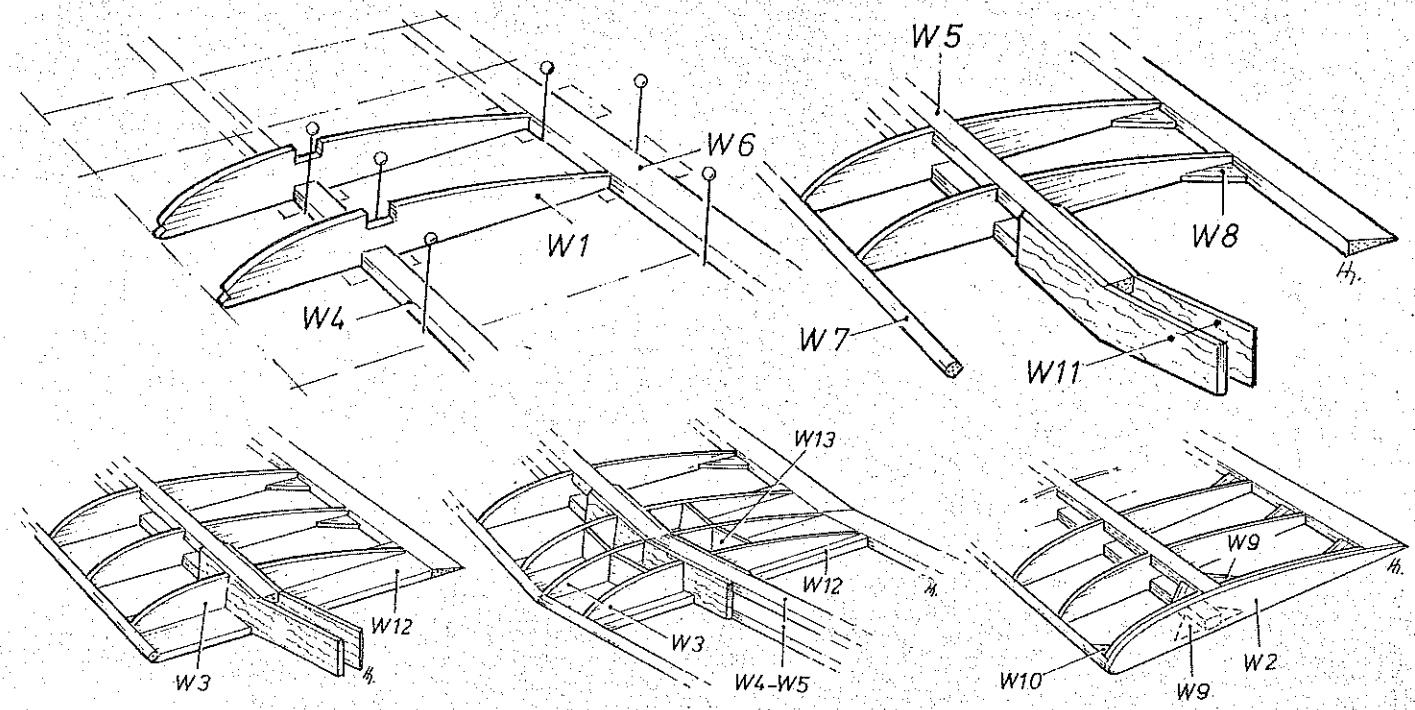

F7
F6
F8
F5
F4
F1
F9
F2
F3
F14
F12
F15
lh.
F13
F11
F10


F20A
1/16"PLY
2 LAYERS
GLUE VERY WELL
1/16"PLY
F20


F25
F23
F18
F24
F17
F16
F19
F13
lh.


STEEL PINS
lh.
3-PLY
TEMPLATE


S4
S1
S8
S6
S7
S3
S5
lh.



trouble. We will list a few points to be kept in mind:

First, study the plan and sketches until every part and what it has to do is fixed in your mind. When things are not clear see if they are explained in the text.

Try to set up a logical sequence of work. Many useful hints are found in the text.

This is not a kit, so you will have to make all the parts yourself. This makes one feel more responsible for the whole thing, but it also means that you can only blame yourself when some detail comes out wrong. Be critical always; when you pass a shoddy job you will be sorry afterwards that you did not do a proper modification.

Copy the larger parts onto the material in an economical way, so the smaller ones can be made from what is leftover, but always take care to have the grain of the balsa run as shown on the plan.

Always remember that, even if the flying may attract you most of all, a lot of fun can be had from building. This is not a model that can be stuck together in a couple of hours.

Mentor has a long pedigree. A larger model, but very much like it, was designed and built around 20 years ago and variants have appeared during the following years. From that experience, aiming at more simplicity all the time, this version was finally developed. And it won't be the last!

Tools and Materials: The model is made almost entirely of balsa, with the exception of the wing spars, dihedral keepers which join the wing halves, and the towhook, all being highly stressed parts. That may need a little work with a jigsaw. The main wing spars are made of spruce, and an expert will probably tell you that the model is much stronger overall than careful treatment would demand. Well, it is quite likely that it may not always get that careful treatment and a high safety factor was intentionally built into the design. After all, a trainer should be robustly made and that goes for models as well as full-size.

Balsa, being fairly soft, can easily be cut with a sharp hobby-knife. Insert a new blade (Editor: Suggest X-Acto No. 11) as soon as you suspect that the old one is getting blunt. Always cut along a stout steel ruler to get a perfectly straight line. The direction of the cut should be chosen so that the knife tends to follow the grain in such a way that it moves away from the part you are cutting. All parts should be a "sliding fit" but no so tight that they have to be forced into place. If a part has a sloppy fit, replace it.

To smooth the contour of the cut use a sanding block, which is simply a wooden block on which you have glued (use contact cement) a strip of sandpaper. A fair assortment of these, with very fine to medium sandpaper, always comes in handy. For roughing out contours, such as the nose of the fuselage, you can use a small plane and file. If you lack extensive experience, cut the parts out oversize and trim them to fit. You do not only represent the Workshop but the Inspection Department as well and the latter should be relentless, even if it hurts the Other's feelings! Straight lines should be truly straight or you will be in trouble and that goes particularly for the fuselage.

We glued everything with white glue, such as is generally used for putting together furniture and other wood work. This glue gives a wonderfully strong joint, does not tighten while drying—which could cause internal stresses—and does not dry too quickly. This enables you to position the parts at your leisure and even makes it possible to shift them slightly when needed. Only one of the parts to be joined has to be provided with glue. Use enough, but avoid an excess which will form a hard crust that will later have to be removed by plane or file. Do not remove excess with your finger, for that will smear the glue all over the wood and make it more difficult to clean up! If you want to become familiar with the glue, just make a few test joints which will give you an idea of the time it needs to dry. Your dealer will sell you special steel pins which are very useful for holding parts together while the glue dries. While building you will automatically invent many ingenious ways to "jig" the bits together. While the joints are left to dry another job may be tackled.

The designer likes to work on softboard which he prefers to a wooden building board. It is cheap and you can stick pins in it easily. The outline of the wing or tailplane can be drawn on it with soft pencil or ballpoint pen, or a copy of the part to be built can be pinned onto it. To prevent the parts from sticking to the plan put small pieces of wax paper or Saran Wrap underneath the joints.

Fuselage: The plan clearly shows the way it is built, particularly the perspective views. First make the base F1 and glue the formers F4 and F5 in position, taking care that they stand at 90 degrees. Next, either F8 or F10, and that will give you a solid basis to work from. The extreme nose is made up of eight layers of ⅛" sheet—same as the rest of the fuselage—all glued together. They may be roughly shaped for we will have to trim them later anyway. You may,

Sound fundamentals mark this no-nonsense towliner. In the text you'll recognize the touch of a master—a construction article rare for its thoughtful presentation of every feature and step.

of course, buy a block of balsa that just fits between the sides and that will save you all this laminating, but the ⅛ sheet is there anyway and it results in a nice strong noseblock. Trimming will mean a fair amount of work with the plane, file, knife, and sandpaper block. Try to make a nicely rounded nose. The towhook F20, of two layers of 1/16 three-ply, can be added after the fuselage is done. See to it that it is in the right position and very well glued as it has to take the pull of the towline.

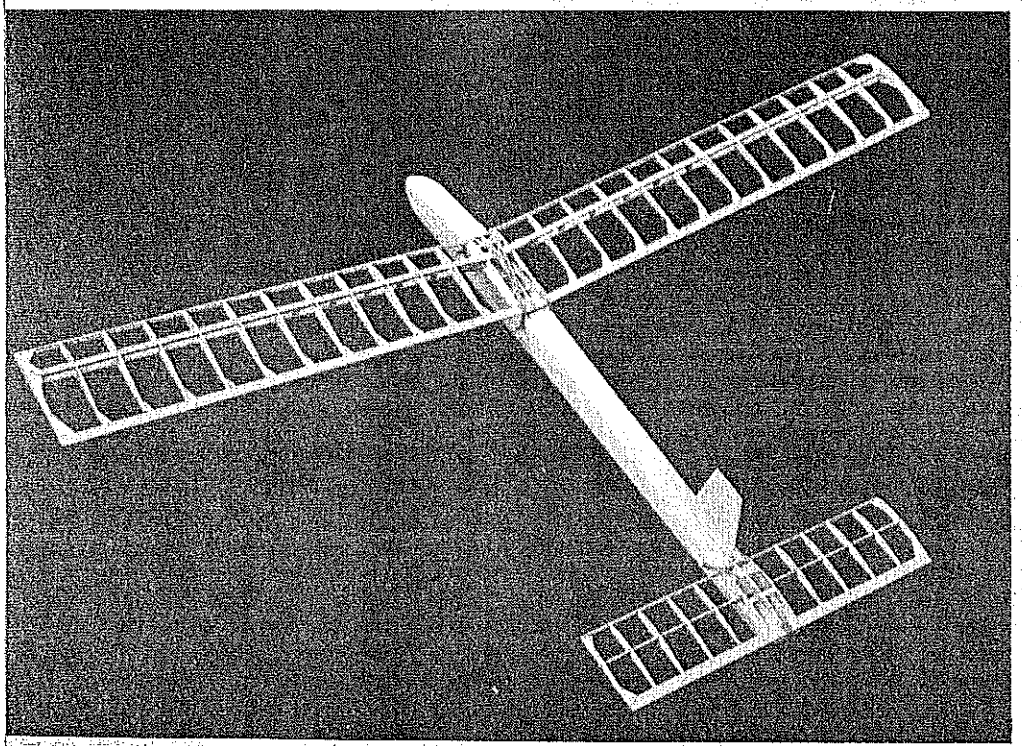
Tail Surfaces: The main fin F22 and its dorsal fin F24 are glued to the fuselage. The former is reinforced at its base by short lengths of ⅛" sq., lightly rounded for better appearance. Take care that the fin sits true in the plane of symmetry and at right angles to the fuselage.

Building the horizontal stabilizer or tailplane will provide you with experience that may be of use when you start on the wing. Both consist of ribs (here S1, S2 and S3), main spar (S4), trailing edge (S5), and leading edge (S6). Although this is a simple structure, it should be well built. It takes some attention and patience to make the ribs, but there is nothing difficult involved. The best procedure is to make a template of 1/16" three-ply. Copy the shape from the plan on the ply, cut out by jigsaw and finish to correct outline by file and sandpaper. Use this template to transfer the shape onto the 1/16 balsa sheet. Save expensive material by dove-tailing the ribs of the wing and stabilizer as shown on the suggested layout.

You need 14 ribs. You can shape the roughly cut ribs by clamping them one by one to the template—or in a small vise, placing a scrap of protecting material against the balsa—and sanding down until you "feel" you have touched the template. Another method consists of using *two* templates, drilling two holes through them and pulling four or five roughly cut balsa ribs between them, using light bolts to keep the lot together. The writer feels that it is hardly worth all the trouble when so few ribs have to be made and even thinks the modest number of ribs in the wing makes it just as easy to use the one-at-a-time method. When one builds a really large model with some two dozen or more ribs in each wing, it will be another matter, but please yourself!

Out of the 14 ribs, four are "specials"; the two extra tip ribs which will be used just as they come and the two ribs in the center section which are ⅛ in. less deep, because they sit on the center-section platform. The normal ribs will have to be provided with slots for the leading edge and the spar, as shown in section E-F. First, carefully make these slots in the three-ply template and use this to cut corresponding slots in each of the ribs in turn. They should be undersized to start with and accurately opened up until a nice sliding fit is obtained.

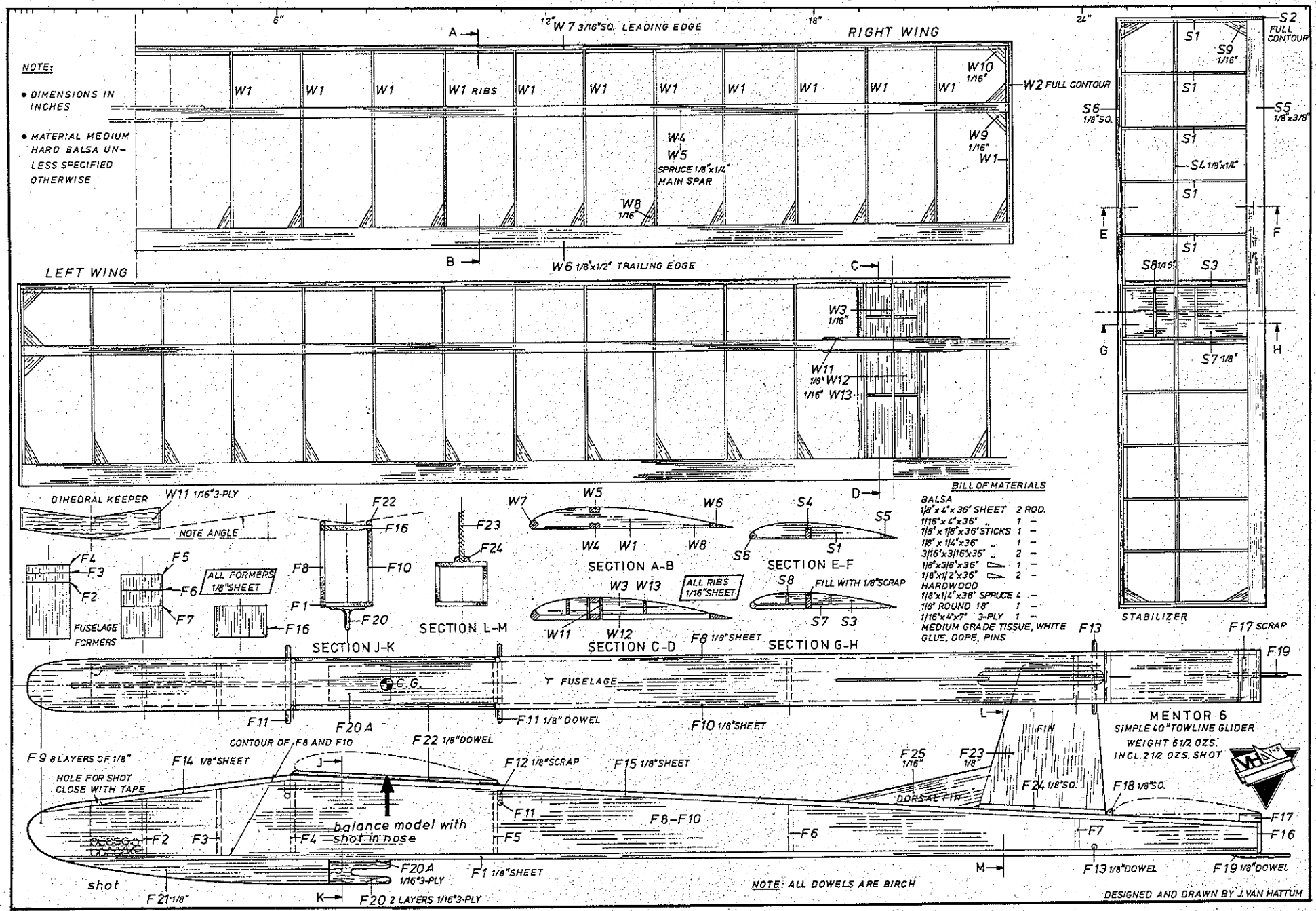
Next, the tails should be cut off, to be replaced by the trailing edge, again using the modified template. From section G-H it is seen that the center ribs S3 have a bit taken out so that the two parts fit on either side of the spar, while there is only "half" of the slot for the leading edge. As said, the extreme ribs S2 are left unchanged. Their job is to reinforce the tips and help withstand the pull of the covering material. You will note that two cross members S8 are glued to the center section. These serve to protect the paper covering against the pull of the taut rubberbands which will secure the tailplane to the fuselage.



If there is a better way of framing a glider of this size we've yet to see it. There is a minimum of pieces that can adequately do the job, nothing that might be too big and wasteful, every gusset precisely placed. Strength to weight is excellent, and structure warp resistant.

Wing: The wing is the most important part of a model and demands all your attention. Here again, there are ribs, spars, etc., but there are also a few differences. The spars consist of an upper and lower flange to give extra strength and they are made of spruce for the same reason. Another big difference is that, just where we shall want the greatest strength, that is in the center, we "cut" the spar. We have to do this because lateral stability—that is the stability about the longitudinal axis you could

Continued on page 100



FULL-SIZE PLANS AVAILABLE . . . . SEE PAGE 104

idea of condition of the batteries, although most modelers now use the sophisticated ohm/volt/amp meters. There are many places that this test light can be used and I keep mine handy. A bulb, a couple lengths of medium gauge wire, a couple of small alligator clips, and you are in business. Solder one end of each wire to the terminals on the bulb; very quickly, so as not to open a hole and cause the bulb to blow. Attach the clips to the other ends of the wires and that's it. I also soldered a pointed probe to the end of each clip, so as to be able to make contact in places where the clips cannot be attached, like in tight spots."

I think you'll find this little test light very handy. One thing, though. Don't use the light in series with the points to check for instant of opening as the build up of current in the primary windings of the coil may burn out the lamp upon collapse of the field as the points open.

Oops! Ralph Turner, of Amhert, Ohio, wrote to inform me of an error in the fuselage cross sectional area formula for Old Rulers. The proper formula is $Cf = \frac{L^2}{100}$ not 2L as stated. Ralph accuses me of not really being an old timer! He goes on to ask if anyone remembers the "old days" when *Air Trails* gave away a class A Buzzard Bombshell kit with a one year subscription! Doubt if we'll see those days again. (Editor's Note: *AT* gave away 10,000 kits.)

Clarence Haught, Route 5, Box 16, Coeur d'Alene, ID 83814.

FF Indoor/Tenny

continued from page 44

(Miami Indoor Aircraft Modelers Assoc.) continues to hold varied classes at monthly contests held in the Goodyear Blimp Hangar at Opa Locka Airport in Miami, Florida. MIAMA is the only active all-indoor model club in the U.S., and their contest event schedules are typical. One of the outstanding features of this club is the enthusiastic sponsorship by Dr. John Martin, which includes a monthly newsletter replete with cartoons and sketches. Each year the club holds an awards banquet to recognize the club's best fliers of the year. However, the real event this year was a proxy contest for Manhattan Cabin models. With nine entries, it was decided that all the models would be flown by the same modeler—FAI Indoor flier Roman Szymula. After all, what could be more fair? Anyway, out of state models won 2nd (David Hagen, Oregon City, Oregon) and 4th (John O'Leary, Minneapolis, Minnesota). Dan Kilgore, Plantation, Florida won 1st with 4:49.1, and John Martin, Coconut Grove, Florida, won third.

Special Classes: One interesting event idea gleaned from club activity around the country is an indoor "scale" model of Old Timer Gas models. These approximate the Peanut Scale models in size, and certainly ought to fly as well as scale models of real airplanes which have short nose-moment arms. When this event was tried in Glastonbury, Connecticut in 1977, it was won by a "Miss America" replica that had to compete against (among others) a Trenton Terror and a Miss Philly. Incidentally—mention was made above about real airplanes. Model airplanes *are* real—special-purpose miniature aircraft—whether or not they are miniatures of man-carrying airplanes!

Indoor Sites: One matter of overwhelming importance to indoor fliers is the locating of places to fly. The AMA Nats usually is held in some site not otherwise available to local fliers because the rent is too steep for local activity. So, when local fliers hold a meet, it often is in some sort of school gymnasium. Only Chicago, with one of two massive armories usually available, and New Jersey/New York, with hangars at Lakehurst Naval Air Station, and Miami, Florida, with the Goodyear hangar, can really plan on good sites regularly available. So, much of America's indoor flying goes on in gymnasiums, small armories and city recreation buildings. Exceptions: New York City, with Low Library Rotunda at Columbia University (105' with very small floor area), and Cincinnati, Ohio, where fliers have occasionally used the 105' Cincinnati Union Terminal.

CD's—Now Hear This! One or two correspondents have requested that contest information be aired in this column. This column is due about 50 days before the magazine which contains any particular column will reach the reader. If you can plan this far ahead, I will be delighted to carry any and all contest information. Of particular interest, is a series of contests or flying sessions stretching over a period of months, and big annual contests which are normally planned well in advance.

Local Publicity: One aspect of indoor modeling which is often overlooked is that of newspaper and TV coverage of local contests. In recent months, a number of clubs have been quite successful, getting excellent coverage in newspapers (ranging from half a page to full page) with good photos. TV coverage made at the NIMAS International Record Trials at West Baden, Indiana, in 1977, was well edited and was shown on network shows in a number of cities. How is this done? Bob Clemens, of Rochester, New York, says, "There is no big secret on how to obtain media publicity. Any club or group desiring coverage can talk to their local papers and TV stations and explain about their models, flight performance, site location, dates and so on. Better yet would be to have a spokesman stop by the paper/station and show the news director (TV) or city editor some models of the type being flown. We indoor freaks have really missed the boat, publicity-wise, and there is really no good reason for it."

Bud Tenny, P.O. Box 545, Richardson, TX 75080.

SAFE FLYING
IS NO ACCIDENT

Mentor/VanHattum

continued from page 48

imagine to run fore and aft through the model—can only be assured by building the wing as an open Vee for dihedral. So we have to join the spars of both wings

solidly together and this is done by means of the "dihedral-keepers" W11. Knowing all we do now, the building sequence of the wing can be summarized as follows:

Put the plan on the building board, fix the lower flange of the main spar W4 and glue the ribs W1 in place with the exception of the ones in the center. Take care that they run at right angles to the spar. Next, fit the trailing edge W6 and the small triangular pieces W8 which assure a good connection. Note the direction of the grain. This has been chosen so that any contraction of the wood will tend to be towards the corner in which the "gusset" is glued. Next comes the top flange W5 and the leading edge W7. Particularly note just how much the flanges of the spar should project beyond the innermost rib. After sanding the tip rib surface smooth, the finishing rib W2 can be glued onto it.

Now for the center section which will demand all of our attention. Two dihedral keepers W11 are carefully drawn on 1/16" three-ply, taking care to obtain the exact dihedral angle. After they have been roughly cut out by jigsaw, they are filed and finished to the right shape. Of course, you could make one and use it as a template to draw the other one. Check for height, which should correspond to that of the wing under construction; if necessary file them down so that they fit exactly from the top of the upper flange to the bottom of the lower one.

We still have to fit the leading edge into the slots of the ribs and sand it carefully to follow the contour of the airfoil. The dihedral keepers may now be glued to the spars of one wing. Take great care that they are properly aligned and do not shift while the glue is drying. When that has been done, the wing can be joined up with its counterpart, blocking up the finished half so that the correct dihedral is obtained. This is probably the only really tricky part of the whole building process. See to it that the leading and trailing edges just butt on and trim where necessary. Keep checking during the drying of the glue. With the help of the plan, cross-sections, and sketches the finishing of the center section will present no difficulties.

Finishing: Carefully inspect the whole structure and correct details where required. Some joints may need a little more glue. Rough spots and remains of glue should be sanded or planed smooth. The fuselage, including the fin, is given two coats of clear dope, sanding the surface smooth after each layer. You can then apply a couple of coats of colored dope, choosing white or a striking color so that the model is easy to spot. To avoid excessive increase in weight the dope may be thinned slightly. As it could happen that you cannot find the model after landing, labels with your name, address and telephone number should be stuck to all the main parts.

Covering: Covering requires planning to get good results. Sand away any rough spots. Cut two panels of medium heavy tissue—colors galore!—for the stabilizer with an overlap of about one inch. Lightly moistened tissue shrinks during drying, giving a nice taut surface. Some builders put it on the framework damp, but the writer prefers to dampen it after it is put on, using a wet nailbrush and running a finger over it or, preferably, a plant spray. The tissue will sag but shrinks during drying. Fix it first from tip to tip with a fairly strong pull, using either the white glue—slightly thinned with water—or white office paste. Both are to be preferred to dope which dries too quickly, making it impossible to correct for wrinkles.

Cover the lower surface first and trim with sharp blade or razor. Apply two coats of clear dope. Do not pull too hard in the direction of the ribs because it makes the covering sag too much and spoil the airfoil.

The wing cannot be covered in one operation, so each half is done separately. The technique is similar to that of the stabilizer, but some care should be taken to obtain a good finish at the center section. Your dealer will have decals for displaying the name of your model, AMA number, etc.

Balancing and Checking: Assemble the model, using rubberbands to fix the wing and stabilizer in place. They should sit firmly on the fuselage but still allow for displacement in the case of a hard landing or landing on one wing tip. Bands should be crossed over the wing.

Shot (or pieces of strip solder) must be put in the nose compartment to bring the center of gravity (balance point) to the location shown on the plan. Final adjustment of the ballast will follow during flight tests. Our model took about 2½ ounces of shot to get the C.G. right, but models differ and yours may require somewhat more or less.

Check for proper "rigging angles" of wing and tail, which should differ by about three degrees. Again, final adjustment will be found during testing, but if you find that it is not correct, glue a sliver of wood on the fuselage, either under the leading edge of the stabilizer or under the trailing edge, as the case may be. Watch also for any "twists" in wing or stabilizer, which will cause an unwanted turn. They can be cured by either "steaming" the side that shows a drooping trailing edge or by doping. In both cases twist the surface in the opposite direction and hold it firmly for some time. Too great a turning tendency in flight may be temporarily cured by a trim tab of stiff paper or cardboard, bending it up to lower a raised wing. A stabilizer which is not placed true with the wing when viewed from the front should be raised on one side until parallel for it would cause too sharp a turn.

Before you take your model to the field, prepare for adjustments—which will undoubtedly be needed—by taking a small repair outfit, such as glue, pins, some covering tissue and dope, thin slices of balsa, plenty of rubberbands and some shot for trimming, material for a trim tab, tape.

The towline launch demands two important items: the towline and your helper. The helper should be someone who is really keen on assisting you and prepared to follow your instructions to the letter. He should watch the flights critically and be able to compare notes with you on the model's behavior. The towline is a light but strong non-elastic line, some 100 feet long and attached to a block or special

towing gear. Tie a ring at the free end with a small vane (strip of cloth) below it. This will pull the ring off the towhook and enable you to see when the line comes free.

Flight Tests: The Mentor was designed for small field work, but that does not mean that it can be flown in the street or a restricted sports ground. Choose a fair-sized field free from obstacles which cause turbulence and may damage the model. Always launch dead into wind, so start at the windward side of the ground.

We always start off by a few hand launches to see if the trim is anywhere near right. Launch the model by holding it just behind the C.G., slightly nose-down and move it in an accelerated arc. You will have to discover the speed at which to launch it and this will obviously depend on the velocity of the wind, so do not launch it too fast the first time or it will rear up, stall, and dive into the ground. Always check after a landing to see if wing and stabilizer are still in the correct positions and no rubberbands have come off. Now, if hand launches show the model to put its nose down instead of making a nice extended glide, the fault may be in a slow launch, so try again a bit faster. If it persists in flying "nose heavy," add a tiny sliver under the trailing edge of the stabilizer and try again. As said, it now may put its nose up too sharply, which may be caused by too much speed or bad trim. Launch again and if it still proves to be "tail heavy," add a thin strip under the leading edge of the stabilizer. Do *not* yet change the position of the C.G. When the hand launch shows there is little amiss, you can glue the slivers of balsa permanently into place, for if you don't they may get lost and trimming should start all over again.

The towline launch depends on the full attention of both yourself and your helper. Arrange for clear signals to avoid misunderstandings. Unwind some 60 feet of line and place the ring on the towhook. The helper should see to it that it does not fall off. He holds the model just behind the C.G., wings level, and with the nose inclined slightly upward. You take the other extreme of the line, right into wind, and check whether you can run freely without having to take your eye off the model, for it is all-important that you observe its behavior.

At the prearranged signal you start to walk at a fair pace—not run!—and at the same time your helper also takes a few steps forward and allows you to pull the model gently from your hand. He should never push it for that would make the ring slide from the towhook. You now give all your attention to the model and try to pull it up at the right speed. From the tension in the line you should learn to feel whether you have gauged that speed correctly. If the model sinks back to the ground it proves that you have been too slow. Start again, for you must still learn to adjust towing speed to the strength of the wind.

Mentor has excessively strong wing spars, but even such a wing will break when stressed too highly, so take it easy! In a strong wind—not recommended for any test flying—the starter may have to stand quite still or may even have to run towards the model. It is all very much like launching a kite. By the time the model comes overhead speed should be reduced until it stands right over you and, as you take all the pull from the line, the ring will slip gently off the hook. Your model is now on its own. Even a hardened veteran feels a thrill of accomplishment when his product shows its merits. This may make it difficult to register every movement the model makes, but if the first impressions may be vague, a second flight may be watched more critically.

The model should float downwind in wide circles—there is always some tendency to turn—or a small trim tab should be glued on the fin to make it do so. If the model rears up and shows a series of stalls, the chances are that the difference between the "rigging angles" is still too great, so the leading edge of the stabilizer should be raised a minute amount. Try again and see. The same applies when the descent is too steep, in which case the trailing edge of the stab must be raised slightly. Always work systematically and carefully remember just what you have done and why. Better to make short notes. If all these changes still do not result in a smooth flight with small rate of descent you may add or remove a very small amount of shot, thus placing the C.G. either further forward or rearward. This is really a last resort, for tests have shown that with this particular wing and stab, plus the horizontal distance between them, the C.G. given on the plan should be correct. But models differ, as we have said before.

A stall may also be caused by abrupt release from the towline and that would mean that the model was pulled up too fast. When the model returns to an even keel after a few undulations, you have the ideal setup! Go easy next time. When the trim satisfies you, locate all the bits that determine the angle of the stabilizer, so it can be attached permanently.

Beginners are rather frightened when the model swerves off to one side, and they well may be, for it could develop into a dangerous situation when it is allowed to continue right to the ground. The swerve may be caused by some asymmetry in the model which should be checked, or from towing in a crosswind. You can try to save the model by stopping and gently pulling at right angles to the flight path when the model should turn towards you and resume its normal tow. However, when this does not work pretty quickly and the model gets closer to the ground, the line should be released at once or you may have a nasty crash. Try again after checking for warps and see if there may be a change of wind at a higher level.

Practice a few more launches and gradually work up to the full length of 100 feet of towline. Since the model now will fly longer, you can observe it better, and it is quite possible that you will spot more scope for improvements. Keep practicing until you know just what your model is capable of. When you have obtained all that experience with the Mentor, you'll surely want to go on from there and build a more complicated model with better performance—maybe even a glider with radio control. That is about the most perfect form of model flying there is! You will know what makes it tick once you have flown a free-flight model. The Mentor is a solid basis to build on.