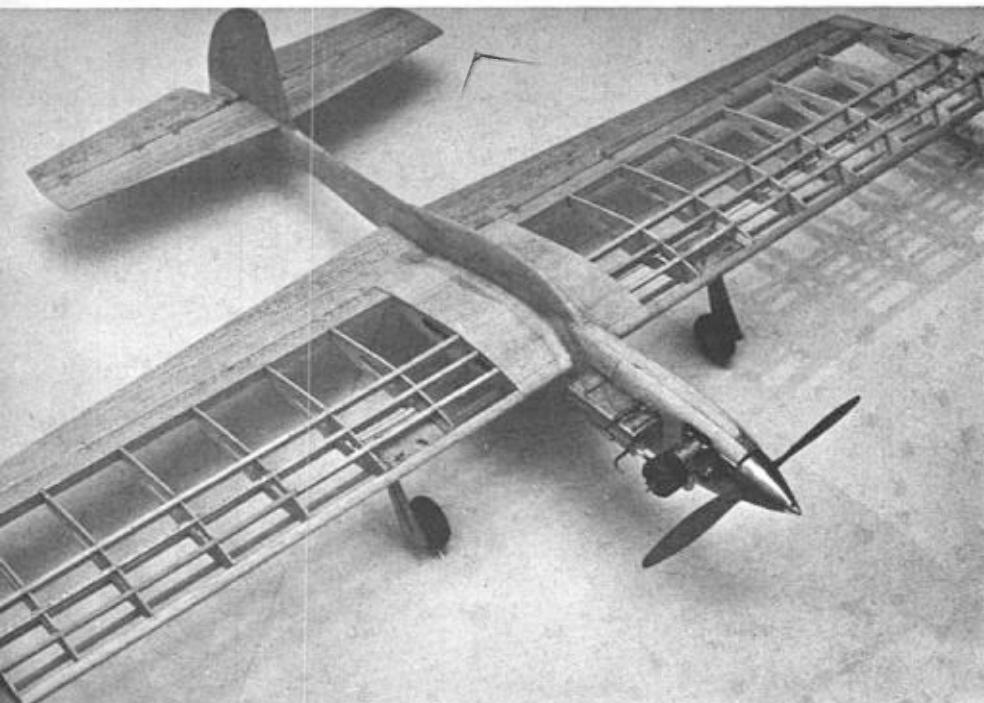




Close-up shows tank mods. Recess for tank holds it in position with clips and rubber bands. Also note recess for engine, which helps lose that "profile" look. Also, note fiberglass reinforcement around fuselage-wing joint.

Dick Mathis'

My Dad, Don Mathis, is rough stunt judge, helped with first test flights. Was one of first to fly upside-down in Texas—used two handles, one regular, one backwards! Wiped everyone out at stunt meets in mid-40's.



"EXCALIBUR"...

FULL SIZE PLAN AVAILABLE THROUGH "MODEL PLAN SERVICE"

◆ Several of my "friends" when they learned the name of my latest brain seizure, have likened it to another, somewhat different "Excalibur," which according to myth, was King Arthur's sword. The sword had been imbedded in solid stone for centuries, and the strongest of men had tried vainly to pull it out. King Arthur, as a boy, succeeded because he was the only one who was pure of heart, which was the only way to remove "Excalibur." It made him invincible because it was magic—or something like that. You can guess how the rest goes. Said "friends" predicted that *I* would also bury my "Excalibur" too deep for anyone to get it out of the ground, the first time I flew it. (Anyone except F.M.'s editor, of course, because he is the purest of heart.) I haven't yet, but I do hope to bury a few *myths* about stunt design however.

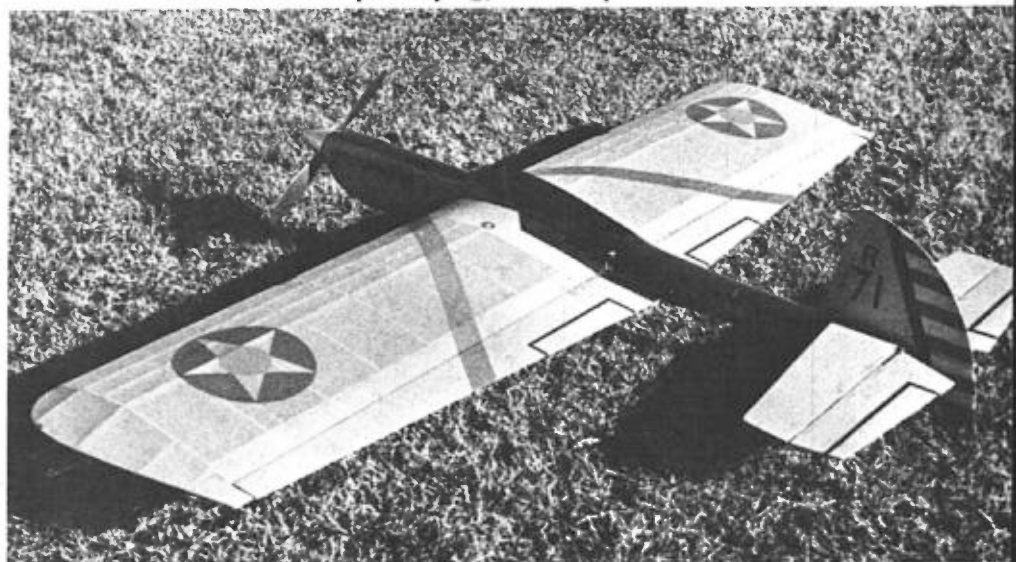
I'll bet many of the persons reading this article will not notice that the "Excalibur" is a "profile" fuselage design until they read this sentence. This is one of the first myths I want to bury—that profiles never look like a first-class airplane. The "Excalibur" never fails to draw admiring attention on the flying field, and this is nice for all flyers, whether they fly only for sport, or in national competition. We all like for our models to please the eye, and this is one of the "Excalibur's"

strong points. I like a design that looks racey, efficient, smooth, and uncluttered, and these are words *other flyers* have used to describe the "Excalibur," so I think it fills the bill.

All right, so it looks good sitting still, but so does a grand piano—that doesn't mean it flies. Fortunately (no matter how scientifically you design, you still

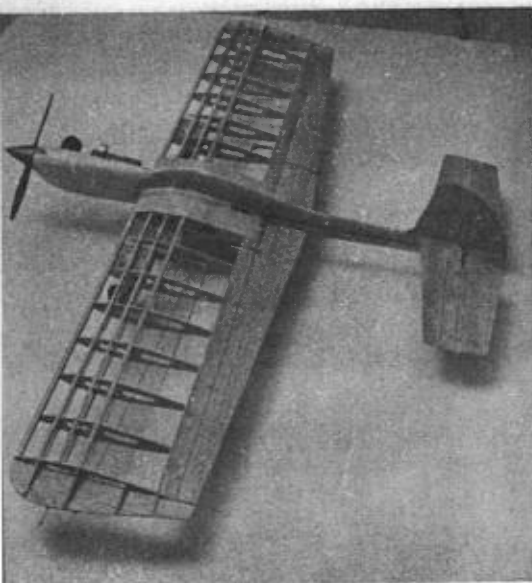
have to have a little luck) the Excalibur flies as well as any stunter I have ever touched. I think this is another myth buried, because, for some reason, most of our influential designers, seem to think that when they work up a "beginner's stunt ship" all they have to do is make it as simple as Tinker Toys and they have met the require-

A HIGH-PERFORMANCE SIMPLIFIED STUNT TRAINER
... ideal for sport flying, full competition stunt meets!



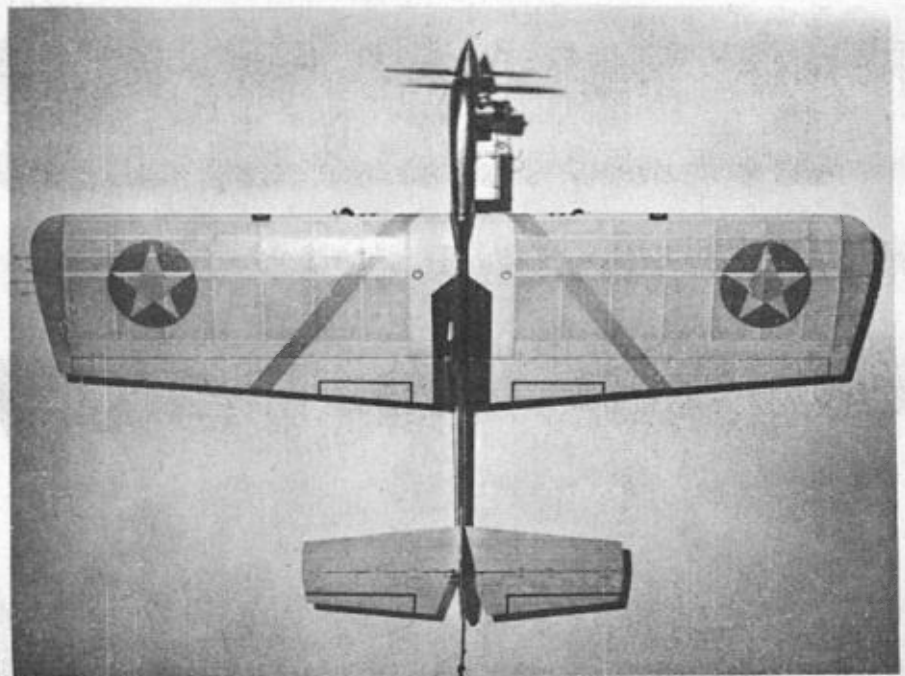


Wide landing gears make for smooth landings, add to realism, tough. Note black tissue gums and landing lights on leading edge.



Not a high aspect ratio, but plenty of area, and good-sized ship, bigger than most super stunters. Rear end shows elevator horn. Use keepers to save hinge wear.

Top view shows other details—engine offset, wing walkways, gas tank fillers (tissue) on wing.



ments. Personally, I have tried to fly a pattern with many of these "beginners" bombs and they are much harder to handle than a "super" stunter. I would hate to have to learn loops, eights, up-side-down, etc., on those trucks. It seems to me that a ship for the beginning stunt flyer should be able to fly all maneuvers as well as the best, because this leaves a "safety-reserve" of maneuverability for those inevitable tight spots we all run into when learning.

The rebuttal to this argument is typically that most beginners can't build a ship capable of really good performance. I think the truth is that *most designers can't design a ship beginners can build easily, yet will still fly well.* Beginners aren't so dumb, but I'm beginning to wonder about us "designers."

"Excalibur" is as simple as any popular profile kit to build, and it doesn't take special skills to make it a fine flier. I hope any younger modelers who read this will study the plans closely and accept what may be a challenging project for them to handle—but with the assurance that this is the only way to improve their skills and achieve a worthwhile goal—more fun with models.

As I have it set up on the plans, the "Excalibur" is in full competition dress. It has flaps on the wing, 45 degree control surface movement, a semi-purified tank, landing gear in the wing for good ground handling, and a colorful trim scheme using Japanese tissue and clear dope only. For sport flying, I think the trim scheme would still be

(Continued on Page 32)

EXCALIBUR continued ...

FLYING MODELS

THE "EXCALIBUR"

(Continued from Page 18)

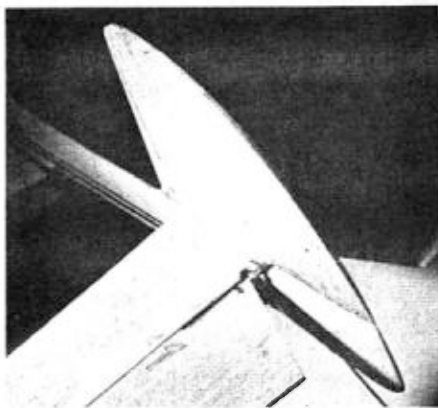
good, because it only takes an hour or so to do, but the flaps can be glued solid on the wing and not change the performance too much. Control movement can be desensitized merely by changing control horn holes, and the landing gear can be mounted on the fuselage conventionally, if you are still having trouble with hard landings and crashes.

To do well in competition, I think it is necessary to have a ship that performs with some distinguishing characteristics which will set it off from the rest of the pack. The "Excalibur's" forte is square corners and slow speed flight. It *ought* to turn, with almost 600 square inches of wing area and a total dry weight of 30-35 ounces! Usually, tight turns mean touchy controls when flying straight, but this problem has been eliminated by placing the center of gravity (balance point) far forward, lengthening the nose, and adding stabilizer area.

The ability to fly slow is great for both learning stunts and contest work because it gives you time to think. One other benefit we get from light weight is that it stays out on the lines very well in overhead maneuvers, so slack lines aren't a problem. I think slack lines cause more crack-ups than pilot error (like giving "up" instead of "down" when it's up-side-down) ever does, so this is important.

My "Excalibur" has a McCoy .40 for power. The one I have in it now is a factory prototype, but current production models of the .40 run just as well, and I can confidently recommend the .40 to you. Most other stunt engines in the .29-.40 range will do fine, but the McCoy is well matched with this design. It will pull through the entire pattern on a four-cycle, which really gives a smooth touch to the flight, especially in the judge's mind. The best props are: any kind of two-blade 10-6; or the Tornado 9-6 nylon three-blader. For best results, use a Veco stunt tank (3.5 oz. or 4.0 oz.). For better runs, the tank can be reverted (use copper tubing because brass cracks easily from vibration) as shown on the plans and in the picture. Whether for sport or competition, always use a fuel filter (Sullivan Products) in the line to the needle valve.

Regarding balsa wood selection, there is no need to pay more for contest balsa, because regular (firm but not rock-hard) balsa will do nicely. While I usually have my wood custom-cut (Model Aircraft Labs), on the "Excalibur" I just walked into the local hobby shop (probably the only one in the world with a pet monkey for an assistant) and grabbed whatever I saw that looked like balsa, because I figure this is the way most modelers who will be interested in this design do it, and I wanted to be sure this prototype could be duplicated by someone 2,000 miles away, like Fred Fuelpump or Neville Noseover.

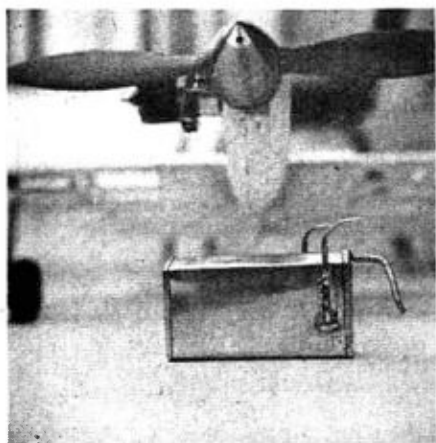


I used a new glue product called "PowerGrip" (which should be on the market when this article goes to press —by Rev-Up) throughout. This glue resembles Elmer's white glue in ease of handling, but it dries very fast, is tougher, and can be sanded. It's good stuff. Whatever glue you use, use a lot, because those joints take a beating.

You can get colored Japanese tissue, or Bamboo paper, which is slightly stronger and heavier, from SIG, to duplicate the color scheme of the prototype, order six sheets of yellow, two of blue, and one each of red and white. These papers have to be dry when covering, and then sprayed with water (a Windex bottle will do, or sneak in and steal your wife's, mother's, or sister's perfume atomizer—she will brag on you after she discovers you dumped her perfume in an old dope bottle to make it shrink tight. After covering the entire model, give it one coat of dope and then apply the trimming tissue, using highly thinned clear dope. With thinned dope, all you need to do is position the tissue trim and brush the dope on top of it. The thin stuff seeps through to the first coat of dope and adheres with minimum wrinkling. From this point, about 5-7 coats more of butyrate dope over the entire ship will give a durable, shiny, and fuelproof finish. Again, if you are rough on models, yellow silk on the wing will give a tougher, though heavier, ship—and the tissue trim will still work.

We have departed from convention

(Continued on Page 38)



Modify tank vents this way, system feeds well.



Bob Geisecke, National stunt champ, and I discuss details of "Excalibur" design—we agree that it is the only profile ship really capable of going from training for the pattern to full competition with a good chance of success.

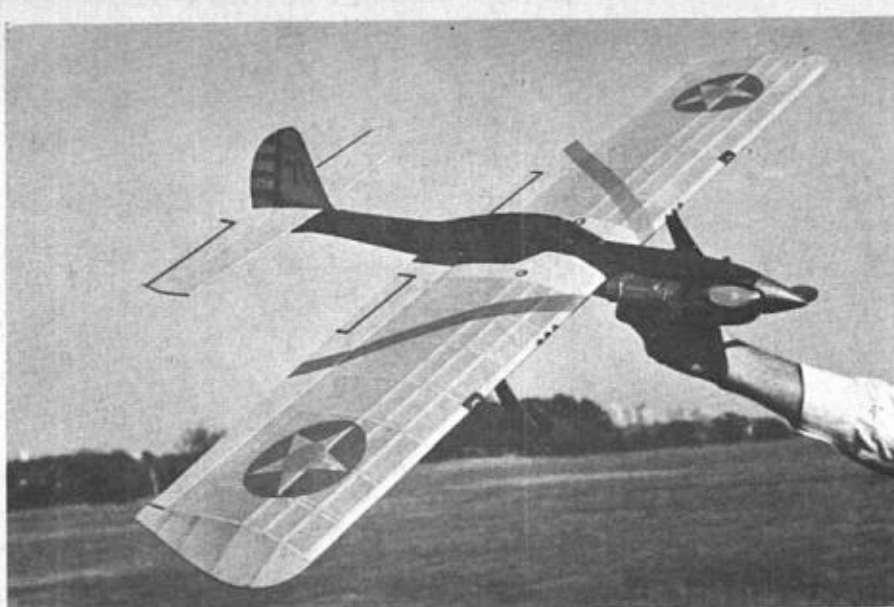
THE "EXCALIBUR"

(Continued from Page 32)

in several places on the "Excalibur." First, for nose doublers, weight is saved by using $\frac{1}{2}$ " sheet rather than plywood. This also gives the "built-up" look to the fuselage. Besides, the fuselage-to-wing mount is much stronger because of the added contact area; and the notch in the right-side doubler for the tank helps keep it in position (a common problem on profiles. The rubber band installation shown for the tank is good because it permits easy removal for repairs or checking. The other deviation in construction is the use of a multispar turbulated airfoil. Not only is it stronger, but it gives a more efficient airfoil. Being more rigid, it is also easier to avoid warps during building.

Start with the wing so it will have time to cure while you build the rest of the airplane. Begin by splicing your leading edge, spars, and trailing edges together so the wing can be built in one piece. The best way to splice a joint is to cut the two pieces to be joined at about a 45 degree angle, pre-glue, and then glue again before joining. These should all be dry and rigid before proceeding. Next, after marking the rib locations on leading and trailing edges and the main spars, pin the bottom trailing edge down on a flat building surface, and glue in all ribs. Then, glue the leading edge in and the top trailing edge. Take all this off the board after it dries and fit it over the bottom main spar, which is already pinned to the flat board. Now it is time for the top main spar. The front turbulator are installed finally after the main spars and the trailing edge shear webs have dried, making sure there are no warps. For the tips, the sheet method shown on the plans is fastest to build, but hollowed balsa blocks are more efficient, and easier to cover with Jap tissue, which doesn't stretch around compound curves easily. The center planking is not inlaid flush with the wing surface, but on top of it, for extra strength. If care is used to feather its edges no one will notice and it will look fine. I have eight copper pennies glued

(Continued on Page 40)



I like the way this ship flies because it is slow, corners like crazy—tightest I've ever seen.

THE "EXCALIBUR"

(Continued from Page 38)

under the outboard wingtip to balance the weight of the lines. (After you crash, buy $\frac{1}{2}$ an ice cream . . . the Editor.) The flaps are installed after the wing has been glued into the fuselage. Note that the cutout in the fuselage for the wing should be about $1/16$ " oversize to allow for the center planking.

The sheet nylon hinges used (de-Bolt) are simple to install, if the instructions that come with them are followed. Be sure to use the control-horn keepers supplied with the horns (Veco) because they form bushings giving smoothness of movement and they reduce the strain on the hinges. They can be sewn on quickly with common thread, and then glued. To bend the landing gears, heat the wire over an open flame until it glows red hot, and then bend away. You will see why I recommend heating when you try to bend them cold. The gears are lashed to their plywood platforms with heavy copper wire, or "J" bolts. The gear platforms should be amply reinforced with bracing where they fasten to the ribs—scraps will do. Make sure the landing gears both face straight forward. If you fly mostly out of grass, the wheels

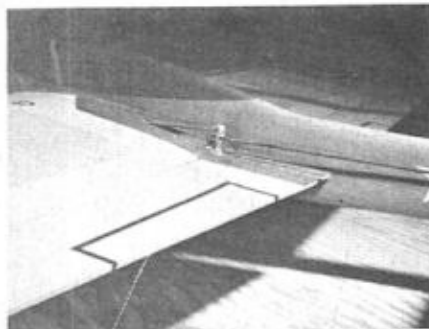
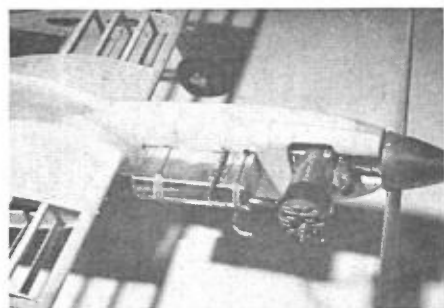
should be moved forward approximately $\frac{1}{2}$ " to prevent landing noseovers. The position shown is ideal for asphalt and you will soon find that it is hard to goof a landing with this sort of setup.

When shaping the fuselage cross section, try to make the nose match the spinner for top appearance. At the back, taper the $\frac{1}{2}$ " thick body to about $3/16$ " so it will fair into the rudder. I use no rudder offset because it makes the ship fly outward from the circle, creating drag and reducing efficiency, but you might want to try about $\frac{1}{4}$ " offset for additional line tension. The pushrod guides are a must to keep the back rod from bowing and causing loss of elevator control. It is very important that the elevator lines up level with the wing, or else the ship will lean toward the high side of the elevator in flight. Likewise, the elevator flaps and the wing flaps should be perfectly in line with each other at neutral control. This should be done by actual measurement and not just eyeballing, because the problems misalignment can cause are really frustrating. Of course, the elevator flaps move opposite from the wing flaps (about 45 degrees for both, each way). It is also important that the wing and elevator line up with each other and the thrustline of the engine. All three should be level.

Correctly locating the center of gravity is another very important step. Use lead, firmly fastened down for adjust-

(Continued on Page 47)

Closeup of flap horn and the control linkages.



McCoy .40 is smooth beast, loafs along on a four cycle throughout any maneuver.

THE "EXCALIBUR"

(Continued from Page 40)

ments. As you gain confidence, or if you like a little more control response, the center of gravity can be moved back, but never more than an inch. Before flying it for the first time, the whole control system should be pull-tested to see if it is strong enough. To do this, hook up the lines, have a trusted friend hold the airplane firmly on the fuselage at the center of the wing, and pull back gradually, giving up and down controls all the time. Pull just a little harder than you think it will take to pull the bellcrank out, and it should be safe for even the worst conditions. If there are any malfunctions in the system, like a catch, or bind, don't fly until you can fix it. I never follow my own advice, it seems, but this incident that happened to me at the 1966 Nationals



Low drag is important for good flying, and you can see how this can be done on a profile design, still maintaining realism.

will show you the importance of having confidence in the control linkages. Just before my final flight in the open finals, I noticed a hitch in the controls at full up. With about a minute to go before I had to fly, this discovery wasn't the most pleasant thing that could have happened! Not knowing whether I was going to be able to have control over my brand new "Chizler" unnerved me so much I left the engine set for a screaming run, which seemed to me like 200 mph, and I was so afraid of losing control I might as well have been flying a 1937 Buick rear axle—and my score showed it. The point is that if you aren't sure everything is right, it doesn't do any good to fly until it is fixed.

I want to pass along some flying tips that may seem simple and unnecessary to some, but they are good to know if you've never had anyone to teach them to you before. I was fortunate in having this year's National stunt champ as an instructor in stunt flying, so most of these tips I learned from Bob Geissecke. First, always have the model released with the wind blowing at the rear of the ship. This allows it to build up flying speed on the ground and gives a long, smooth roll, for beautiful, realistic takeoffs. Second, when the model is

THE "EXCALIBUR"

(Continued from Page 47)

released, leave the controls neutral, don't try to haul it off fast with up control. If you do, the effect will be just the opposite—the flaps will overpower the elevator at this very low speed and the nose will come down, with the result being at least a broken prop. Instead, let it roll awhile and then gradually lift it off with smooth up control. When landing, try to touch down at the takeoff spot. The wind will help keep the ship on the ground. Once on the ground, it helps to gradually give down control, especially as the ship rolls around into the wind. Here, the flaps are again most effective in destroying all lift, which could cause bounces, or even a sudden jump back into the air, with little flying speed, and a resulting stall and crash, which really tears a model up. This is important on windy days.

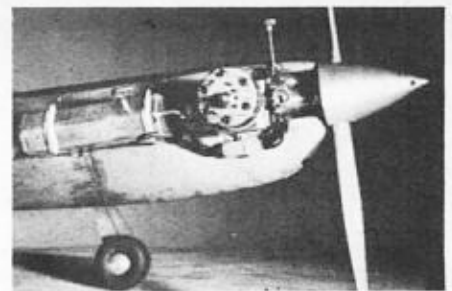
Wingovers should be started with the wind directly in your face. This makes it easier to keep a straight line and keeps the lines tight. Most other maneuvers are best done with your back to the wind. I know that many top fliers are uneasy in strong wind, but this doesn't mean you have to be. Think of the wind as a friend in these ways: As long as you are doing your maneuvers in the right place, the wind helps keep line tension; If the motor should quit, in a maneuver, it is much more likely that the wind will give

(Continued on Page 50)

the extra speed needed to recover and land safely. High winds can cause a few problems, but there are ways of solving them. For example, if you continue to do inside loops directly downwind, the ship will pick up speed so fast you can't control it—it throws your reflexes off. To solve this, start your loops a little more *into* the wind, and you are right back to that comfortable speed again, particularly on the bottom of the loop, where it is most important. For outside loops, go the other way. I saw Bob Geisecke win the 1964 FAI team selection finals in a 30 mph wind using these techniques—and it was hard to tell from his pattern that conditions weren't perfect. So, don't let the wind intimidate you.

These tips were mainly for those flying the AMA stunt pattern. Here are a few for those who are just now learning loops and inverted flying. The safest way to learn inside loops is to start from a moderate climb on the downwind side. At about midway up to the top of the circle, increase up control so the model reaches the top of the circle going from left to right on its back. Now, continue to give more up as it starts back down. At about 45 degrees, it should be heading straight down, and from there, pull out as quickly and as smoothly as you can. At no time should you have to give full up. At no time should the model stall. You should feel complete control at all times. Once the first one is done, it gets easier, so you can reduce their size and try consecutive loops. Remember, you will be changing controls all through the loop—flying it all the time. If you find the ship loses altitude when you try consecutive loops, you are probably guilty of freezing the controls in one up position.

To learn inverted, start from the wing over, with the wind in your face. As the ship comes over head, give a little down control so it cuts toward your right at about a 60 degree angle to the ground. Having done this, pull out right-side-up immediately with up control. Repeat this many times, all the while making sharper cutbacks, but still pulling out level. When this has become comfortable, you are ready for inverted. Go over the top, cut back, but this time give more down so you end up with it inverted, but with lots of altitude. As it continues, increase down control rapidly so it comes back over the circle in a big loop. Continue on down and level off. You may have only gone three feet inverted, but that's three feet more than before! Now, as this gets easier, you will be able to extend the inverted part until you can make that first lap—remembering that the controls are reversed: up is down and down is up. It may help you to lay your hand over with the top side up, while flying inverted, because the arm is steadiest in this position. To get out of inverted flight the first time, wait until it's directly down-



Finished engine and tank installation shows filter in fuel line—absolutely essential.

wind and give it down—for a loop up and right-side-up. If you have it very high, an inside loop out will be safe, but not below 45 degrees. Besides up-side-down, you have also learned outside loops, getting two birds with one stone. Be patient with yourself and be sure of the airplane's performance and you will learn easily without unnecessary crackups. One final word; since line tension is essential to control, it helps to develop a "walking-backwards-in-a-small-circle" style of flying—instead of spinning around in one spot. In this way you can lead the model around firmly, and keep your bearings better. Do this especially while gliding in for a landing.

Judging by the questions I have been asked by learners, these points I've been discussing are the most frequent problem areas. There are many other techniques that could be discussed, but it would be best to seek the help of a friend who has been through it himself, and who can watch you to see what is wrong. Most stunt flyers are eager to help beginners who want to learn, because we all want to see new fliers come up and eventually join the competition and fun. If this is the sort of information you would like to see printed in model magazines, then let the editor know, and I'll bet it will come soon. The problem with modelers is that usually only the pros write the magazine editors, so they have no way of knowing what the vast majority of their readers want.

In conclusion, the "Excalibur" was designed to wear many different shoes—so it would please both beginners and experts equally well. If you build one, I hope you enjoy flying it as much as I am, and good luck!

Bottom construction shows planking in space where landing gear comes out of wing—helps in covering and adds strength.

