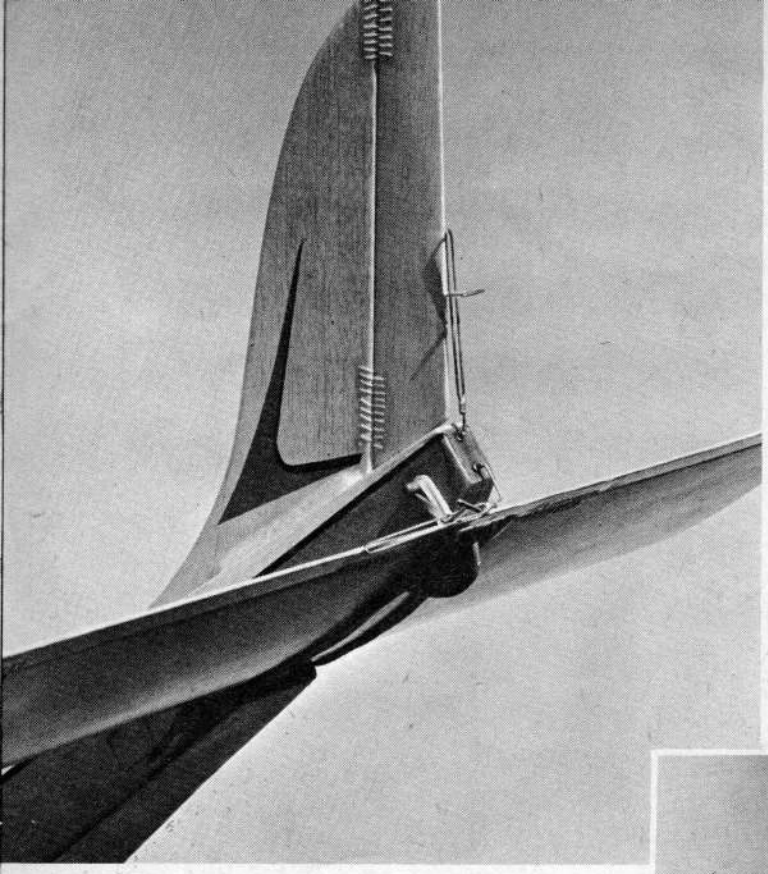
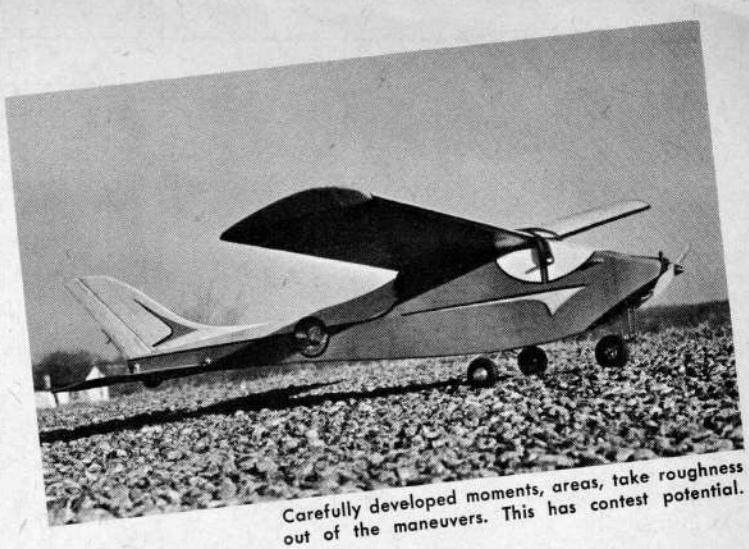




Carefully developed moments, areas, take roughness out of the maneuvers. This has contest potential.

HALF WHAT?

Ship-Shape Sheet-Ship for Single Channel! 40" span, .049 engines, rudder-elevator.

by Gerald R. Zeigenfuse

Full Size "Timely" Plans Available

▶ "Half What" is a quickly constructed 1/2A R/C model due to its being almost completely constructed of sheet balsa. Yet, it is still light enough to be slightly over powered with the latest 1/2A engines. A Cox .049 Golden Bee, RR-1 or the Cub and Fox .049's are ideal power. A Holland Hornet .049 or .051, a Cox T-Dee .049 or a Fox .07 engine will be more power than you need, and will give wild performance for the more experienced. We are presently using a Hornet .051 with a 6-4 prop and a fuel of 10 to 15% nitro. When we are in a more leisurely mood, we plug the intake to reduce the power.

In "Half What," we have tried to produce a plane that would have forgiving characteristics, (we all make mistakes) yet still be able to stunt. We think we have accomplished this and more. We were surprised to see that ballooning was held to a minimum, yet the plane will loop easily, rudder only, after two spiral turns. We are now considering scaling up the design for future rudder-only contest work. Our original intention was to have basically a rudder-only plane trimmed to fly flat to keep ballooning to a minimum. We could always loop by employing a kickup elevator. We had an opportunity to pick up a set of used Varicomps so decided to add down elevator for a little extra excitement.

With a high lift airfoil such as we employ on this plane, down elevator

This is one of those ships you fly till the sun sets. No sweat, cost is low, an R/C'ers R/C.

. . . continued . . .

HALF WHAT?

isn't too effective. It starts to dive, but as speed and lift build up, the dive turns into a screaming, almost level flight. We are using only 1/8" to 3/16" up and down movement. More down elevator movement would give us a steeper dive, but then the loops would be too tight. You only need enough up elevator to change trim in order to loop. If you can work out a differential set-up on your elevator to give twice as much down as up, you can get your almost vertical dive and pretty loops too. Another alternative was to use a semi-symmetrical airfoil. This, we felt, would be going too far to gain almost all out stunt performance when all we wanted was a fun ship.

This plane is designed to use the latest all transistor equipment and the weight saved here was put into the structure. We use a 3 volt all-transistor relay type receiver of popular make. We have found, that for best performance with these receivers, nicad batteries are best and to use three batteries in series for 3.6 volts. We are using three 450 mah pencell type ni-cads to power the receiver and escapements. We feel that 250 mah button type ni-cads would work just as well and give as many as 25 to 30 flights between charges. The 450 mah pencells are definitely over sized although their weight up front is helpful.

Although the construction is a little different, it is not difficult. The wing construction was lifted from the 1951-52 Zaic Yearbook and used on an earlier 1/2A R/C design of ours eight years ago with much success. Instead of using a flat stab of 1/8" sheet, we decided to split it down the middle for two 1/16" sheets, add a few ribs, and come up with a stab that is lighter, (due to being able to use softer wood) stronger and warp free.

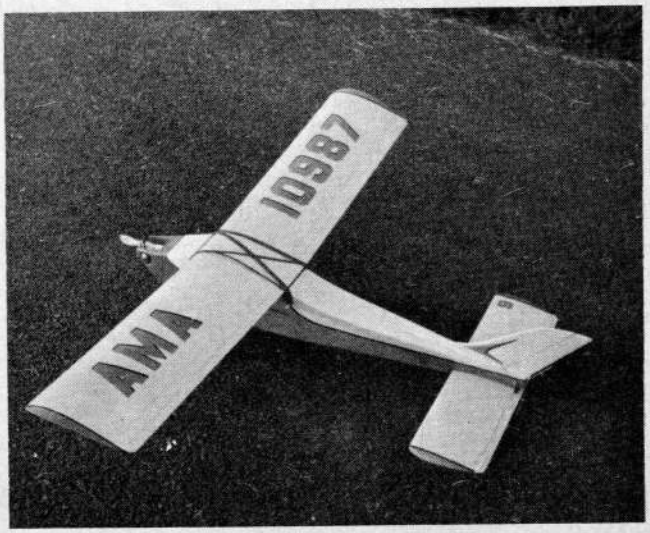
The swept back rudder doesn't add anything except looks. It is larger than the rudders found on most of todays R/C planes, but we feel it is best as shown. We purposely made it oversize, and trimmed it down on successive flights until we had the desired turn characteristics. That is, it will hang in a turn for about 270° of a circle unless taken out by opposite rudder. Further trimming of the area will allow the plane to straighten out sooner but we prefer it as is. Weather vane stability is excellent with this size rudder and keeping the nose pointed upwind is no problem even under gusty conditions.

The landing gear arrangement has been lifted from Jack Ports 1953 Nats

(*Continued on Page* 26)

A naturally curly gear. Takes the lumps out of landings. Holland Hornet pokes its twirler out.

Entire upper camber of the wing is sheeted, as well as the stab. Lots of room in bulgy-body.



HALF WHAT?

(*Continued from Page* 22)

R/C ship. The main wheels should be on, or for strict rudder only flying, slightly ahead of the C.G. When the plane is released, downthrust pulls the plane forward and down on the nosewheel. The plane tracks on three wheels during slow speed. This is the most critical part of the take off as the plane can be deflected from its take-off path by stones or cracks in the runway As the plane approaches flight speed it rocks back, on the main wheels, into its natural flight attitude and lifts automatically off when the proper speed is reached. On the ground, the plane rests on the two main wheels and the tailskid. Not pretty, but practical.

Placing the main wheels too far back will cause the plane to ride heavily on the nose wheel and to get the plane to lift off its normal flight speed must be exceeded. The result is a big zoom after lift-off and sometimes a stall close to the ground.

You will note that the wheels on our plane are slightly behind the C.G. This is because the C.G. didn't work out to where we thought it would. The plans were copied exactly from our plane. We recommend that they be placed further forward if you plan to fly rudder only, but the position as shown on the plans is okay if you plan to use elevator control. It can be used occasionally to lift off the plane when flight speed is reached and the plane will sit on all three wheels at rest in case the other at rest position disturbs you.

The plans include all the important dimensions to enable you to scale them up with a minimum of fuss. Lately, we have noticed a trend by many authors of not wanting to offend anyone or insult their intelligence by providing building instructions. For those who might feel insulted, please skip the next couple of pages. For those who aren't, the following is a general description of the construction highlighting those points that may vary from the usual construction methods or give you trouble. Since this plane is of simple construction, a few readers may want to construct this as their first R/C model. If the following construction notes and the details on the plans still haven't cleared up some points, please write us in care of this magazine and we will be glad to help you out. We would like to say that having some experience with free flight construction and adjustment procedures is desirable if not a must.

CONSTRUCTION: We generally construct the wing first in order to allow it some aging time, so begin by selecting a 6" wide piece of 1/16" sheet, 36" long, that weighs no more than 1¼ oz., and is straight grained. Butt joint a 9/16" wide strip to it. Cut it in half to obtain two 6 9/16" x 18" blanks. Laminate a 1/8" x ¼" balsa strip and a 1/8" x ¼" basswood strip together for the leading edge and cement this assembly to the wing blanks. The basswood side being the leading edge. Select a hard 3/16" x ¾" trailing edge and cut a 1/16" deep by 1/8" wide strip from it as indicated on the typical wing airfoil sketch shown on the plans. Notch the trailing edge to accept the wing ribs and then cement it to the wing blanks and allow to dry throughly. Cut out the wing ribs while waiting. Mark the rib locations on the

(*Continued on Page* 30)

HALF WHAT?

(*Continued from Page 26*)

underside of the wing blanks with a soft pencil. Rub a little cement into the wing blank wherever each rib is to be located and also on the top of each rib.

Wet the top surface of the wing at the leading edge only. This is important! About 1½" back from leading edge is sufficient. If you wet the whole surface it will curl too much and you will have one heck of a time trying to keep it pinned to the ribs. Work a curvature into the leading edge of the wing blank until you are satisfied that it will fit the curve of the wing rib without using a half dozen pins to hold it down. Cement all the ribs in place, using a pin or two per rib to hold the sheet surface to them and then, when each rib is placed properly, place each wing half on a flat surface and pin it down for several hours. Overnight, if possible. While it is pinned down, the wing tips could be cemented in place.

Next, lift the wing panels from the board and bevel, at the dihedral joints, in the same manner as you would a hand launch glider wing with the tip blocked up 1¾". Mark the spar location on the ribs at the end of the wing panels, being careful to make it as vertical from the bottom of the wing as possible. Do not cut the notch at this time.

Block up each panel 1¾" at the tip and place them on a flat surface leaving a 3" wide gap between them. Build the 3" wide wing center section into this gap. Construct it similarly to the wing panels with the same leading and trailing edge and one wing rib. Build up a ½" wide cement skin at each joint and allow the assembly to dry thoroughly.

When dry, lift from the board, and notch the ribs carefully to accept the spar. Cut the spar from hard ¼" sheet and cement in place. Be sure it fits freely, not a force fit. The whole wing can be twisted at this stage by forcing the spar in place. Cut out the 1/16" plywood wing braces and cement them in place. Note that the leading edge must be cut into slightly for the wing brace. Plank the bottom of the center

section and cement all the ⅛" sheet gussets in place. Shape the wing tips and the leading edge. Don't forget the 1/16" dia. wire inset in the trailing edge.

Don't be alarmed by what appears to be an easily twisted wing at this point. When the bottom is covered, the wing becomes very rigid. Cover the bottom of the wing with light silk, heavy silkspan or, do as we do, double cover with Jap tissue with the grain of the layers running at right angles to each other.

Tail surface: The stabilizer is quite simple. Cut two 4¼" x 16" blanks from 1/16" sheet the same weight, or lighter, as the wing blanks. If you don't plan to use a movable elevator, make the blanks 4¾" x 16".

Mark the rib locations on one of the blanks and then cement the leading and trailing edge strips to it. Cut out the ribs and cement them to it also. Immediately cement the remaining sheet on top of the first. Pin or clamp the leading and trailing edges together the entire length and then, and this is important, while the cement is still wet, carefully align by sighting from the front and rear. Once the cement has set, you will not be able to twist the stabilizer, so do a good job the first time.

Finish by adding the stabilizer tips. The elevator is not added until after the plane is finished.

Cut out all of the pieces that make up the rudder assembly. The rudder is assembled on the fuselage and the parts are fitted at that time.

Fuselage: The fuselage sides and doublers are cut from 6" wide 1/16" sheet 36" long, that weighs no more than 1½ oz. Laminate the doublers to the sides and also cement the ⅛" x ¼" uprights in place. We prefer to run the grain of the doublers in the same directions as the fuselage sides. Cut out the ⅛" plywood firewall and main bulkhead. Be careful with the main bulkhead as the squareness of the fuselage depends upon this bulkhead being cut accurately.

Now is the time to plan radio installation. Place all the slide tracks accordingly. Cement the main bulkhead in place and the ⅛" x ¼" crossbraces at

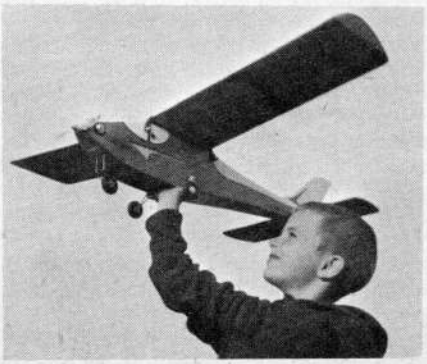
the rear of the radio compartment. Align the sides carefully and allow to dry thoroughly. When dry, pull the sides together at the rear and cement a ⅛" x ¼" strip in place. Cement the 1¼" wide, ⅛" sheet rear bulkhead in place. Cut a hole in this bulkhead, to allow the torque rods to pass through, before cementing in place. The rear of the fuselage will bow naturally, allowing the remainder of the ⅛" x ¼" crossbraces to be cemented in place.

Note that we show the engine as being side mounted. This is just a matter of personal preference and there is no reason that the engine could not be mounted upright or inverted. If you mount your engine differently than we have, you may have to relocate the tank slightly to prevent it from being punctured by the engine mounting bolts. Another point to remember is that we have so positioned the firewall to accept an engine complete with a tank mount. We feel that the majority of ½A engines are more firmly mounted using the tank mount or integral tank. The tank is also a good place to stow ballast and can be used for test flights due to their small capacity compared to the built-in tank.

The firewall is next, but before cementing it in place, the tank must be installed. We used a standard 1 oz. wedge tank modified as follows: We first pinched off the vent on the left side and soldered the pinched portion shut. The remaining vent was extended as was the outlet. An additional vent is added aside of the one just extended.

You must ad lib it from here, as this is the point at which the radio gear is installed and wired. We'd like to point out our method of anchoring the receiver plug socket because we feel it eliminates one of the most common trouble spots on an R/C model. This is the wiring on the back of the socket.

In the past, no matter how hard we tried to do a neat job, this socket wound-up as the messiest and most vulnerable part of the installation. We have another plane with a pulse system in it and the wiring between the receiver socket and the pulse omission-detector socket was really wild. It was at this time we obtained a P. C. kit from Ace Radio and immediately began to hunt around for something to make with it. The kit comes complete with special drills, a 7 pin P/C tube socket and all the necessary instructions.



A side-mounted engine, super-simple structure.

The socket mount seemed like a good subject and turned out fine. The only wiring now was that which came to the P/C board. The wiring between the sockets was etched on the board. This was so successful that we have used it on all out R/C models since. Even on simple installations such as this. Admittedly it does take a bit longer to make, but it is not subject to failure as is the wired type of socket.

Don't forget to bond together all the moving metal parts to eliminate electrical noise. Run a wire throughout the plane and attach it to the engine, the nose wheel, the main gear and the escapements and then to the positive (+) side of your receiver batteries. If you are using Bonner Varicomp escapements, the bonding is accomplished automatically when the escapement is wired into the circuit. Almost all tone receivers are sensitive to electrical noise regardless of advertisements to the contrary. The engine is the biggest culprit. Many fliers have had this trouble, but blame it on interference as it effects the receiver in the same manner. We have attached the bonding wire to both the positive (+) and negative (—) terminals with equal

results. Upon examination of the receiver, we found that the positive side is grounded to the receiver case and this alone was the deciding factor on where to make the final connection. It really didn't seem to matter.

After the radio equipment installation is complete and wired, make up the torque rods and install them. Note that we use a small piece of 1/16" phenolic material as the rear bearing for the torque rod. Do not affix the torque rod at the escapement end as yet. Make up the escapement rubber access doors and fit them into the fuselage sides.

Now plank the top and bottom of the fuselage with 1/16" sheet. Note the grain direction shown on the plans. Before enclosing the nose, be sure to install a piece of tin with the engine mounting nuts and the nosewheel mounting nuts soldered to it. It is to this piece of tin we solder the bonding wire and bring it back into the radio compartment to complete the bonding circuit. When the engine and nosewheel are bolted in place, they are bonded into the circuit. Sand the entire fuselage well, and install and carve to shape the cowling blocks. Carefully cut a portion of the bottom planking away to install the main landing gear mount of 1/8" plywood. The landing gear being previously attached to the mount by sewing with fine wire and lightly soldering.

It is worth your while to fiberglass the nose of the airplane. It not only strengthens the nose but, most important, it is fuelproof and will prevent the nose from sponging up fuel and oil. We used fine mesh fiberglass cloth, as handled by Ace Radio, on the bottom of the fuselage from the main landing gear forward and on the sides of the cowling blocks tapering off to the bottom of the fuselage. An extra coat of resin was brushed on from the nose to the rear of the Radio compartment

(*Continued on Page* 45)

CITATION

(*Continued from Page* 15)

seasons we have now had to build only three machines and, if a replacement does need to be constructed, it requires not much more than half the time previously required.

In addition too simplicity and practicality, a good multi should possess certain other special attributes and chief among these is an almost automatic quality to its flight performance in order to minimize piloting corrections, both on the ground and in the air. Corrections can always be seen and can cost points. The necessity of making corrections, complicates piloting technique, making for inferior maneuvers.

The fewer the corrections necessary, the easier and quicker the maneuvers, and the more points scored. Even for the multi beginner or sport flier this is important because it permits the effective accomplishments of many stunts and maneuvers which normally are sloppy or actually unrecognizable. There should be a high order of stability throughout the approach and landing maneuvers.

"Citation" is a light-weight, tricycle-landing geared, shoulder wing having parallel edged wings and stabilizer.

Light weight is important in many maneuvers, notably the vertical eight where the entry is at the bottom of the eight, and the outside loop at the top of the eight—where a loggy machine is at a very great disadvantage. The lighter loading shows up on takeoffs and when an approach is slow. The heavier machine may look bad in climbing maneuvers and on outside loops, particularly when three consecutive outsides are performed. First-rate multi's today are coming in at 5½ and 5¾ but not more than 6 pounds. The "Citation" falls in this bracket.

The tricycle landing gear today is almost essential for ground maneuvering points. The three-wheel gear tracks far better on takeoff run in fairly deep grass and lifted off for a good climb out, so obviously its takeoffs are automatic, usually requiring no trim or elevator control movements until the ship has made its 360 and come back

(*Continued on Page* 35)

Refer to top plan view on this. Assemble the step area, then follow with forward bottom hull planking. A little patience, pins and glue will create the necessary bow flair.

Those desiring to make an amphibian out of the ship would do well to attach necessary tubing sockets etc. to receive gear, while structure is still open and easy to reach. A two-wheel tandem type gear might suffice for most land needs, with tip floats acting as skids. Small disk type wheels could be installed, or at least a wire skid for protection.

Block balsa is shaped to form the bow, and a small eyelet is attached to serve as mooring hook. Fine for floating the plane a few feet off-shore away from beach pests.

The forward hull area has no external hatch, so the rounded upper surface in front of the windshield is planked. First however, install suggested battery compartment runners etc., should you intend to fly R/C. All access to equipment is through the cabin roof. Batteries encased in plastic film envelopes are slipped into the foam-padded tunnel-like bow compartment. All Free-flight builders should install ballast in this area, if and when needed to exactly retain indicated balance point.

While aft hull area is still accessible, install all torque rod, escapement rubber, winding hooks etc., and check for freedom of movement. Also, you might want to spray or brush a coat or two of clear dope on these inner hull surfaces, which will be exposed to moisture.

Receiver is mounted in mid-cabin, foam rubber protected, just forward of the escapement. Babcock BCR-16 Receivers and like units rattle around with plenty of room to spare in the cabin, so installation is no problem. We do suggest that you hold the design to single channel, with perhaps elevator trim and engine control. Multi installations would be a little cumbersome for this size ship, and weight is a penalty when it comes to breaking off the water.

With all dowels and such in place, stab, rudder fin attached and aligned, the fuselage or hull may be completed. Sheet the uper aft portions as indicated, install cabin windows, recessing sheeting a sliver to flush-mount the celluloid.

The entire hull should be carefully trimmed and sanded with medium through fine grits, and given several coats of clear dope to waterproof the frame prior to covering. This is most important and should not be overlooked. Leave no visible leaks in the hull, but do provide a drain tube in the nose area. By tipping the hull on end, any bilge water can be returned to the pond.

ENGINE NACELLE: 4 degrees upthrust is desirable, coupled with a two to three degrees right. Use a touch more than normal on the right

(*Continued on Page* 50)

HALF WHAT?

(*Continued from Page* 33)

on both sides and top and bottom of the fuselage. If you don't fiberglass, at least put two layers of nylon or silk around the nose and firewall and saturate with a fuelproof cement.

At this time, assemble the rudder on the fuselage taking care to see that it is vertical and, most important, aligned fore and aft. A line, scribed from the centerline of the firewall to the centerline of the fuselage rear is helpful.

We covered our entire model with Jap Tissue for several reasons. First it will present a glossy finish with little dope. Secondly, because it adds strength to the sheet. Thirdly, because it fills the grain without the weight of many coats of wood filler and last, but not least, because it gives us color without the use of heavy colored dopes. We do use one thin coat of sanding sealer merely to even the balsa coloration and we also did use a small amount of colored dope. The colored dope is sprayed on around the nose to cover the spots we couldn't cover with tissue. It fades out toward the rear. The windows are painted on with white dope. All other colored trim, including the black pin stripes, is done with tissue.

Dope the model with a good fuelproof dope until it is glossy. Dull finishes absorb fuel more readily. You will note that our aim is to produce a

light finish as all of the above mentioned reasons for using Jap Tissue point toward lightness. Thin the dope 50-50 with thinner for a more even finish.

Sew the movable surfaces on with dacron line (½A U-Control line is fine) using a figure "8" stitch. A thin skin of cement will fix the thread when you are finished.

Pin the movable surfaces in a neutral position and now affix the torque rods at the escapement end as per the manufacturers instruction. We use a "T" pin with a ¼" to ⅜" length of Teflon tubing slipped over it to transmit the torque rod motion to the movable surfaces. The reason for the Teflon tubing is to prevent electrical noises. A small piece of nylon should be cemented to the edge of the control surface to prevent splitting when inserting the pin.

FLYING: Before flying, check the incidence angle. Assemble the plane and block up the fuselage on a large flat surface so that the stabilizer is at 0°, or parallel, to the surface. The leading edge of the wing should be a little less than ¼" higher than the trailing edge. Correct, by shimming, if it isn't. Also check to see that the wing or stabilizer is not tilted as viewed from the front. Then cement a strip of rubber to the fuselage top where the wing rests upon it to act as a seal to keep out fuel and oil and to dampen vibration between the wing and fuselage. Also place the C.G. as shown on the plans by adding weight to the nose or tail.

If you have completed the above correctly, the rest will be easy. Glide test, if you like, to further check the correctness of the incidence set-up and the C.G. If you have faithfully observed, we repeat, the incidence set-up and C. G. you may get away without a glide test if you have had trouble in the past test gliding models. Test gliding is difficult because you must have a feel for the plane's natural glide speed and launch it accordingly. Too fast a shove may stall a perfectly trimmed ship or not enough shove will bounce it, giving the impression of nose heaviness. Suit yourself. Personally, we test glide anything we can run with, if only to check for a turning tendency.

If you are satisfied that your R/C equipment works perfectly with the engine running and have had successful distance checks, you are ready for that heart stopping first flight. Put about 10 pumps of fuel in the tank, start the engine and launch. We assume you've already turned the receiver on. When launching, run with the model held high and level and, when you feel it start to lift, give it a gentle shove forward, not up. Make a few turns, both right and left. Let the plane fly straight while you note whether it has a natural turn tendency. This is about all you'll have time for before you run out of gas. If you are high enough, also observe the glide for any turning tendency. Correct the turning tendency

in the glide with rudder adjustments and when this is accomplished, correct the power turn, if it is still present, with thrust adjustments.

The adjustment procedure should take place over as many as the first 20 flights or so. This may seem silly to some people but we sometimes are adjusting for better flight after 30 or 40 flights. Never be satisfied with just so-so performance.

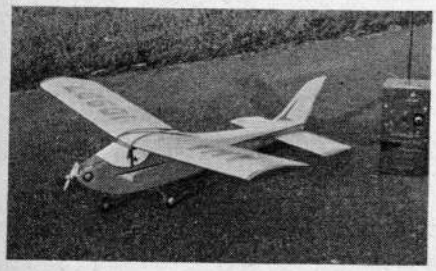
If the plane has a tendency to hang in a turn longer than you think it should, don't hack at the rudder. Chances are that you have a warp in the wing. On the next flight, bank the plane at the same angle in a left and right turn. You may notice, for instance, that although the plane hangs too long in a right hand turn, it may rock out of a left hand turn too quickly. This could be a wing warp if the straight flight is okay. The warp takes effect as the speed increases, as in a turn. If you have elevator control, put the plane in a dive. Any wing warp will show up here as the plane picks up speed.

Avoid the "floating" type of glide. Make small adjustments with the stabilizer or wing angles until you have a fast, flat glide with a steady rate of sink. This type of glide meets the earth with a harder bump than it would if it "floated" down, but you can set up your landing approaches much easier and hit the spot more consistently. Don't worry, this plane can take a lot of punishment.

After the adjusting period is over, you are on your own. Just stay upwind and don't fly too low. One of our pet peeves is the guy who flies low just to show off, but endangers everyone near him. If you want to fly low, do it when no one else is around.

One hint on how to keep your plane around for a long time, barring crackups, is to keep the front end of the plane in constant repair. When fuel is allowed to seep in cracks, the whole front end is eventually weakened and, although the rest of the plane is in good shape, you'll find that thrust adjustment change, the motor keeps falling out and all sorts of annoying things happen. Better to spend a little time after each flying session retouching the finish than to have to rebuild. Most modelers do this instinctively, but we still see planes that look as if the nose is an oil soaked sponge.

Good Luck. If you have any further questions about this plane, please write me in care of this magazine. ●



Citizenship Transmitter, and the "Half-What".

MODEL BUILDERS

(Continued from Page 27)

discussed in many club bulletins. The Bulletin of the Tri-City "Sky Steelers" publishes a memorandum received by **Art Schaefer,** CB member, from the national executive committee. Entitled an "Operating Analysis of Rat Race at the Nationals," it goes as follows:

The following five points are an assumption of the above committee and is based on the best available data on Nationals management.

1. The event would have to be run by AMA rules with awards only through four places.
2. The entry would be comparable to Combat, averaging one hundred entries per age group. (Of which only eighty show up)
3. To insure that everyone would have a chance to fly without ending the day with a long line waiting, the event would be time scheduled as in Combat.
4. The AMA rules do not establish a race time limit, which would be required. For planning purposes five minutes after first plane finishes or a total of seven minutes on a 2.5-mile heat, a total of ten minutes on a 5-mile heat, and a total of 15 minutes on a 10-mile heat.
5. A minimum time of five minutes would be required to get the planes in and started and out of the circle after the race. (This is the time allowance used in scheduling Combat and is extremely difficult to maintain with only two flyers involved)

Now the final analysis of the above five points would be:

a) With minimum operating times the schedule would require ten and three-quarter circle hours. (35-lap heats)

b) Two circles would be required each day for three days, allowing a minimum of 16 circle hours. (70 and 140-lap heats)

c) Eighteen men per day for three days would be required for Rat Racing. Including tabulating, scheduling events, etc. Rat Race would consume in excess of 500 additional man hours of officials at the Nationals.

d) The event would have to be flown on full days in competition with Speed, Stunt and Combat, requiring a minimum of ten circles being available or fourteen in the event that AYSC and Gilbert events are flown.

To summarize: by adding "Rat Race" to the Nats, there would be required an approximately 34% increase in controline event personnel and a 25% increase in field facilities.

● Bulletin Editors Note: New bulletin being published by the Saginaw, Michigan, "Wingdingers." The group is tied in with Saginaw Department of