

**A highly practical experimental Flying Boat design.
It just might swallow a gull or two, so beware.**

**A vented main step, with slipstream ducted down to dispell vacuum . . .
For full house radio systems, Class II or Class III equipment.
Radio positionable wing float setting . . .**

Citizen-Ship Digital radio, an Enya .60 mounted in the nacelle.

Vented Long Planing Hull

"MAKO"

MONSTER

Amphibious Flying Boat

76" wingspan, 67" overall. Rudder/Elevator/Engine/Flaps/Ailerons/Floats

by Don McGovern

◆ Native to the local puddle is a particularly cute fang-toothed carnivore which does much to promote sun tans on the beach. It is a handsome species of dangerous shark, considered to be quite a game fish which has been known to leap some 15 feet out of the water to pull down passing gulls. Imagine the surprise!!!

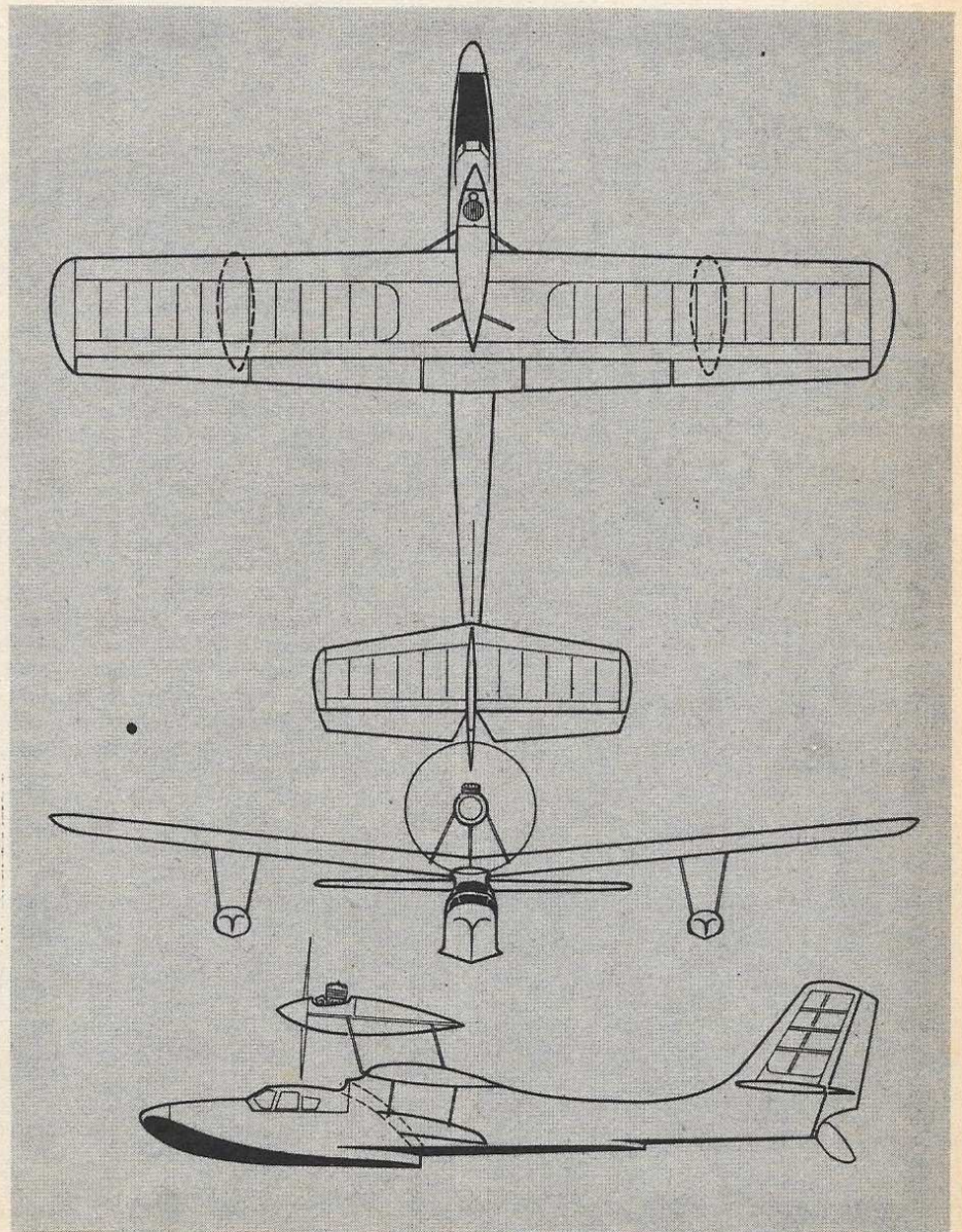
After looking into the mouths of a few, I got sort of inspired with the dental work. I figured it would be rather nice to have a pet like that to keep the neighbor's mutt out of my swimming pool. And so I built the "MAKO" monster.

Admittedly, it's not what you'd call a scale replica. Sharks do not have scales, but rather a rough-sandpaper-like hide, which is sort of the way I build anyway to hear Crash Rogers tell it.

I tried a G.H.Q. to activate a pair of dentures I swiped up at church, and while it ate lunch fine, it fell short in the thrust department. So I settled on an Enya .60 whirling a Top Flite nylon screw which does everything well. It would like to meat you, and see how nicely careless finger bits and pieces are ingested down that cavernous tunnel which serves as a mouth, rudimentary digestive system and general catch-all.

Not exactly scale perhaps, but then you can blame it on the evolution of the species. It's about time the stupid sharks were updated a bit anyway. They trace back about 350,000,00½ years and have had moderately rotten to poor table manners for the whole time, except for the Vietnam truce periods which are always scrupulously observed.

Actually, there are other similarities. Your "Mako" monster will get just as oily, the same reception at the local beach, and worry the garbage-laden



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gulls an equal degree. Locally the gulls now fly in sort of a "stack" formation. "Low-man-eaten" marks the 15 foot elevation, whereupon they regroup. What else?

Originally I had thought of building a multi R/C Portuguese Man-of-War made out of nettles, acid and Jello to beat the high cost of balsa, but I feared it might thermal-out, and how would I explain that to the Air Force? Besides, Sig would have difficulty packaging the raw materials.

The "MAKO" is an experimental ship, a sixth generation Flying Boat with a Privateer/Scavenger/Navigator/Piranha background. Of these, it most resembles the "Piranha" design, which appeared in the December issue. This .45 powered seaplane performed excellently in the air, but could stand further improvement in water affairs. Notably, it had a minimum amount of bow displacement, which makes it work too hard to reach planing speeds. More displacement has been added to the forward bow on this "MAKO" design. Secondly, the wing floats have been increased in displacement slightly and mounted a few inches further outboard on the wings to better stabilize the aircraft in severe cross-wind conditions. Use of a wider bow, plus a forward chine spray rail has been employed to fling bow splash water (as when striking a wave) further from the prop arc.

Drops of water hitting a seaplane's propeller is a major factor in retarding take-offs. The tips of the prop at high r.p.m. approach the speed of sound, and drops of water can actually demolish the blades of a softer type wooden prop. The nylon props are better suited for the task and we have not had any difficulty with them. The intricate forward chine lines of the hull on this new design require a little more building effort, but it will greatly retard this spray problem and allow faster acceleration on every take-off run. This is most important, as it creates stabilizing wing lift, which lessens water drag as the hull rises higher in the water. Once speed starts to build, the take-off is assured.

A more concave "V" bottom to the forward bow has also been employed on this design, with the intention of riding the forward portion of the hull on entrapped air, as on many of the newer speedboat hulls.

Aft of the step, another innovation which we hope will be of some merit. The large air scoop just behind the prop arc, above the cabin and below the wing is intended to duct quantities of prop wash down through the rull, exiting into the void behind the "step". In theory, it should help eliminate any vacuum which might otherwise develop, a constant source of trouble with seaplanes. It should vent the step, and provide a layer of air for the hull to slide on, bordering on a "hovercraft" principle.

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It may not be needed, for the "long planing type hulls" do not seem to develop as much suction as other types, a fact that is obvious by the smoother lift-offs, without a violent upward surge. Still, it offers interesting food for thought, and has been incorporated into this aircraft with fingers crossed. Possibly it might cause aerodynamic complications, but could easily be closed off if need be.

Wing floats are necessary for water stability, but are less than helpful in all other respects as the model tries to accelerate. A pivoting parallelogram arrangement has been employed on this design to offer a positionable float setting, which can either be adjusted manually, or with a servo to position the floats. Thus, a full down position while at rest on the water, with the floats retracting into a slightly higher above-water position as the model accelerates and stabilizes itself on its own wing lift. It can and should be landed in this same position, minimum initial wing float water contact, with the floats driven to the lowest position as the model coasts to a halt. The problem is solved in full scale flying boats by the higher setting, with the pilot balancing the leaning aircraft on aileron control. Possible, but harder to feel on a model, when you are not within the aircraft, and in fact may

be some distance away at times to clearly view the take-off conditions. The water rudder will offer directional control at low speeds before the air rudder becomes effective.

Flaps and ailerons have been incorporated into this aircraft for more than the normal reasons. Our regular "Seavenger" design of 1962 featured flaps, which worked quite well in developing additional wing lift, though not too necessary with the Davis airfoil which it employed. The "MAKO" has a semi-symmetrical airfoil section, and can use the additional lift to advantage. It does not seem to be really needed on large bodies of water, but if you are faced with flying from marginal pond sized sites, it will speed up the lift-off. 150 foot to 200 foot take-off runs are common with multi radio seaplanes, and the use of flaps can take a few extra yards off this, which might help you clear the trees, etc. Consider them optional, if your equipment has the servo to trigger them, and build the wing accordingly.

The same might be said of the ailerons. The design certainly in no way requires them aerodynamically, as proportional engine/rudder and elevator will do a near perfect control job for you. Still, those with full house equipment enjoy using it, and it can refine the performance aerodynamically and widen the scope of stunts possible. It is of value to a seaplane taking off, in that as already mentioned, it gives you stabilizing corrective control to a model

leaning on one wing float or another, when you want to accelerate straight ahead. It can be used in addition to, or instead of the positionable wing floats.

At this writing, the aircraft is being built. It is a fact of life with seaplanes that the year doesn't have enough months. To test a seaplane in mid-winter is impossible, yet it must go into print in April before the boating season, to be printed in May for distribution in June, for building in July, for flying in August. Otherwise you end up in about

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September with a plan, a ship in November and you missed the summer season.

Give the design a try. We feel it will be the best Flying Boat of the long series by far, and while some of the special features are still to be proven, the ship can't be that far from wrong. It is a very graceful aircraft in line, sleek and streamlined, and judging from the bulkier "Piranha", capable of a bit of thermal soaring even.

It also differs from the preceding "Piranha", in that the nacelle is wire mounted on $\frac{3}{32}$ " dia. braces, which are quite easily formed and installed. They slip into drilled ply gussets within the wing, and may be installed after the top of the wing is sanded and silk covered. Mounting brackets bolt the bracing to the $\frac{1}{4}$ " ply nacelle crutch, and the affair is solidly mounted. It offers room for a larger fuel tank than possible with a central plywood nacelle mount projecting from the wing root.

The "MAKO" is aerodynamically quite rugged and can be stunted as much as any other multi aircraft, within its potential of performance. If you trip over the wing spar gusset for instance, you'll probably break a leg. Other balsa spars within the wing terminate at varied rib positions, stressing the wing evenly.

Unlike the predecessor, the radio is divided into separate watertight compartments, with the receiver, nicad power pack, rudder and elevator servos in the forward bow, while the servos related to engine speed control, ailerons, flaps and wing floats are located within the thick wing section. More on this further along.

Much water tries to enter a Flying Boat via the top the cabin. It tends to splash onto the bottom of the wing, then run down the dihedral angle, spilling into the cabin unless precautions and hatches fend it off. On this model, the radio is accessible without taking the wing off. The cabin area is simply removable, with excellent waterproofing.

CONSTRUCTION:

● Full Size Plans are available if desired, which saves a long session on the drawing board with dividers. Study the basic design over a bit, with an eye toward your radio equipment, servos and channels available, and how it will fit etc. Make a list of the materials required, all of which are fairly easily obtained through hobby shops, and stock-pile the necessary lumber etc. Inform your little 'uns that if they cut up your spar stock for forts, turtle cages and the like again, you will boil them in glue. My monsters always take the middle out of every log and test-crush the remainder in the vise. Then there was the day I cut out a whole set of tapered wing ribs, whereupon my son appeared on the scene, picked up the set of ribs, looked at them, decided they were the scrap pieces, snapped the whole stack in half and consigned the fragments to the trash can, all before I could register the proper shade of horror. No doubt you have had a few such highlights in your day from time to time also, but I am digressing, back to the delightful chore of going a few thousand ity-bity parts together, some of which won't fit.

To set your mind at ease a bit, there is nothing truly difficult to build in the entire aircraft, just a lot of it. Admittedly I am never accused of not using enough ribs and pieces, but each is there for a reason. Ample ribs in-

sure a strong wing and a good airfoil section, adequate framing within the hull guards against structural sagging, which frankly interferes with my digestion, to rephrase a familiar comment. Actually, the difference between ribs and not enough is about two in number. Less than ten minutes time. Personally, I feel that if I'm going to spend the hundred-odd hours of time and the money on a radio design, I should end up with a structure to be proud of. If the number of ribs really does bother you, you might want to shorten the span one or two ribs on each panel. The wing has more than adequate area, and it therefore can be easily shortened in favor of a hotter aircraft. The more the lift is reduced however, the more you will have to depend on brute power to make take-offs.

Wing Panels: Accurately cut-out the required ribs and sight your spar stock, leading edge etc. for serious warps. The ribs are self aligning with a small foot toward the rear, which holds each round-bottomed rib in a level attitude. After the panels are lifted from the workbench, they are easily trimmed off with a slice of a razor.

Jig-saw $\frac{1}{4}$ " plywood main gusset, the $\frac{1}{4}$ " ply leading edge gusset, and drill $5/32$ " dia. holes in each as indicated. Do this accurately. Cut out the secondary gussets as detailed on the plans.

Swipe your wife's best China, and mix up a nice glop of Hobby-Poxy epoxy cement, and bond the $\frac{1}{4}$ "x $\frac{3}{4}$ " (hard) spar stock to the $\frac{1}{4}$ " main gusset forever. Clear the $5/32$ " dia. holes of epoxy squeezings before it hardens to stone.

Slip ribs #2 through #17 (in order) over the tip end of the spar and slide to approximate position. No cement as yet. Accurately position main spar over the plan, and slide each rib into exact position, apply cement on both sides, shifting rib back and forth a bit to carry the cement into the joint. Pin the rib firmly to the working surface, and carefully align both spar and rib. Each rib in turn can be so treated, working reasonably quickly down the panel.

Before the cement has had a chance to set too firmly, block up the last rib $3/16$ " under the aft foot of the rib. About mid-panel, or at rib #9, block up the rib with $3/32$ " shim. This will build a small amount of washout into the wing panel, to lessen chance of tip stall. Some of this washout will probably creep out, leaving perhaps $1/8$ " washout per panel. (Trailing edge of tip raised.)

The top wing spars are now installed. Note that some of the $\frac{1}{4}$ " square spars are double laminations extending to mid wing as per rib notches. Extend each to the next rib blocking its way. These partial spars should be installed before the full length spars capping them, as it must be done in this order. The idea is to make a light wing, evenly stressed.

If in doubt about the strength for your form of acrobatics, extend the sparts a rib or so further.

Installation of the leading edge, trailing edge strip, $\frac{1}{8}$ " squares, bottom spars etc. is pretty obvious. I used a $\frac{1}{8}$ "x $\frac{3}{4}$ " spruce trailing edge spar, capped with a more easily tapered $\frac{1}{8}$ " x whatever height required shim to reach the height of each tapered rib.

Flaps: If desired, the flaps are easily assembled as per plan call-outs. Install good strong hinges, with no metal to metal contact. A suggested method is shown on the plan.

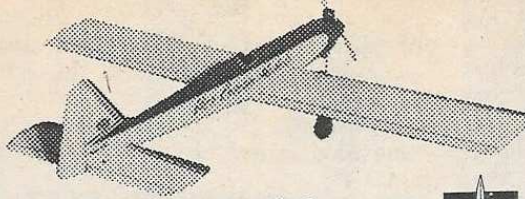
Ailerons: Also optional, and not unlike the flap structure and hinging system. Use care in rounding off the leading edge and check for a smooth rotation in reference to the wing rib.

Wing Float Mounting: Essentially two $\frac{1}{8}$ " wire mounting wires rotate within non-metallic tubing within the wing. This permits the wing floats to swing forward and back into raised and lowered positions. At the time of this writing, the best method to actuate these floats by radio is still to be decided upon. A full-down stop, preferably spring loaded is a possibility with the floats held down by light rubber tension and air and water drag. An electric motor could then wind in a line on a small diameter axle, pulling both floats up bit by bit on command.

Radio positionable wing floats are not a necessity. Perhaps with your equipment you would prefer to settle for a manually adjustable setting prior to flight. If the floats are radio actuated, they should be ideally full down for "at rest" position on the water, full down for low speed taxiing, raised gradually as the aircraft develops wing lift, and fully retracted to the highest position possible as the aircraft is balanced on the wing lift, prior to take-off. The airplane should be landed with floats high, with the floats lowering as the model coasts to a stop on the water. (About two to four seconds.) This timing is not all that critical, for the most the model will do is lean to port or starboard at rest, at which time the plane can still be levelled while at rest. As said before, winter is just ending as I write this, and therefore this float positioning mechanics is more in mind than fact at the moment and should be considered an experimental idea. The ship will take-off with these floats in almost any position with sufficient power. It may be more advisable to swing the floats up and rearward to maintain a cleaner airfoil. In either case, keeps the floats as clear of the wing itself as possible to avoid spoiling the airflow.

Bear in mind that when contacting a wave, the shock to the float will be fairly hard. Try to cushion this impact before it is transmitted to a servo. Possibly a monofilament fishline with a weak-link, externally replaceable. Thus, on hard impact, this fishline retracting the float would be free to snap lighter string loop, minimizing

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the force to be transmitted back to winding motor and shaft. File the whole problem away in your mind and work on it in your sleep. By the time you have advanced the structure to the point where installation of the floats is at hand, a solution will come to mind. Incidentally, try to rig the floats in a detachable manner for land flying. With a fiberglass or Celastic bottom on the hull, you can skid onto the ground with no difficulties, launching via the hand-launch route, which is also easy with this lightly loaded aircraft. The wing floats however are best removed for land flying, though not that objectionable to fly with, as long as you maintain a level wing attitude on touchdown. Always try to signal floats to raised position for land or water flying, particularly for rough land or water.

Wing Floats: Easily assembled of sheet balsa parts, as per plan patterns. A central keel, formers to give shape, bottom sheeting the "V" bottom", $\frac{1}{8}$ " soft planking above. The $\frac{1}{8}$ " wire mounts are pivoted in the tubing and installed as you progress. Both floats can be completed in just a few working hours. They should be silked or covered in some way as they are exposed on landings. Celastic or fiberglass on the bottoms is good insurance.

Engine Nacelle: Now this is fun. Chew out the $\frac{1}{4}$ " Sig birch aircraft grade plywood nacelle crutch as per pattern presented. Next, a $\frac{3}{16}$ " (minimum—not $\frac{1}{8}$ ") phenolic or fiberglass engine mounting plate is jig-sawed to the pattern, modified to seat your intended powerplant. Carefully set engine at 0 degrees downthrust (in relation to the nacelle crutch, as 4 degrees upthrust has been already built into the basic design, which is just about right) and about $1\frac{1}{2}$ degrees of right thrust, to counter torque. An upright engine is advised to simplify starting problems, but invert the engine if you wish for a still more streamlined silhouette.

The nacelle is basically a strong ply crutch, a fiberglass engine mount bolted to the ply, secured beneath with $\frac{4}{40}$ blind mounting nuts. A large clank tank, at least six or preferably eight ounce capacity. Larger if you can fit one in. Carved blocks top and bottom, rounded in cross-section, and tack-cemented in place temporarily for the shaping operation. The $\frac{5}{32}$ " dia. piano wire struts are bolted in place, well lathered into epoxy pudding, as is the bottom nacelle block. The upper half (or possibly the lower half if engine is inverted) is made removable to facilitate engine repairs and tank inspection. A spinner should be installed for insurance reasons, not to mention efficiency.

Stabilizer: If you can build the wing, you can build anything, so not too much need be said on the stab. Ribs

are self-aligning as on the wing, slipped over the $\frac{1}{8}$ "x $\frac{3}{8}$ " spar, and pinned down after cementing in place. Add the top spars, leading edge and gussets at the center. I found it convenient to mount the elevator hinges at this point, sandwiched between two $\frac{1}{8}$ "x $\frac{1}{4}$ " strips plastered in Hobby-Poxy. A straight edge aligned them perfectly. The remaining trailing edge stock is now bevelled and installed as per plan details. Once removed from the plan, the bottom spars are easily inserted, and short of trimming, sheeting and capstripping, your stab assembly is pretty well kicked in the head.

The Elevators: Cut four to outline, of firm quarter-grained balsa $\frac{3}{32}$ " sheet. Bevel the edges to make a neat thin edge, on account of if I catch you at the lake with an $\frac{1}{8}$ " thick trailing edge, I will get sick.

Fuselage: Any old 2"x4" will do, but it makes people stare at you. Better you should follow the plan to a reasonable degree. It is not hard at all to build, almost fun. Start with the $\frac{1}{8}$ " medium-hard (or hard) balsa siding. You will have to splice to make the length, preferably as indicated, with strip balsa backing each seam. I used Sig's $\frac{1}{8}$ "x3" aft of the step, $\frac{1}{8}$ "x6" sheet forward of the step. This width is often factory joined of two sheets, and on a hunch, I soaked a sample in a dish of water for a few minutes. The seam gave way, indicating a water soluble glue, so beware!! I noted this a little late, or I would have resealed the sheet. I added a butt block in the form of $\frac{1}{8}$ " x $\frac{1}{4}$ " strip the length of the joint, which hopefully will prevent trouble. Keep it in mind, and do not use any white glue in a seaplane. Akin to a snowball in a frying pan.

With siding laid out, aligned, cemented etc., the longerons and cross-pieces are added. $\frac{1}{8}$ " x $\frac{1}{4}$ " balsa, laid flat is ideal. If $\frac{1}{8}$ " x $\frac{1}{4}$ " spruce is available, it is worth using for the longerons, as it is a slender fuselage and potently powered. Both sides should take only an hour or so each to complete.

Join the sides in the conventional manner. Cut cross-pieces to size ($\frac{1}{8}$ " x $\frac{1}{4}$ " laid prone for greater pushrod clearance) and pre-cement ends to seal the pores. One $\frac{1}{8}$ " sheet rectangle temporarily mounted at the widest point forward of the step, and another near the aft end will align the sides initially. Check with a triangle. Once dry, a few cross pieces of similar width are installed, the sheet spacer pulled away from the rear, and the sides drawn together at the aft end. Trim and bevel to meet, sheet to sheet ($\frac{1}{4}$ " aft width). Add additional cross-pieces, a pair at a time, with rubber band tension when necessary. Next, pull the bow together with a rubber band, and fill in the nose cross-pieces.

The bottom keel is next installed. Cut from $\frac{1}{8}$ " sheet, splicing as necessary, but retain strength in an unbroken length near the step area. The

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keel is the height visible on the side view between the bottom $\frac{1}{8}$ " planking forward of the step, and the actual siding edge at the chine. (Not the edge of the bottom planking at the chine.) Just remember it must seat against the cross-pieces joining the siding, and must be capped with the $\frac{1}{8}$ " bottom planking. Cement it in place.

Fill in with $\frac{1}{8}$ " x $\frac{1}{4}$ " or triangular $\frac{1}{16}$ " stock further aft to form an 18 degree "V" bottom. Forward of the step, the shallow "V" bottom is carved into a graduated "concave" bottom, creating a very graceful and functional bow flair, designed to help curl the water away.

When planking the bottom of the hull, be weight conscious. $\frac{1}{16}$ " hard sheet is adequate aft of the secondary step. Install this sheet first, extending it underneath the step completely, to provide a foundation for the arched step formers. Cut four of these to pattern indicated. Cement two to the $\frac{1}{16}$ " aft bottom sheeting at the step position. Attach the others in line with where the bottom sheeting forward of this step is to be positioned. Brace between to support it.

$\frac{3}{32}$ " sheet, cut into thin strips with grain running vertically is now cemented in place to box in the step. Apply ample cement here. The excess is easily trimmed off when the cement dries, and the grain direction makes it easy to bend the sheeting around the step.

You may wish to run some sort of a vent tube from a side or top mounted air scoop to further vent this secondary step, but it is not known to be needed. If you wish.

The second and major step position is built in like manner, with the $\frac{3}{32}$ " bottom sheeting (extending amidships from step to step) passing underneath the entire step area, to form a foundation for the step formers. The second pair of formers are once again blocked up, boxed in with the vertically grained $\frac{3}{32}$ " sheet and trimmed flush as before. This step differs from the other in that the tunnel area venting the step from above must be cut away as indicated. This according to my weak-minded theory will forever dispell the chance of vacuum in the step proximity. If nothing else, it is wierdly odd to behold, and worth the trying. Whether it will actually help will be fairly easy to determine by plugging the scoop on alternating take-off attempts.

The forward $\frac{1}{8}$ " planking is of $\frac{1}{8}$ " x $\frac{3}{8}$ ", mashed and crushed into shape around the bow sweep. You will find it easiest to start at the chine, bevelling and cementing strip by strip, allowing each to dry to form an anchor for the next. This is not easy to plank, but not too hard either. It will look horrible until sanded into one compound curvature which is reward enough for the effort expended.

Before sanding anything however,

the nose block should be bandsawed and epoxied in place. Also, the chine spray rail should be installed. Start with triangular stock if possible, carving a concave hollow into it. It may be cut into small lengths if necessary to follow the curving chine, sanded and faired into the siding as neatly as possible. Work carefully to avoid gouging the siding. Save that for crashing. The superstructure is not difficult. Forward of the cabin, the nose has four small formers, $\frac{1}{8}$ " planking. The cabin has plexiglass windows, jigsawed to shape fitted. The cabin is best formed of a mixture of sheet, block and strips as indicated, swerving into the air scoop tunnel.

Bear in mind the dowel pushrods have to pass through this tunnel area, and can best due so through a tubing effect. Positions will vary with servos used to some extent, but actually there is plenty of room to seek individual solutions in this ship.

The bow compartment houses the battery pack, receiver, elevator servo, rudder servo, switchboard and switch. The wing root mounts your engine speed servo and your aileron, flap and float positioning servos. Any combination and double uses you can dream up will do. Build in a waterproof tunnel for connecting wiring. Make all radio compartments watertight. Make radio system readily removable, both hull from wing, torque rods and push rods from servos, and radio system from the aircraft. In short, it must be convenient under adverse conditions at the beach or in a wave tossed boat, and it must be quickly accessible in case of accidental flooding. It should and almost "must" be removed from the damp environment as soon as the days flying is over. I always remove R/C gear upon returning home and expose it to warmth to guard against dampness.

The Jan. '67 issue of F.M. dealt in great detail with waterproofing radio systems, and much of the data is applicable with modification here. Visualize a slender sealed box in the bow, housing the radio totally, pushrods exiting rearward, capped over with toy balloon necks, shielding against water entry. Silica gel within to absorb dampness if any enters, a layer of silicone rubber sealing the hatch which is bolted tight. All this within water deflecting nose hatch, which does its best to keep water out. A sealed envirement within the airframe describes it. Not easy, but you must, and the ship will hopefully last many years it must be remembered. Worth the effort. As a side advantage, the waterproof housing also keeps sand, dust, dirt and rain out, major causes of radio and servo failures. More work, but less crashes, and less chance of damage in a bad crash, due to the strength of the packaging.

The wing mount is rugged, best envisioned by referring to the plan. The air scoop through the fuselage in no way detracts from the strength. The aft turtleback is formed and planked in

the best performing engines are checked with an Original

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typical fashion. It cannot take in the vast gulps of water that other cabin types tend to swallow.

Fin and Rudder: Built up, though you could get lazy and substitute flat sheeting. Actually an airfoiled rudder fin will keep flying longer than a flat rudder, which stalls sooner, and just might cream you some day. Apart from that, it blends into the design much better.

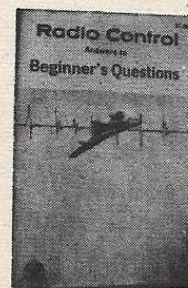
Water rudder. Try hard, thin ply, epoxied over. Bracket with metal strips, attached to moveable rudder. Pivot the water rudder as indicated to swing upward on landings, under impact, and from excessive water drag. It turns with the rudder, giving you directional control on the water at dead slow speeds, when the air rudder is not effective.

A word in regard to finishing. Use ample clear, silk, and clear or color trim to a high gloss. Wax if desired.

In flight, it will perform much like any other aircraft. It will fly in a mild mannered way, not bad as a training type, except it's a lot of marbles to cream. Without flaps it will run an estimated 150 feet on the water before lift off, and on approaches, it will seek a flat glide slope, which will surprise you. This due to its relatively light wing loading and ample power, even when throttled. Flaps will settle it in, via a steeper slope. Fly it safely. ●

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