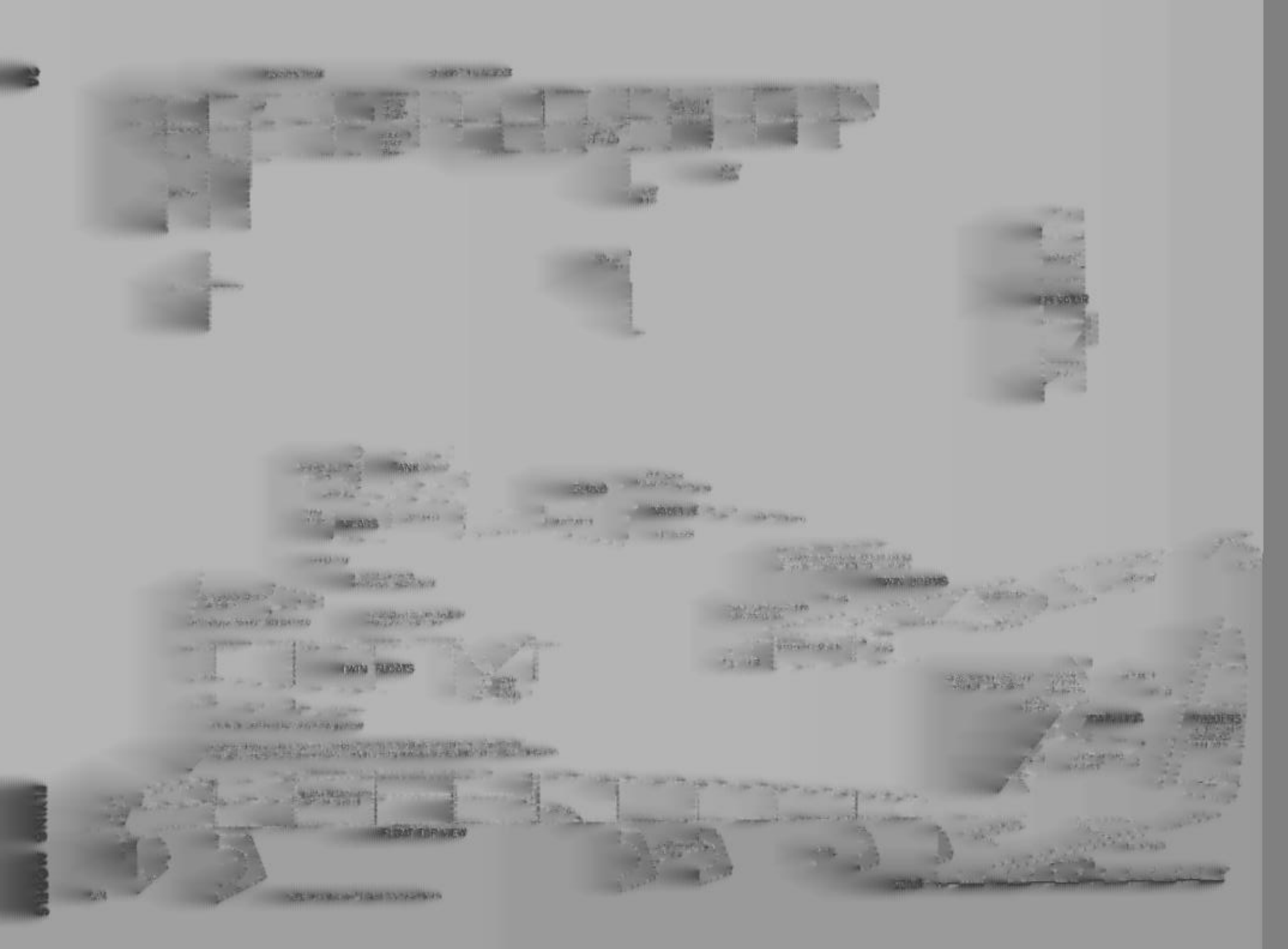


Amphibious "SEA HORSE" Flying Boat

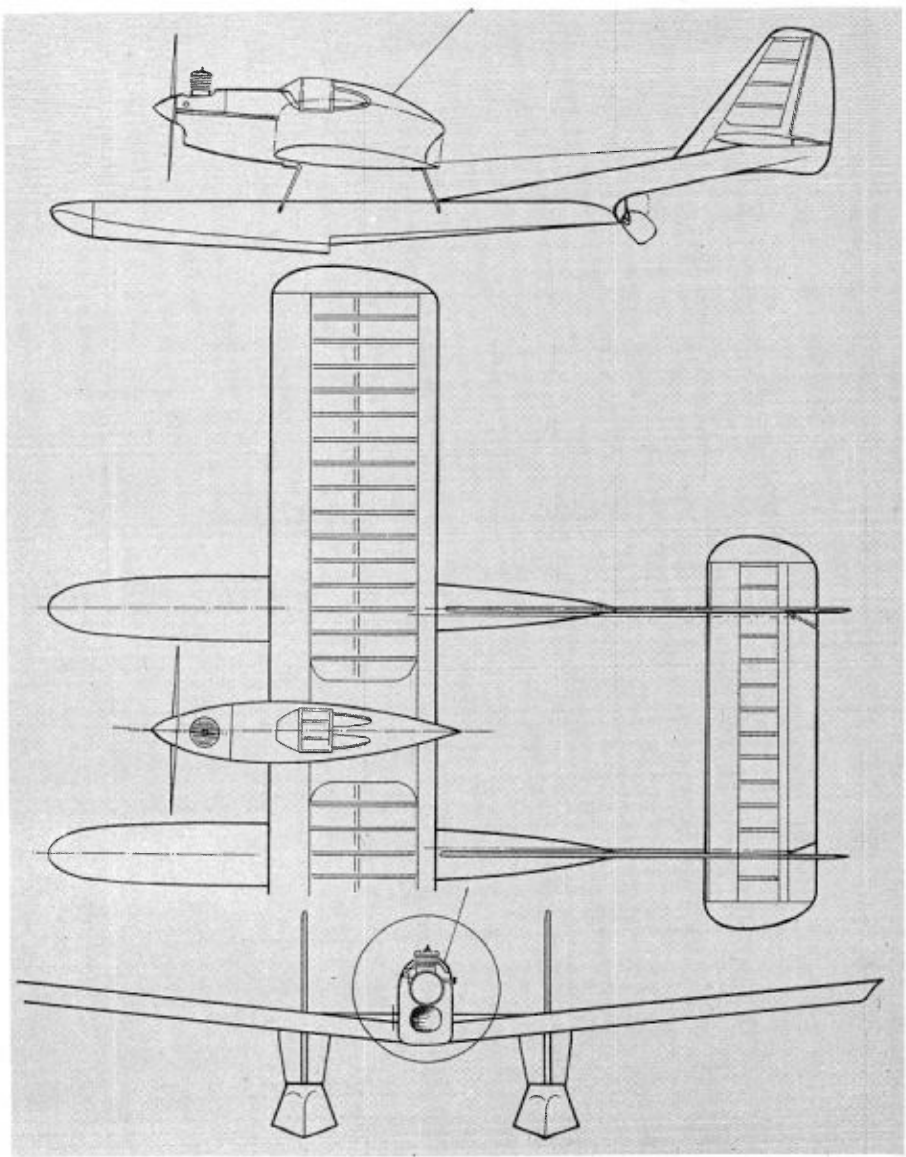
by Don McGovern

FULL SIZE PLAN AVAILABLE THROUGH "MODEL PLAN SERVICE"

Super Tigre .45

Rudder/Elevator/Engine Speed

67" Wingspan, Twin-Hulled Flying Boat . . . Citizen-Ship Analog



land or sea . . .

♦ **Round wheels** roll better than flat tires. The guy who designed that first stone with a hole in it came up with a functional shape that's hard to beat. The design was right and it will stay with us.

You can say the same for the multi pattern ships, the pylon free-flights, the controline stunters and so on. E: nearly perfect in design for its inten function, and the same is true in sense of the present stage of devel ment of our seaplanes. Both flying boats and twin-float seaplanes tend to settle into their own distinctive planforms which have proven functional and efficient, and it is hard to vary the configuration.

While refinements in design from one ship to another breed the perfect aircraft, the spirit of the modeler tends to decay away in the process. It is hard to keep up an interest forever in look-alike designs and we all tend to feel unduly inspired when somebody totes out the unusual to the flying field.

This was our frame of mind when we tried to doodle-out a new basic design. A wing here, a tail there, engine in a nacelle, a hull to connect all, wing floats for stability . . . and the sketch already resembled our 15 year old line of flying boats . . .

Then the mind wandered back to Martin Mariners, Boeing 314 Clippers, Sikorsky flying boats . . . and Balboa's 1933 Italian twin-hulled seaplanes which flew overhead enroute to the Chicago World's Fair. Two giant floats, booms, tail, engine in a nacelle. Why not? A perfect change of pace, and a design which requires new solutions, but offers a promise of excellent water and air performance. A design which requires less wood, less weight and less take-off power.

This ancient craft might make a fine scale seaplane for some industrious soul, but the general idea rather than the scale configuration is what interested this designer.

And so, the "Sea Horse" design took form, and is currently being built. Spring weather should see it in the air, and as the design is readily adjustable for float angles, incidence and what have you, we anticipate quick success with it on the water and in the air.

The design offers a complete change of pace, both structurally and in appearance. The kind of ship that is both easy and fun to build, though we are building this ship and modifying it as we go along. Depending upon your degree of skill, experience and available equipment, you may choose to do the same.

The ship spans 67", ample in area, with a semi-symmetrical airfoil section, intended to develop some lift to free the beast from the water. Ample in area to lessen the wing loading, creating a fairly mild flying machine with modern proportional equipment. It should be quite flyable with other systems, though elevator should be used when possible to flair the landings.

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The planform is truly distinctive, and as such need not rely on a complex tapered wing for appearance, which greatly simplifies the task facing the builder. The rectangular planform also offers greater stability than sharply tapered panels, and provides the extra wing area for a mild machine.

Twin floats of simple construction, well beefed for the rigors of flying are ample in length to support the weight of any current R/C equipment. As both floats are identical, four former or bulkhead halves should be cut (or jig-sawed) to the given patterns. Floats are then assembled upside-down, directly on the top ⅛" sheeting, aligned by a ⅛" sq. pre-cemented in position. Keel strips, chine rails, etc. are then installed. It adds up to an easy assembly job.

No radio equipment is installed within the floats, to lessen the problems of water-proofing, electrical linkages and the need to balance equipment in one float with a like weight in the other. Granted it would be nice from a standpoint of fore and aft balance, but a small ballast compartment for lead or clay in float tips can handle minor corrective C.G. trim.

Provision within the floats for water-rudder linkages should be considered

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while building, or it could be jury-rigged on the exterior if you want to get a little sloppy. Also, before sheeting the exterior of the floats, securely mount the piano wire supports to the floats, testing fit within the wing. Actually you will find the "Sea Horse" breaks down compactly for vacation trips in the family car. (Assuming you go alone.) With floats removed, tail removed, nacelle detached, it is not bad at all for a big ship.

For pure water flying, the ⅛" sheet balsa float bottoms will suffice, if covered with silk or Silkspan. A simple to add layer of Sig's "Celastic" will add great strength to the float bottoms, and we so advise you. If you have not used this material, it comes in folded sheets, softens in thinner, and flows nicely around complex curvatures. A still harder surface? Fiberglass the bottoms if your terrain is rocky, scratchy and miserable to skid in on.

● **Wing Design:** The wing is truly rugged, with ribs spaced every 1¾", deep strong spars and well gussetted at the center. The wing will withstand the most violent of manuevers and should be safe with any engine in the .60 displacement range. As the rest of the design is fairly light for a radio aircraft, we have stressed the wing to last. Also, it will absorb some engine vibration which might otherwise create havoc with so short a fuselage.

The wing airfoil is deep enough to bury servos between the spars if you wish to position them here. We suggest you build a rectangular box with tiny drain holes, mount the servo on raised strips to keep dry should the compartment take in a few drops by accident. A toy balloon neck shielding the push-rod connection will form a water-tight seal, allowing a fore-aft motion without admitting water. A plexiglass hatch cover screwed in place over a silicone rubber seal (from tube available in hardware stores) will give a visible indication that all is water-tight. A packet of silica-gel can be installed to absorb dampness. We suggest you refer to the Jan. 1967 F.M. "All-Dry Canister" article for further details on waterproof R/C installations. It works wonderfully well and the basic idea is applicable to any type installation, be it one package or divided in compartments as you will most likely do with this aircraft.

Depending on your equipment you may fit all into the nacelle area (which understandably is limited due to fuel tank, engine and mounts) or you may settle for receiver, battery pack and engine servo in the nacelle, with rudder and elevator servo mounted in the wing as mentioned.

We are using Citizen-Ship's "Analog Proportional" equipment in the original, installing the engine control servo in the nacelle, the rudder and elevator servos in the wing as indicated. Either

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a pushrod (not too flexible) or monofilament fishline (two for push-pull scale-type control action) can traverse the open distances between the wing and the tail surfaces. Some purists may wish to pass the pushrod or cables through the floats into booms and to the rudders and elevators, but we feel this too prone to trouble to be worth the effort. Pushrods are hardly noticable on the assembled aircraft, so why worry?

Twin rudders are used on the design, and you will note a larger than average amount of area and control surface. As a twin rudder places the fin outboard of the prop-wash it becomes much less effective than on a normal tail arrangement, thus more area and movement to compensate. The plans detail suggested linkage.

Engine nacelle: A tight fit no matter how you slice it. The engine, tank and mounts must be pretty much as indicated, with your radio equipment fitted in as best you can. Bear in mind it must be accessible for servicing, and it must be in a water-tight sealed compartment as previously described. Formers, planking and hollowed block structure as indicated on the plan. Key and lash the nacelle firmly to the wing, or use Tatone's nylon screws and brackets for a hidden installation.

Flying: The fastest way to cream a new ship is to rush the flight tests. Take the time to inspect the finished craft, with special attention to the C.G. location, the alignment of all surfaces, sufficient bindings and control action. If anything is causing a bind in the linkages, fix it before you fly, or the ground will fix you. Thrustline settings should be as indicated or very close to it. No sever warps should be present in the flying surfaces, other than a very slight washout (trailing edge up about ⅛") toward the wingtips. This will help avoid the wingtips stalling out before the rest of the wing, letting the model fall off to right or left in slow speed flight as when on a landing approach. It is also a factor to reckon with if the engine conks on climb-out after take-off.

So, here you are all done, the weather dawns calm and clear. No excuses left. You can test fly on land or sea as you prefer, whatever is more convenient for you. As long as your equipment is fully waterproofed, we would suggest you test fly from the water, for it is more forgiving if you wind it in on take-off or landing. If, however, you crash dive from a great height, you can expect some pretty severe damage.

Set the model in the water, and coast it around a bit to get the feel of it. If your water-rudder is connected and working at this early date, you can try some low power taxi tests, providing the water is reasonably calm. This however is a luxury, and is not absolutely necessary for initial flights, as long as you can keep the aircraft aimed

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into the wind until the ship reaches a speed where the rudders give you corrective response.

A wooden prop may give trouble. As blade tips are hitting close to 500 mph, a drop of spray water hits it like a stone, and one taxi run may splinter the prop tips. Switch to nylon propellers if this condition plagues you. Calmer water helps of course also.

Full bore power should get the model into a planing attitude in a few yards travel, and if all is in trim, the model will pick up speed, skimming smoothly across the water for a hundred feet, and break loose with a moderately steep climb angle. Watch out for this! Seaplanes tend to glue themselves to the water, picking up excessive speed before lift-off, which shows up as a rapid climb-out once unstuck. Be ready to moderate the climb angle before a stall condition exists. Seldom a problem unless the engine leans and dies, but then it can be embarrassing.

Actually, once in trim, you will soon develop a lift-off technique, feeding it elevator corrections to get it up planing and to rock it off as in full scale practice.

Full scale aircraft also make use of aileron and elevator positions when taxiing on the ground (or on water) to maintain safe control in cross-winds etc. When facing downwind for instance, down elevator is held, deflecting the wind upward, forcing the tail toward the ground. Once your "Sea Horse" lands, and while it sits at rest on the water we suggest you crank in full down elevator until the craft is retrieved. Thus, if the model exposes its tail to a stiff breeze, the wind will hold the tail down, rather than being blown upside down and dunked.

In flight, the model should perform well and withstand pretty violent acrobatics. The landings should follow standard procedure, with emphasis placed on a smooth flair-out inches above the water. Float angle shown offers good wing lift, but it pre-supposes a controlled landing where a flairout will bring the ship in tail as low as possible. Not all that critical, but try. Adjust float angles slightly if you experience difficulty on take-offs.

Hope the design adds fun to your summer days. It opens up vast new frontiers for you in modeling, and it can also be flown off hard ground, ice and packed snow. Wheels may be added to make it truly amphibious. Fire in a photo of the ship taking off. ●