77" Span Amphibian Flying Boat

Single to Multi Channel Radio or Fly Free-Flight:

Barnacles can't stand our fuel, so go to sea with this versatile flying boat.

Full-house controls, Ecktronic's 10, Single Channel, or anything between.

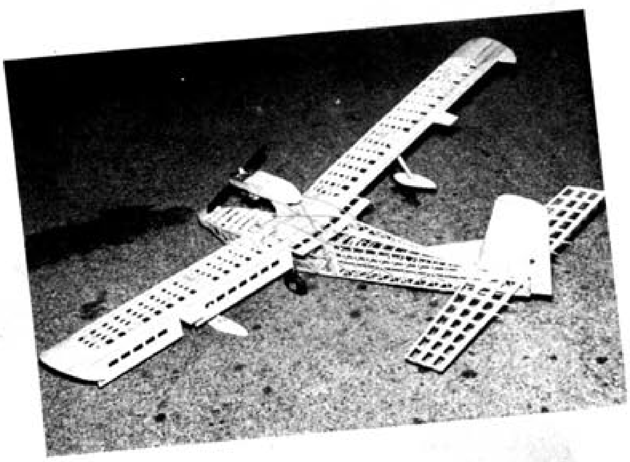
Build light, sturdy, well braced to stand up, look decent. Movable trike gear, many other structural options.

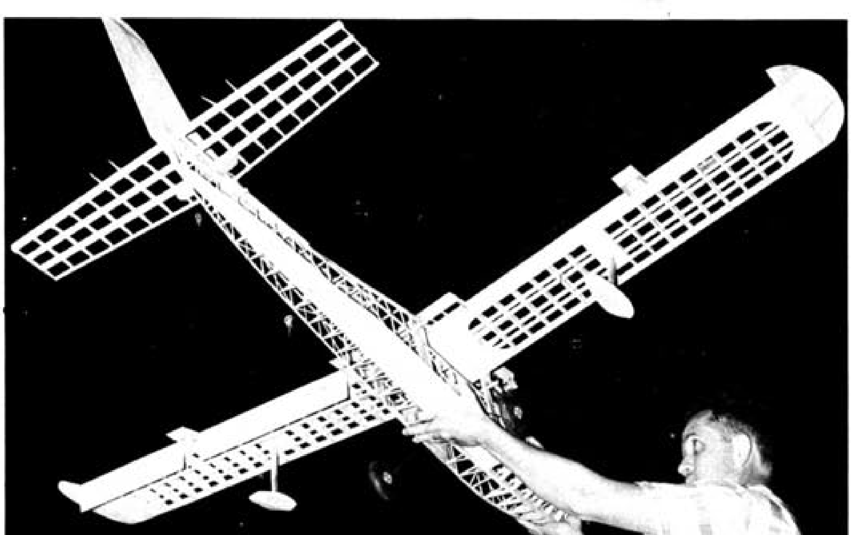
Rudder, Aileron, Flaps, Motor, Trim, Elevator and Retracting Gear . . . or just keep it simple, go free-flight.

Designed for water flying, takes wide range of engines, .35, .45, .56's.

"THE SCAVENGER"

by Don McGovern





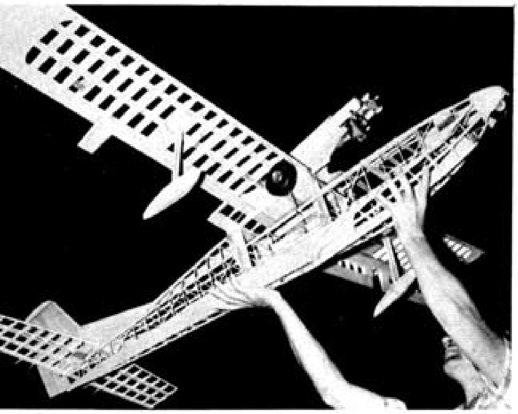
Full Size "Timely" Plan Available!

▶ The "Scavenger" derives its name from its habit of gobbling up all available balsa, wheels, wire, silk, dope and assorted R/C gear lying about. It can do the same for you.

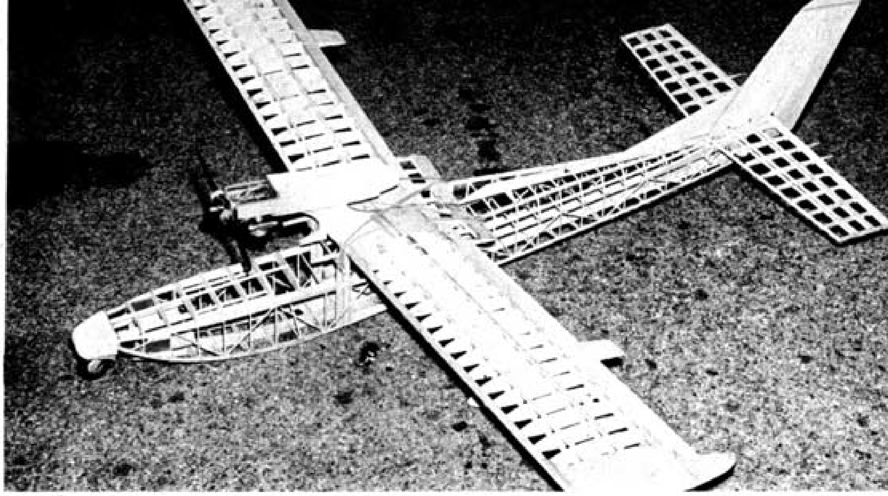
We concocted this amphibian to fill the need for a versatile flying boat, equally at home on land or water, and capable of excellent performance as a free-flight, with single channel, or an advanced multi control system.

To accomplish this end, a relatively large size was decided upon, slightly in excess of six foot span, with a length of 64". This permits a wide choice of powerplants, from .14 displacements for free-flight, on up to .56 or .60 power for heavy multi versions. .35 to .45 power is ideal, and hotter engines should be used only if your flying experience is considerable. Beef up here and there for the large engines, and conversely, save any weight you can when planning on smaller engines, as water take-offs require a very high power-to-weight ratio.

We recommend you assemble your nacelle in a manner which allows a fast engine change. In this way a dunked engine can be drained quickly, and test flights can be made with reduced power, with larger displacement engines substituted as you gain in experience in flying the design. While even a .15 should keep the



Silk cover, dope to a high gloss, make pin-hole vents to relieve heated-air and drain moisture.



Set gear by hand, or add to system to make retractable by mechanical means. Nose wheel forms bow-bumper, main wheels swing-up clear of water, simple pivot action free of locks.

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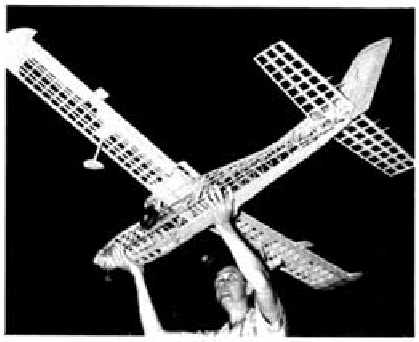
model airborne, you will need something close to a .45 for a good water take-off, and may have to go to .56 or .60 if the ship ends up as a heavyweight.

Build it strictly as a seaplane, or with the amphibious gear as on the original. Our gear detailed uses a 2½" nosewheel, and two 3½" main wheels. It may be manually placed in the up or down position, or if you wish, it can be radio or timer retracted after a land take-off, or made retractable and extensible through the use of motors, servos and gadgetry. Basically the gear design is as simple a retraction system as can be made, gears pivoting in hardwood mounts, held down by the weight of the model, rotating up as the model becomes airborne, in much the same manner as on retractable legs and single wheels occasionally seen on free-flights and Wakefields. This type gear is free of the need for intricate down-up locks, and needs no wheel cover doors.

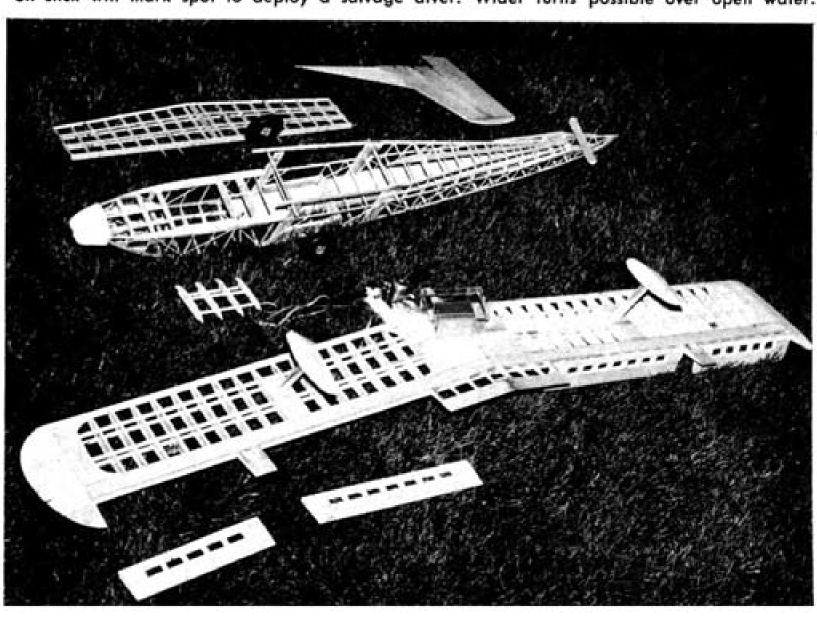
Wheel installation is optional. Fly strictly seaplane if you wish. Flaps are for experimentation, may be omitted. Servos in wing center.



While the nose gear retracts into the recess in the bow-blocks, where it serves double-duty as a rubber dock-bumper, the two main wheels simply swing upward out of the way of the water. It was not our intention to clean the design aerodynamically, but rather to permit land/water flights, and the possibility to set the gear by radio during the flight, if the builder wants to tinker a bit. The gear could have been enclosed in the hull or wing, but it creates many additional problems of strength, cover doors, water intake and on endlessly.

The "Scavenger" makes a fine sport free-flight, a stable, mild mannered single channel craft, or a potent powered one, depending on power choices, and an unusual intermediate or multi vehicle for experienced flyers. Choice of controls possible include: Rudder, engine speed, elevator trim, elevator, aileron, flaps and radio actuated gear, listed in order of importance to flight of this design. Engine speed control and elevator up trim are high on the list for water take-off reasons. While full brute power is necessary for break-off, a means of reducing power to a cruise setting once airborne is most desirable. Up elevator trim can aid in breaking the model off the water, and both engine and trim can be actuated automatically by a trailing wire water vane, which seeks a new position as it leaves the water. This method is a boon to free flight versions, or single channel ships. Even where the channels are available, an automatic power/trim adjustment leaves the foggy mind free to consentrate on other

Design overall is bigger, roomier, slower in flight than most multi's therefore ideal as a trainer, with water as an extra cushion, though not as soft as it looks. Floating debris, oil slick will mark spot to deploy a salvage diver. Wider turns possible over open water.



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corrective measures.

And so—make it as complicated as you care to, but don't go in over your head unless you have enough radio experience. Seaplane flying is involved enough, and in addition to boating problems, everything electronic within the model must be kept in absolutely watertight compartments. Keep control movement to minimums and test with caution. Our own flying time with the design has been limited to a couple of weekends, as marine insurance curtails boating prior to May hereabouts, not to mention the problems of getting a boat spring-painted and overboard. Couple that to the magazine deadline, and it leaves two weeks. If you find four blank pages right about here, you'll know we ran out of luck.

The design is stable on the water, balanced by tip floats which are really mounted near the center of each panel, thereby reducing the swerving effect to the path of the model if a float digs in. The long low hull will seldom if ever flip over, and your engine will usually stay fairly dry. Floats are shock mounted, and on hard impact, they will pull off preventing damage to the wing. Rubber bands hold them in place. A water rudder, free to pivot upward is affixed to the rudder tab, and will provide a measure of control on the water, subject to winds, tides etc.

Building materials are pretty standard, and no harm in a little intelligent substitution of sizes here and there. Sheet required is mostly 1/16", and 1/8". Longerons, spars are 1/8" x 1/4", 1/4" sq., some 1/8" sq., 1/16" x 1/8" strips, and suitable tapered trailing edge stock, leading edge lumber etc.

Full size plans are available through Timely plans, and that shoots your last excuse for turning the page.

Wing Assembly: The panels offer no problem, and once all your 1/16" sheet ribs are cut-out, the wing will go together as fast as you can squeeze the glue. Select the straightest wood available for wing edges and spars, and avoid mushy stock for same. Multi's should use 1 3/8" wide trailing edges at least. We used 3/8" x 1/2" for edges, or sheet reinforced trailing a leading edge, ample for the task. This can be lightened on lighter loaded models. Any changes deemed necessary for materials available should be allowed for on your master rib.

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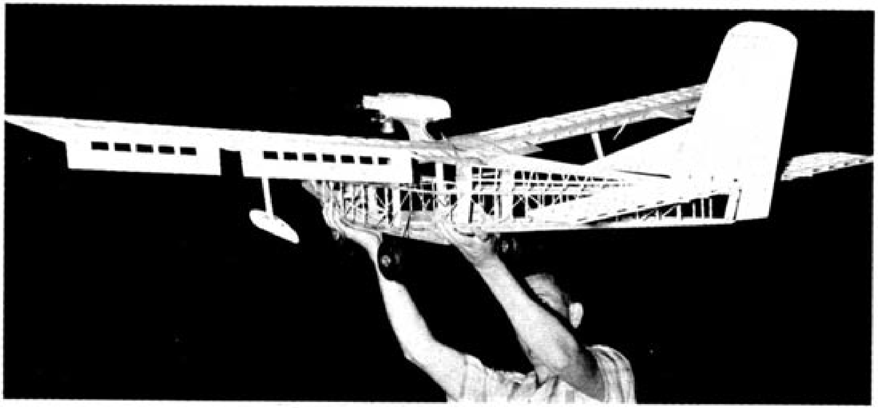

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The plans show ailerons and flaps for those who wish to actuate them. Cut your ribs all in one piece if you prefer to build a standard wing. Note method of hinging surfaces on the plan, or modify to suit your own preferences if you wish. Drill holes in rib stacks, for aileron or flap controls, and install wires to actuate them prior to attaching the wingtips.

Note all ribs are capstripped top and bottom, or sheet covered in the center-section area. A Davis airfoil is used, and it has a tiny amount of undercamber. If the trailing edge is pinned flat to the plan, and the rear of each rib blocked up 1/16" at the trailing edge notch, it will assume the correct angle. The forward portion of the ribs must rest flat on the plan. Shim up bottom spars with 1/16" and 3/32" scrap to recess into the rib notches. Note spars are recessed 1/16" below the rib edges to allow 1/8" of space between spar and covering material, when capstrips are in place. A lesser amount of clearance encourages adhesions if the freshly-doped silk comes in contact with the spars.

Gussets of plywood or hardwood reinforces all spars and wing edges. Vary lengths and trim any excess weight-off possible. Before the top center sheeting is applied, servos and batteries are positioned, with access hatches. Seal off in watertight plastic. The nacelle mount cements into the wing, and must be braced with sheet and strip, grain endwise, in every conceivable way. Great strain will be transmitted to this juncture, particularly if you get a hydraulic lock caused by water in your engine when flipping it over.

Standard nylon bellcranks and horns are advised, or you may wish to concoct your own. In either case, the finished result must be a rugged bind-free assembly. Nylon fittings

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In the down-position, the gear wire rests against a rugged stop, which may be rubber shock-mounted for additional flexibility. A line attached to a pulley disc will provide the motion necessary to retract the gear via electric motor winding the line on a shaft. Slight rubber tension may be employed to hold the gear down, or stronger rubber power may be used to retract it, and then the power of the rubber released for descent of the gear. Such a system could be completely automatic, but would go through the cycle of gear down-up-down only once per flight. Timers can cut or release the line controlling the gears, allowing the lighter rubber power to pull gears to the next desired position.

Any balsa disc pulleys employed should be of as large a diameter as possible, and firmly attached to the projecting gear center. Rig the gears if possible to retract or extend through one fishline, and preferably with the same amount of horizontal movement of the line. Such disc pulleys will keep the fishline pulling at a 90 degree angle for maximum efficiency at all times.

You are free then to further develop the automatic action of the gear to any degree you wish, but as we cautioned elsewhere in the article, do not get too involved, as all weight added lengthens the take-off run, particularly on water, and all electrical equipment, switches, catches, latches etc. endlessly must be water-protected and serviced.

Fuselage Completion: Once the sides have been assembled, and joined, with gear installed, the cabin area, hull bottom and step and forward hull area should be finished off. Forward of the step, 1/8" sheet and planking is used. Aft of the step, 1/16" sheet planking suffices. Build up to the bottom planking with sheet or strip, from chine to keel. Aft of cross-sect on No. 7 the sheeting is flat, at a 17 degree angle toward the keel. From No. 7 forward, the bottom becomes a concave curvature, sweeping up to the bow at a steepening angle.

We recommend making a large hatch forward of the cabin, for easier radio access. Reinforce areas to support weighty radio equipment with strip rails to locate the boxes housing receiver, batteries etc. Servos are best located in the cabin area beneath the wing, where connecting torque or pushrods are closer to the tail surfaces. Locate them amid-fuselage in waterproof boxes or plastic, rather than along the bottom in bilge water. Actually you will find a great deal of room within this fuselage, due to its extreme 5¾" width, and 6" height. Ample room for any installation system.

All openings on the fuselage, the forward hatch and the cabin access area should be protected with a drip strip rail, to deflect incoming wat[illegible] The cabin area in particular is subjected to a cascade of water running down the undersurface of the wing, which tends to accumulate within the cabin, if the area is left uncovered. Provide a drain tube in the nose to pour off bilge water as it accumulates. Also, install screw-eyes on each side of the nose wheel, to serve as both bow-chocks and mooring hooks. You will find them to be a small blessing in disguise, permitting offshore mooring at the beach, away from grubby little hands unfamiliar with fragile aircraft.

Radio Installation: Keep it dry! Whatever equipment you decide to use, single channel, intermediate or multi, everything electrical must be well shielded against the water. Do not expect your hull to be watertight. It will probably dispense a half-glass of water every time you tip it on end. All electronic equipment must be encapsulated in a plastic or wooden tape-sealed box, plastic film or other material. As a suggestion, the new Cox engine display cases are ideal, light in weight, transparent, and offer protection on five of six surfaces. Tape a cover in place, and all is ready. They are large enough to take a ten-channel Ecktronics relay type receiver with foam padding.

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Test balance the completed structure, with radio equipment in place. The model must balance at or very close to the 25% balance point, measured back from the wing leading edge. Position the radio gear accordingly, allowing for a gain of a few ounces aft, when tail surfaces are covered and doped. Check to see that all is smooth and cement joints of importance well skinned with goo. Tail surfaces must be keyed in place, as the rudder is attached, and the slightest shift in position would be too much.

We recommend that the structure be pre-doped, by brush or spray, with particular attention being given to the outer portions of wing and stab, rudder, nacelle, and tip float and hull bottom area. A good coat applied internally will help the cause. We try to build up a good layer of clear dope on the hull bottom areas, then cover, and apply several more coats,

Covering: Use silk throughout. It is light, durable, and available in a range of colors. Apply wet, pull taut and even, doping to structural extremities. On the wing undercamber area, a coat of semi-thickened, clear applied through the damp silk and pressed down to each rib with your finger, will give good results. Silk should be properly stretched, and doped with care to avoid creating adhesions along the spars as mentioned earlier.

Once silk is dry, trim off excess, and dope loose edges. Apply coat after coat of clear, until the finish is glossy. A few drops of castor oil mixed in the dope will act as a plastercizer, and prevent covering from pulling too tight, warping the model.

Warp Removal: A warp usually sneaks in like a fly at a picnic. It may be removed when the last coat of dope has been applied. Allow the wing to dry well, then twist the warped panel an equal amount in the opposite direction, while applying steam from a tea kettle spout to both sides. Allow to cool, retaining the opposite twist, releasing slowly. If in time a little of the warp returns, repeat the procedure, adjusting until panel is warp free.

Give the model a thorough check prior to flight. An 1/8" or so washout (trailing edge raised toward the tip) is acceptable, but all other noticable warps must be removed. An alternate method to replace the steam treatment, is to immerse the afflicted panel in a bathtub of hot water. Twist in the opposite direction as before, allowing the surface to cool. Excess water should be blotted up with a towel.

Check for the balance, freedom of action on all hinges surfaces etc. Strap all surfaces in place, and inspect alignment from the front, top and side. Give the engine a test run, and adjust idle speed, and other flight settings. Prop should be well balanced, all engine mounting bolts down tight.

Before exposing the model to the heat of the sun, pin-prick the covering between each rib, at the trailing edge, to allow the structure to breath. Otherwise, the highly doped surfaces if airtight, will swell with the heated air within, badly stretching the covering, or bursting it in extreme cases. These vent holes go through both top and bottom cambers, and serve as a blow-hole to expell the few drops of water which may collect in the wing or stab tip areas.

Flying: Don't. Next best suggestion for the gamblers among you, is to pick calm weather and a large enough flying site, preferably liquid. While water can deal a severe blow to a wide-open diving model, it will be kinder to mis-adjusted models on low test power, or a stalling ship in the glide.

Test glide the model into the water, shimming the glide until buoyant. Move up to a higher launching site if possible, to better observe and correct turning characteristics.

Once satisfied, reach for the booster. Initial power flights should be made well offshore, from an outboard if possible. Keep power to a minimum, and engine run on the short side. Observe the flight pattern, remembering the direction of turns, any stalling or nose-low tendencies, etc. correcting each symptom prior to the next flight.

These first flights may be made with or without radio, but avoid trying to manipulate the gear, and full house controls. Simple rudder corrections may be helpful, but not all the other unnecessary complexities. As flights progress, gradually increase the power, and add desired control actions.

Take-Offs: For land, a smooth site is a necessity, and it should be large enough for an extended run and lift-off. Multi's will need room, though lighter single channel models and free-flight models will get off proportionately faster.

Hydro T.O. tests are best made in fairly calm water, where effect of water-rudder etc. can be seen. Scream the engine fullout, and hope. Properly trimmed, the model will gain speed, raise on the step, and break free tail-low. If the model rises on the step and planes on the hull forebody, but fails to break free, add a shim of incidence to the stab. This will lower the afterbody and off you go. If it fails to accelerate, go to a more powerful engine or fuel. Strive for a straight take-off run, and give it help with up-trim.

Landings are best made into the wind, keeping the wings level and flairing the approach as on a full scale anything.

It's a complicated way to get a sunburn. Try it though, it's fun. ●