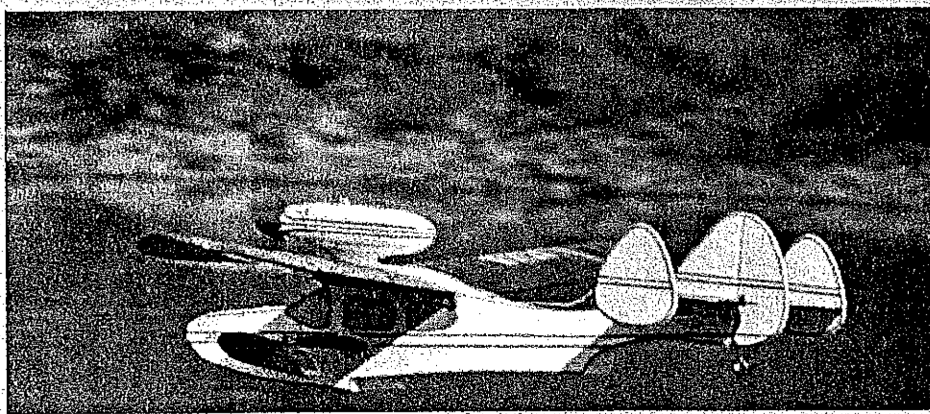
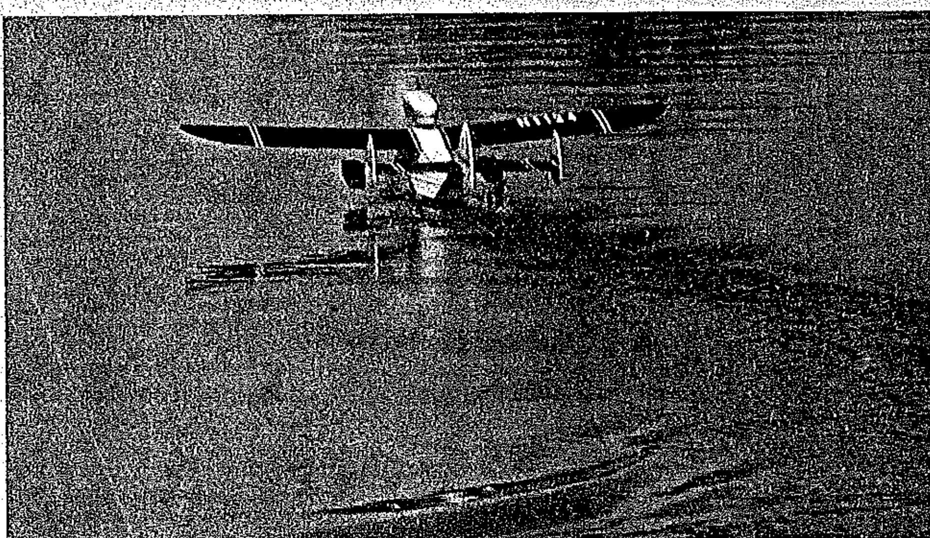
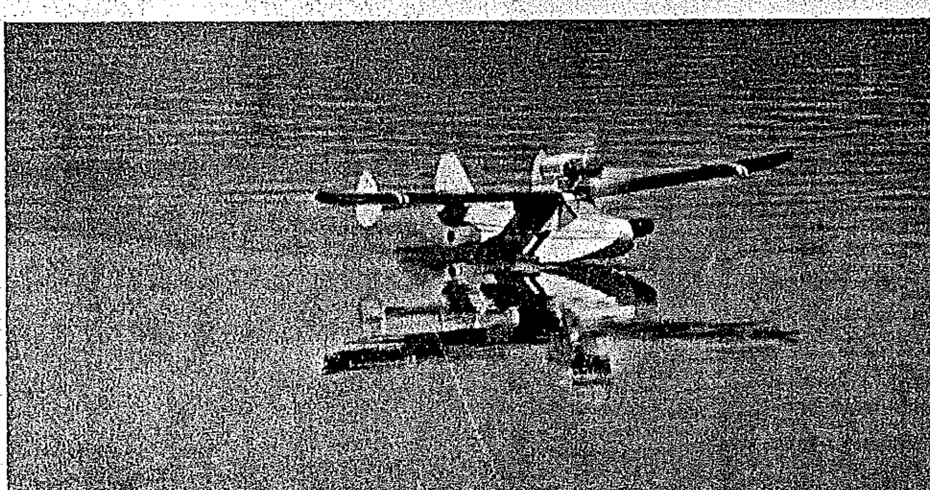






DRAKE II

Ken Willard

Benny Howard's DGA (Damn Good Airplane) applies to all of Ken's designs. They perform very well. This .15-powered flying boat adds a new feather to his cap. Fly it off land, too, with detachable wheel gear.

SOME 28 years ago I designed a free-flight flying boat named the Drake. Bill Winter was the editor of Model Airplane News at the time, and bought the design for publication. It was one of the most popular designs of the time. (Editor's Note: Top on the plans list for years.) Bill even got a letter from a reader telling how his flew out of sight over the Atlantic, and three weeks later was returned by a fisherman who found it floating some 50 miles offshore!

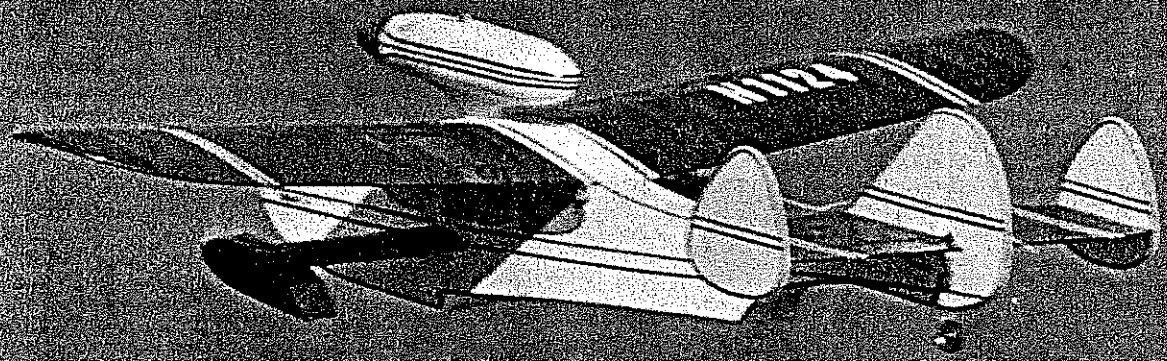
Recently, I received a letter from Bill, asking if I would be interested in making an updated version of the Drake (it was a ½A design) with radio control and a .15 engine up front.

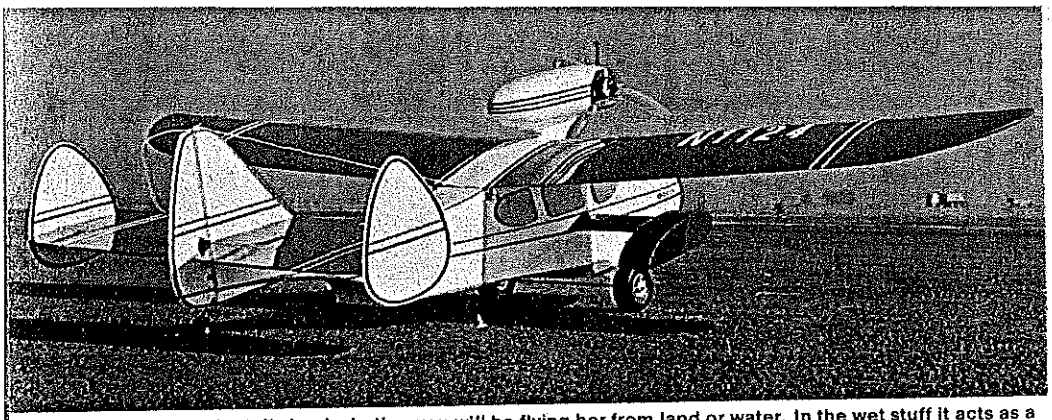
Sounded like a good idea, so I agreed. Should be simple enough. Move the step back under the center of gravity, since elevator control was available (the free flight had the step forward of the C.G. so it wouldn't "plow and porpoise" on takeoff). Also, for greater simplicity of rudder control linkage, I added a center fin and rudder, leaving the tip fins as they were on the free flight. The resulting triple tail brought various comments from modelers as to whether it was inspired by the old Boeing 314 Flying Boat, or the Lockheed Constellation, or the Bellanca Cruiser. None of them. It was "inspired" by the ease of operating the rudder.

A four-foot span seemed about right for a .15-powered version, so I enlarged the plans accordingly, made the changes mentioned, and built the model. It looked great.

The first flight was made with the removable landing gear at-

The weather in Washington, when these captions were written, was an even 100 degrees. If you think that the sight of all the water in these pictures—and the neat views of the Drake II—doesn't make us long to be doing something else, you've got another think coming!





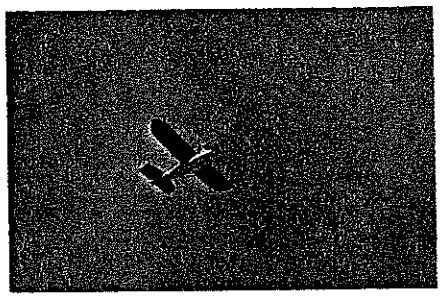
Put on the tailwheel whether you will be flying her from land or water. In the wet stuff it acts as a water rudder. If you don't plan to fly from land, you could substitute sheet aluminum.

Willard calls 'em 'sploats' because they're not wing tip floats, nor are they really sponsons. But he had to lengthen their spread from 15 in. (shown here) to 24 in. That gave enough leverage.

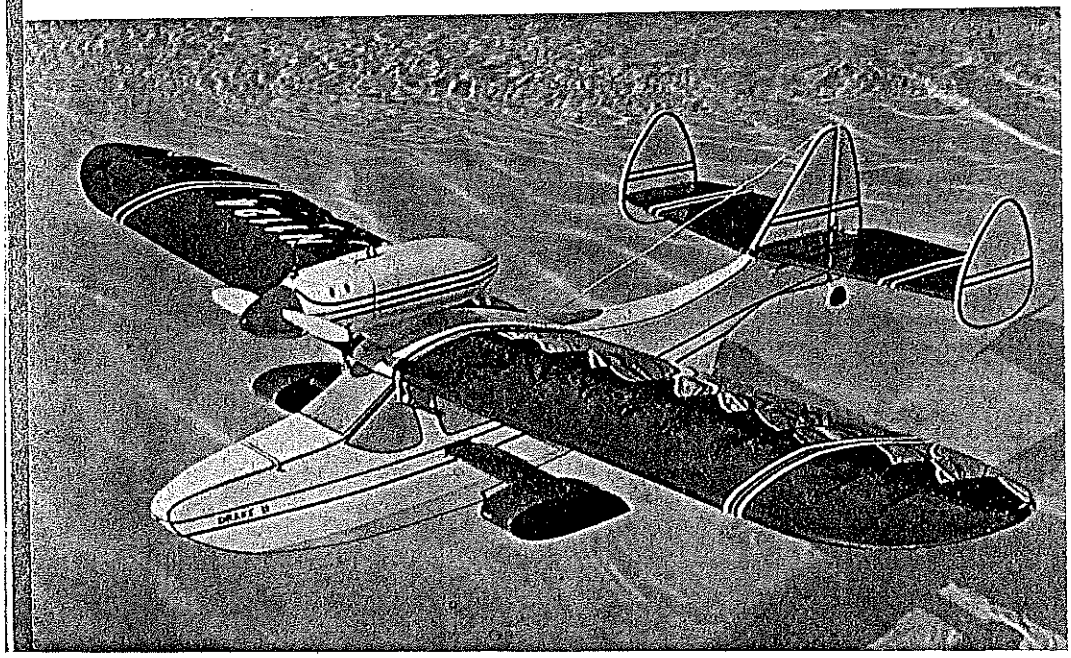
tached. That flight was fine—but almost a free flight. The triple fins made it so directionally stable that the rudder was barely able to make the model turn. So, I took it home, enlarged the rudder and put it to maximum travel.

The Max .15 that I used for power was the same engine I had on my Honcho Gasser when I won the Intermediate Class championship in aerobatics at the 1959 Nats! And the engine was two years old even then. But that 22-year-old Max is one of the smoothest operating engines ever built; with an 8-inch diameter, 4-inch pitch prop it revs up to 12,000, and idles down, reliably, to 3000 rpm—better than today's versions.

Since the idle was so reliable, I ran it in the swimming pool to check flotation and water



That triple tail gives Drake II a special air—something like the old Boeing 314 Flying Boat, Lockheed Constellation, or Bellanca Cruiser. Truly, middle fin simply for easy rudder operation.



handling. It looked great. So, out to the lake to fly it off water.

You'd think by now that I could take the test flights of a new design—even a new version of an old design—in stride. Nope. I still get nervous. Item; I have a retrieval boat, seven feet long and three and a half feet wide. It's plastic, light, very maneuverable—if you remember to take two oars with you. I only took one! Another example comes up a bit later.

There was a slight breeze blowing, making a nice ripple on the water. With my friends Jim Wade and Ilan Kroo helping, we fired up the Max .15, set the Drake II in the water and started to taxi out. Right then I knew it needed further modification. As it turned crosswind, the downwind wing tip went into the water. The "sploats" didn't provide enough flotation. I call them sploats because they're not wing-tip floats, nor are they really sponsons, so that's where the hybrid name comes from.

It was at this time that I remembered that when flying free flight flying boats, you don't have engine control, so the takeoff is made by holding the model headed into the wind, or slightly quartering to the wind to the right so that as it moves forward it turns into the wind and takes off.

Anyway, I finally got it into that position—quartering into the wind—and gave it throttle. It took off, but when it left the water it had already turned slightly crosswind to the left (the rudder was still not effective enough) and the wind got under the right wing and dumped the Drake II into the drink. Blast!

Ilan is an accomplished canoeist, so, with one oar, he got out to the model and retrieved it. The only damage was a broken arm on the left sploat, but the radio got wet.

Several times I've been asked why I don't recommend flying off salt water. The reason is simple; if you don't have your radio fully encapsulated so it won't get wet, salt water will ruin it. Fresh water will temporarily short it out, but if you get to it fast and blow it dry, then let it sit in the sun, you usually can get it back in operation in about an hour or so. And that's what we did.

While the radio was drying out we repaired the broken arm with Hot Stuff. We didn't have any microballoons or baking soda, so we used plain old dusty dirt! It worked, too.

Finally, everything was ready for try number two. We were going to hand launch, since we knew it couldn't handle a cross wind, but the wind died down, so another takeoff seemed worth trying. The engine had been dried out, and ran fine. Ilan put the Drake II in the water, and it taxied out nicely. There was no wind, so I guided it out near the center of the lake, when suddenly the engine went to full throttle, the model took off, turned left, and dumped into the drink again. Blast!

As I said earlier, you'd think I wouldn't get nervous. No? Well, all I can tell you is that radio range is reduced considerably, particularly on the surface, when you forget to extend the transmitter antenna!

So, once again, the drying out, and another try, since it was still calm. The third time was the charm, as the saying goes. The Drake II took off and had a fine flight. We didn't press our luck any further. Just went home.

Once back in the shop, I modified the sploats, extending them out from 15 inches overall to 24 inches (12 inches out on each side from the center line). I even thought about giving up the design concept and going to tip floats, but this looked like it might do the job and still keep the unusual configuration.

It did. A few days later we again went out, and had several successful test flights. Water handling

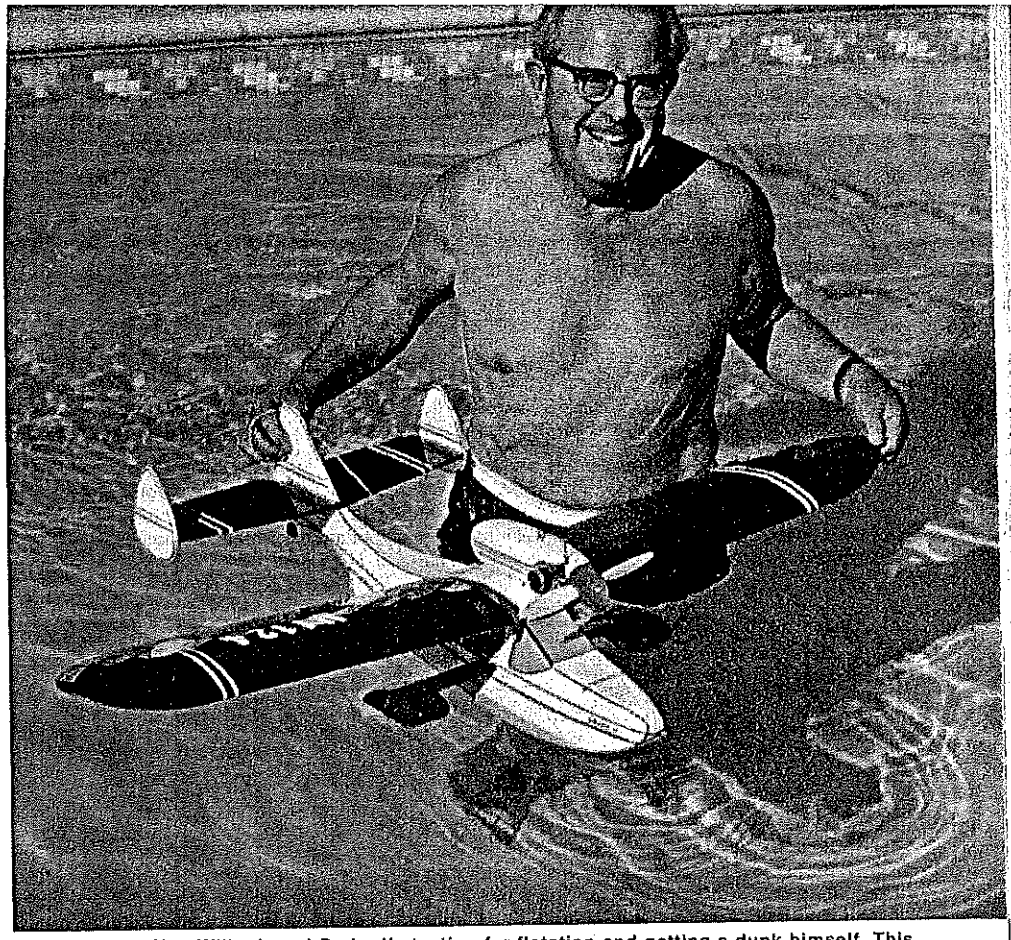
was good, and the air control fine. I was satisfied. But let me say this; if, by any chance you don't care for the long sploats installed on the hull, you can rig up wing-tip floats if you prefer. I just wanted to maintain the original Drake concept as nearly as possible, and still have a good RC water control. The Drake II does just that.

So, let's get on with the construction. It's not hard, but it is tedious in some spots. And, because of some of the angles involved, it will take some cutting and fitting to make all the joints nice and tight. Take your time, study the plans and photos, and I think you'll be able to figure it out. As usual, some of you will undoubtedly come up with better methods of getting it all together, and that's great. Just don't be bashful; write and tell us what you did.

Hull: This is a fairly standard construction except for one thing; the sides slant up from the bottom to the top, so you have to be careful and sand the edges at an angle so they fit snugly to the top and bottom sheeting. A block sander does the job very well. The basic bulkheads are shown without the cutouts which are required for routing wires and control rods, since you may not use the same arrangement as I did. Note the grain direction of the balsa on the top and bottom sheeting. It adds a lot of strength to the structure.

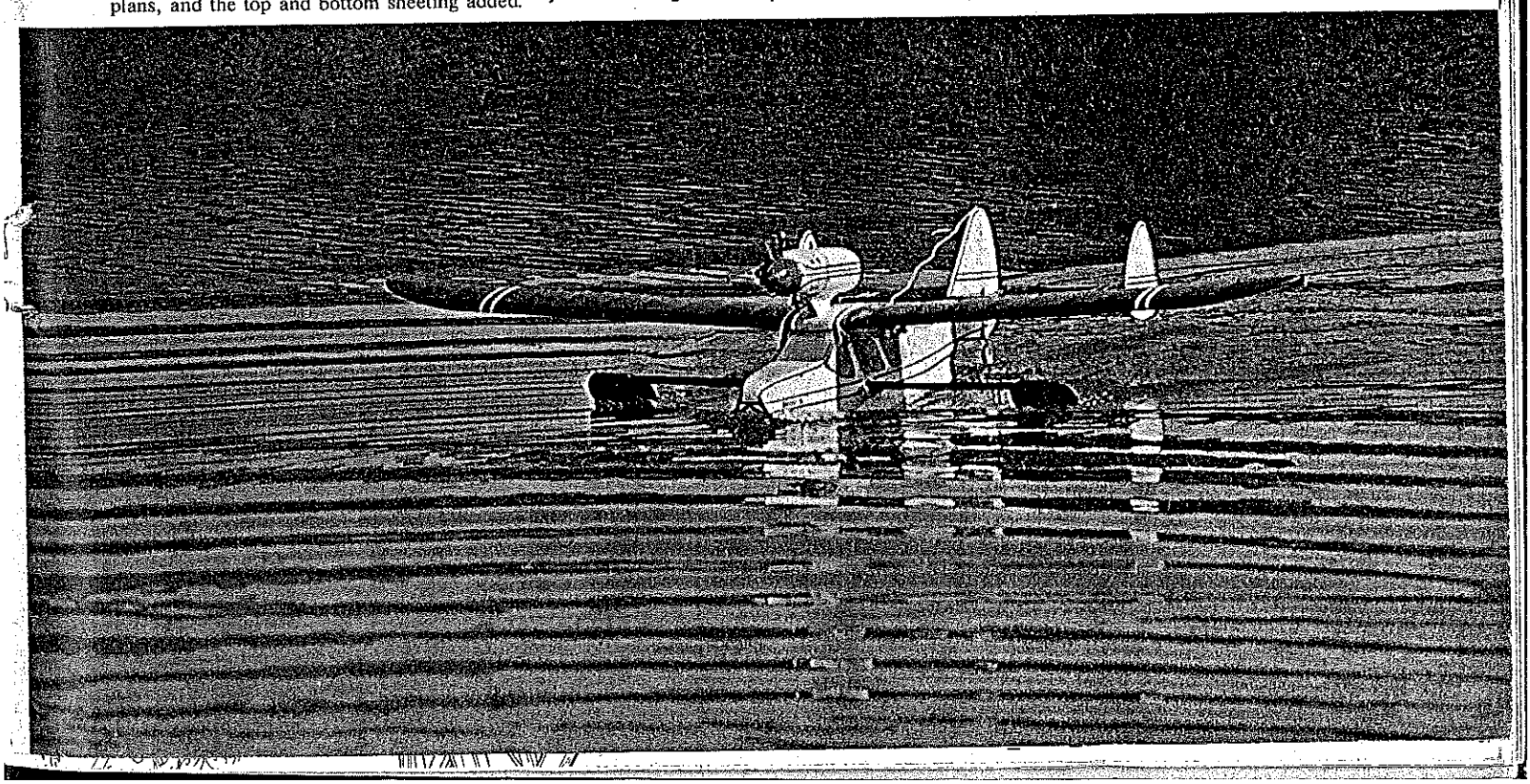
Wing: This should present no problem, unless the wing tips bother you. The shaped sections slant upward from the last full rib to the tip, and the bottom spar is cracked at the last full rib and also slanted up to meet the top spar at the tip. What this does, in effect, is to give a slight effect of polyhedral; the dihedral braces provide 3° of dihedral, and the upswept tips make it effectively just a bit more, and this gives good turning characteristics using only rudder. Now, if any of you prefer to use ailerons, fine. But I'd suggest that if you do, reduce the main dihedral angle to only one degree.

Sploats: These consist of a main structural arm which goes through the hull, to which is added a shaped leading and trailing edge, and floats are attached to the end. The arm is cut from ¼-in. plywood (preferably marine plywood) which is ⅞" wide and 24 inches long. The sides of the sploats are glued to the arm, as shown in the plans, and the top and bottom sheeting added. The high angle of attack of the arm and the sploats keeps them from digging in on takeoff.

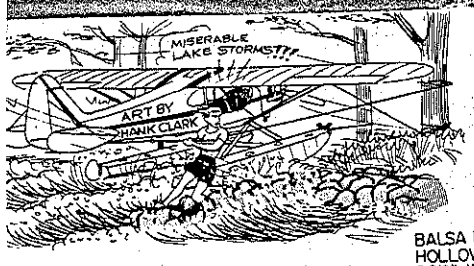


The designer, Ken Willard, and Drake II—testing for flotation and getting a dunk himself. This photo by Kaye Willard; others by the author and Jim Wade.

Empennage: The stabilizer is built up with ¼" balsa stock. You may observe that the stab seems large—and it is. The reason is that the free flight model needed the comparatively large stab for stability, and, in blowing up the plans, I maintained the same relative size to the wing. There is also an advantage here; the model is not too sensitive to the location of the C.G. It can vary as much as ½ inch back from where it is shown on the plans and the model will still fly well. In fact, if placed a bit further back, although it does increase the sensitivity to elevator, it improves the water handling by reducing the tendency to



So peaceful looking. Willard covered his entirely with MonoKote; it's waterproof. Lap seams at least ¼ in. Good fit required for hatch and wing/cabin mating. Seal hatch with Vaseline, wing/cabin joint with wing saddle tape. Rubberbands will press-fit wing to tape to keep water out.



FUEL TANK LINES THRU SLOT

1/4" BALSA TOP & BOTTOM JOINS 1/8" BALSA SIDES WITH TRIANGLE STOCK

SOLID BALSA HOLLOWED OUT

1/16" SHEET BALSA FINS (2)

3/16" BALSA SHEET FIN AND RUDDER

1/4" BALSA RIBS AND LEADING EDGE AND SPAR

1/8" PLYWOOD BRACE ACROSS ELEVATORS

SIG 2" TAPERED AILERON STOCK FOR ELEVATORS (ONE PIECE)

1/4" BALSA NACELLE MOUNTS

1/4" BALSA PYLON DOUBLER

BALSA BLOCK HOLLOWED AS COWLING

MAX .15 ENGINE ON 1/4" PLYWOOD MOUNT-ONE PIECE PYLON

ENGINE SERVO IN PYLON BASE

FLEX RODS TO RUDDER & ELEVATOR

TAIL BULKHEAD

3/32" PLYWOOD SPAR BRACES

1/4" X 3/8" BALSA WING CRADLE AT TOP

W.L.

TAIL WHEEL ON 3/32" WIRE INTO RUDDER

3/16" DORSAL

3/32" BALSA SHEET TOP AND BOTTOM FUSELAGE

1/16" BALSA SHEET CENTER SECTION OVER FOUR RIBS

1/4" HOLD DOWN DOWEL ON 1/8" BALSA BULKHEAD

3/32" BALSA RIBS

1/4" DOWEL ON FRONT 1/4" X 3/8" WING CRADLE

1/4" X 3/8" TOP AND BOTTOM SPARS

1/4" X 3/4" BALSA T.E. STOCK

HATCH HOLD DOWN PINS

1/4" SQ. EDGE FRAMES

DUBRO HATCH LATCH ASSEMBLY

SHAPED BALSA SPAR T.E.

1/4" SHEET BALSA FORMED WING TIPS

1/16" SHEET BALSA FLOAT SIDES, TOP, BOTTOM

1/2" SQ. BALSA LEADING EDGE

1/4" SQ. FUSELAGE BRACES (4)

1/4" X 7/8" X 24" PLYWOOD FLOAT SPAR THRU SPAR

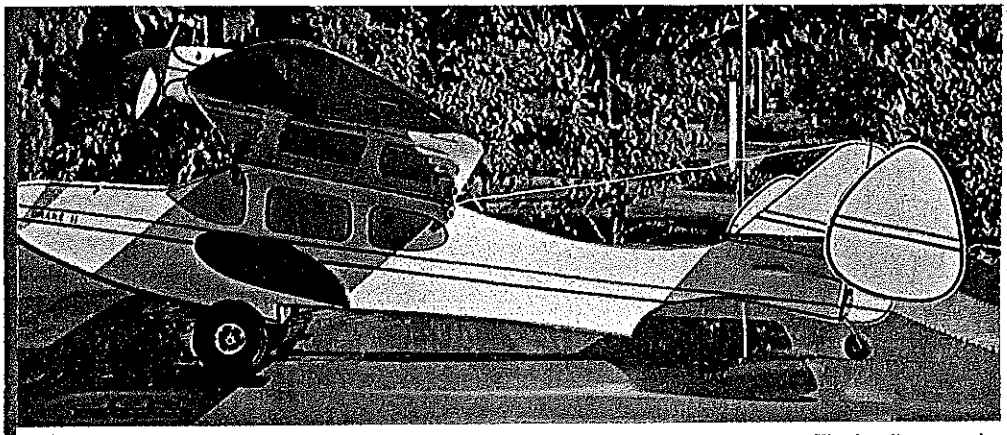
3/32" SHEET BALSA HULL SIDES ENTIRE LENGTH

SHEET ALUMINUM REMOVABLE LAND GEAR LEGS

1/4" BALSA SPAR L.EDGE

2 1/4" WHEELS ON WIRE ACROSS

SOLID BALSA NOSE BLOCK



Gosh, that profile! It has all the romance of those flying boats of yesteryear. The landing gear is optional. Landlubbers can have fun with the Drake, too. Gear held on with servo tape.

plow when taxiing in displacement mode, and the tail wheel, which serves as a water rudder, is slightly lower in the water and makes steering better. However, the difference is small, and I prefer the slightly forward location of the C.G. for smoother flight.

The center fin and rudder are cut from 3/16 balsa. The elevators are made from 2-in. aileron stock, with the forward edge cut at an angle to accommodate the Monokote hinge when down elevator is applied.

Tip fins are cut from 1/16 balsa sheet.

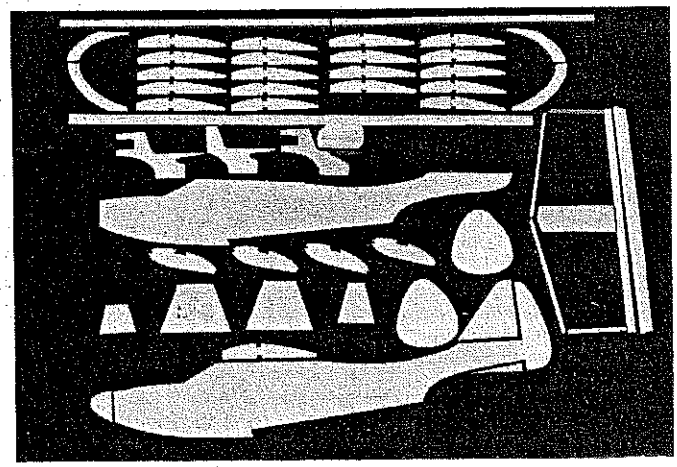
Engine Pylon and Tank Housing: This is the most tedious part of building. The principal strength member is comprised of two pieces of ⅛ plywood which are epoxied together to make a ¼ thick pylon mount. Alternatively, if your saw will handle it, you could make the unit out of one piece of ¼ plywood.

A fairing piece of ¼ balsa is then epoxied to the right side of the pylon; note that it does not extend forward of the rear alignment of the engine crankcase.

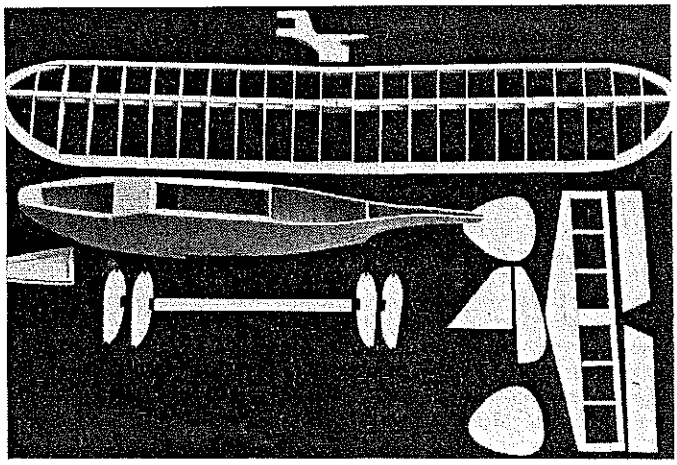
The spear-like extension on the rear of the pylon provides an aligning surface for the tank housing.

The tank housing can be made in several ways. I used the built-up balsa construction method shown in the plans, but if you have a Formicator, you could just as easily make a plastic housing to fit the tank of your choice. The Sullivan tank shown holds four ounces, enough for about ten minutes of flight, which is as much as I want.

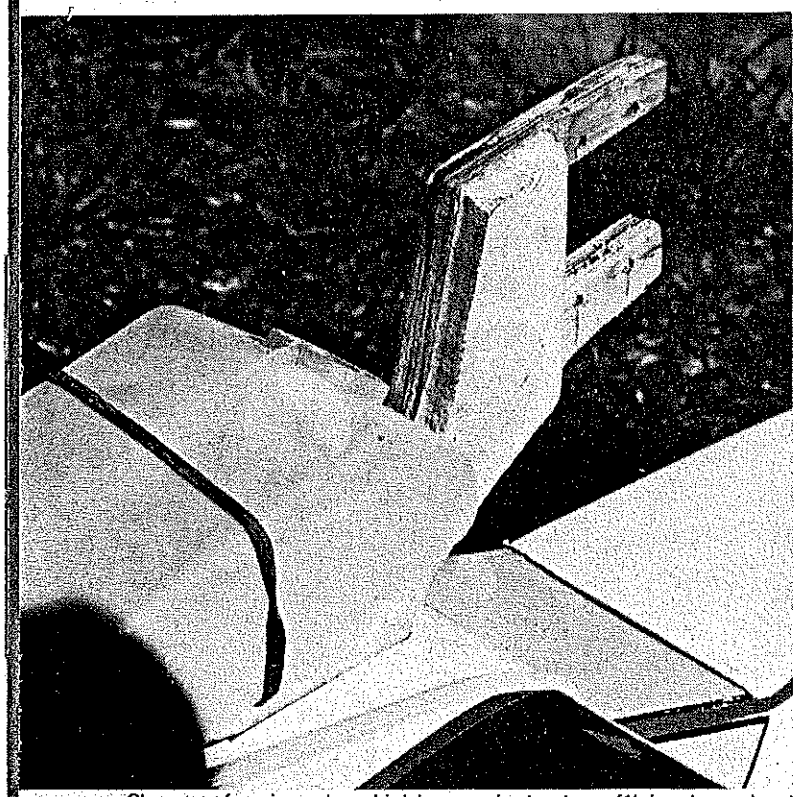
Note how the pylon is epoxied into the center section of the wing, which is then sheeted over on both top and bottom. If you are a purist, you

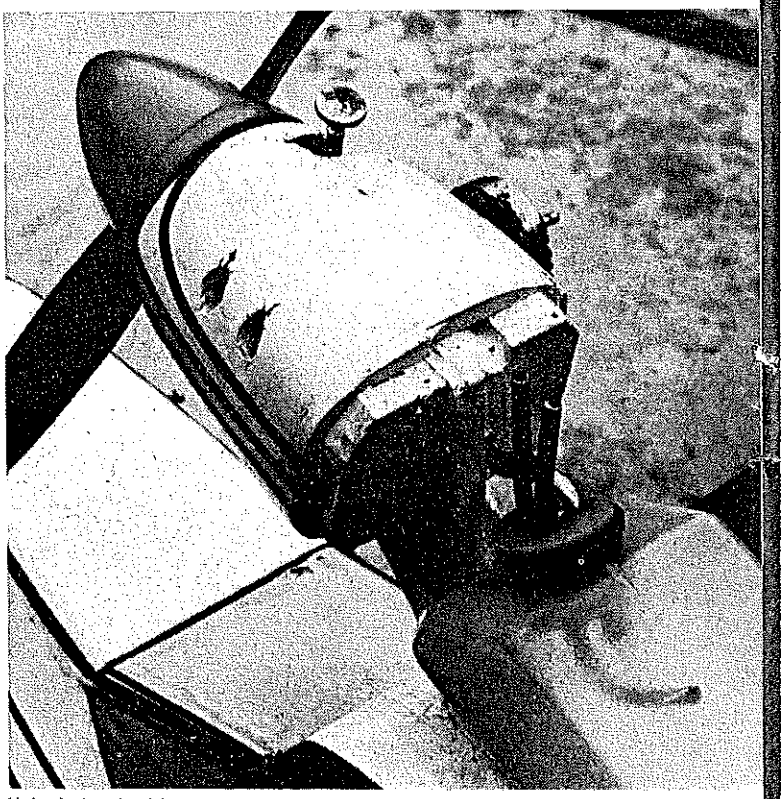


Cut out and line up the parts like this, and building the Drake is a snap. Note, however, that the stabilizer parts have been changed.



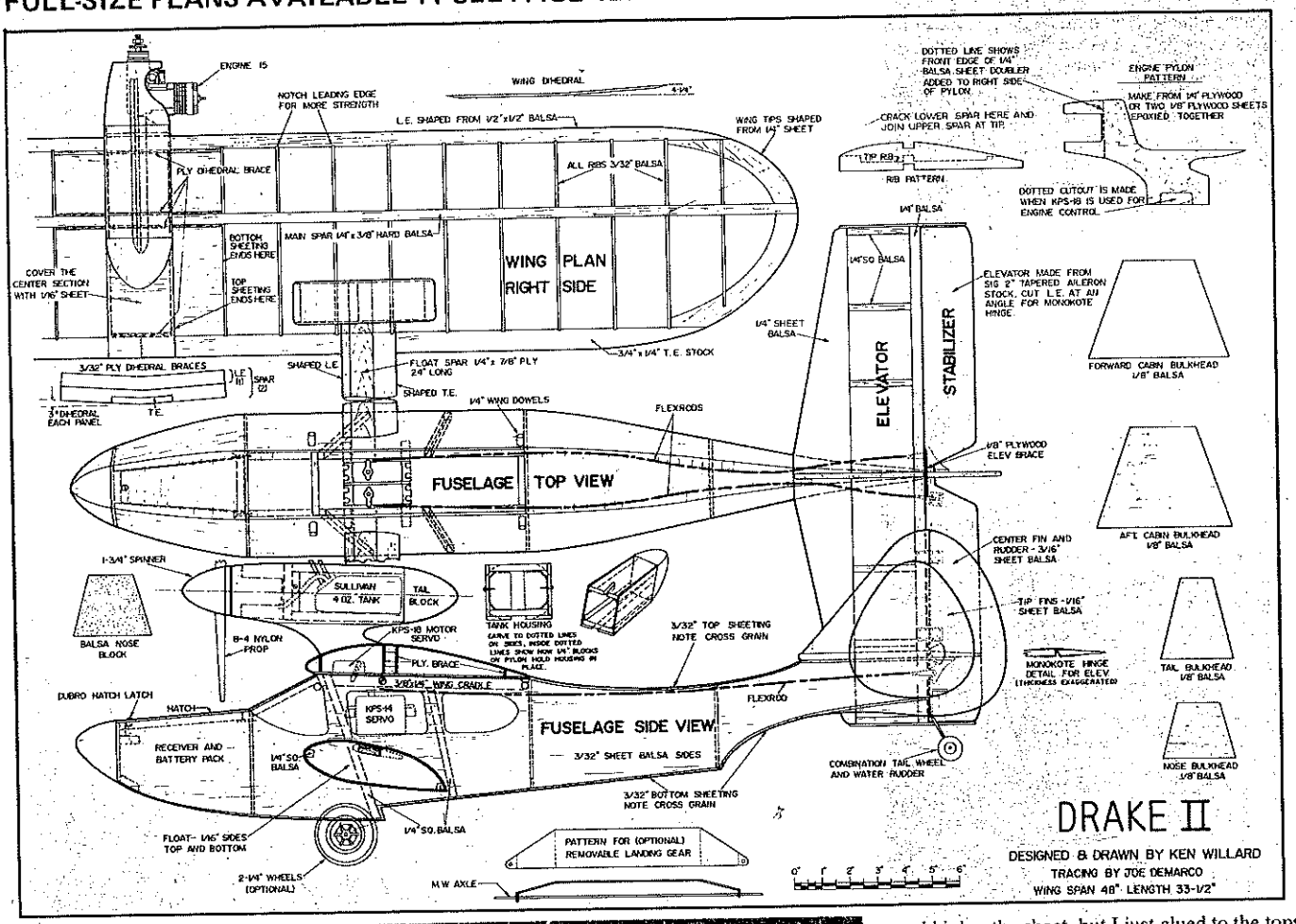
Parts are pretty well assembled in this view. "Sploat" bar (near side of hull) was lengthened to 24 in. for improved water stability.

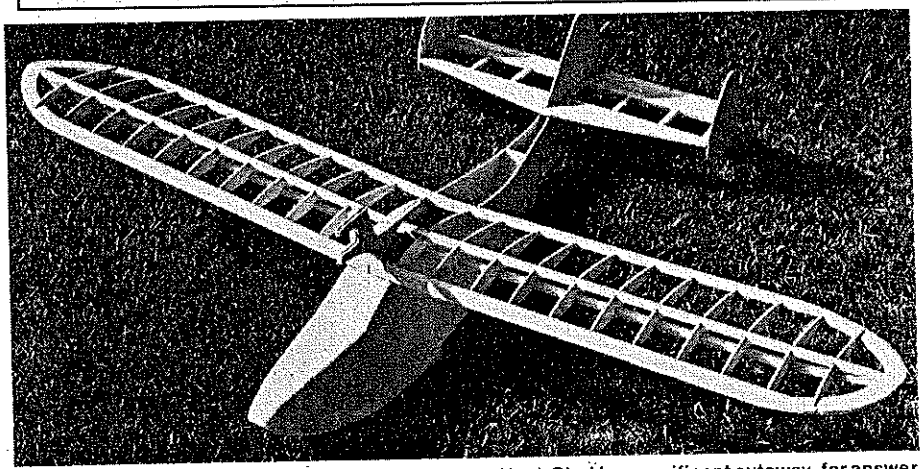




Close-up of engine pylon which has a main structure of ¼-in. plywood and a ¼-in. balsa doubler on the right side. Tank housing blocks not yet in place in left picture. With the engine cowling and prop spinner in place, in right pic, the Drake's beauty begins to unfold. Uses "tame" .15 engine.

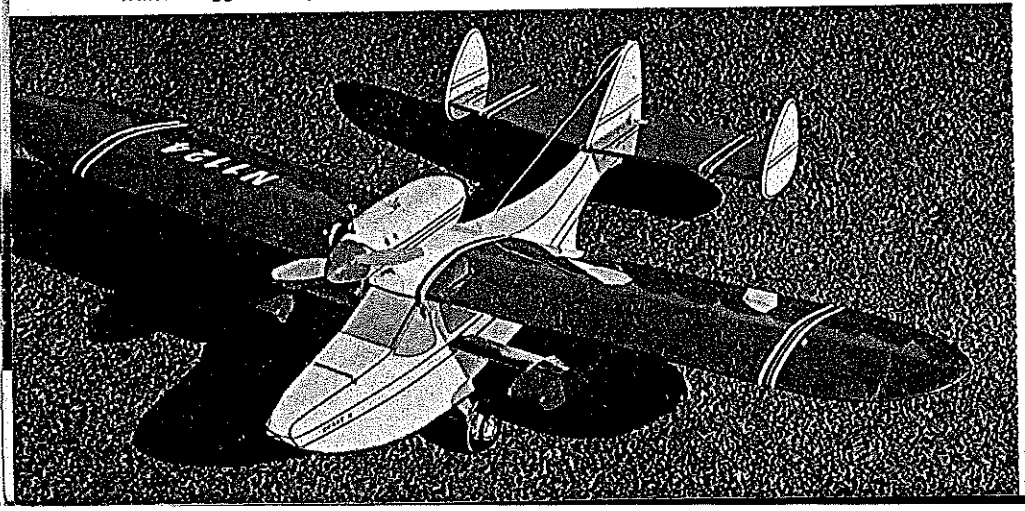
FULL-SIZE PLANS AVAILABLE . . SEE PAGE 128





Take a good look at this "bare bones" view, and also Hank Clark's magnificent cutaway, for answer to most any question about how the Drake II goes together. Hull sheeting is 3/32-in. balsa.

From a runway (using the detachable gear) is okay. From fresh water (no wheels) is okay. But Willard suggests staying away from salt water, as a dunking may ruin the radio if not fully sealed.



could inlay the sheet, but I just glued to the tops of the ribs and then faired the edges down. The Monokote covering stretches over the joint very neatly.

Landing Gear: This is optional—except for the tail wheel, but it is fun to fly off a runway, too, and the gear is simply attached using servo tape, so it can be removed easily. If you cover the hull with Monokote, as I did, you must use care in removing the gear, since it will pull the Monokote away from the bottom unless you slit the tape, and then roll the residue off. In the event you don't want to fly off land, you could use a simple piece of sheet aluminum in lieu of the tail wheel for a water rudder.

Radio Installation: The Drake II is roomy enough to accommodate almost any of the available receiver and servo units, so it is largely a matter of fitting your units into the hull. Since I had a couple of KPS-14s and a KPS 18 which were not in use at the time, I installed them as shown in the plans. I used the flexrods for control, since they can be routed easily, and the hole where they exit the side of the hull can be closed and made water resistant by filling with epoxy.

Rigging up the engine control will require some ingenuity on your part. I've shown how I connected the KPS-18 to the rotating exhaust baffle on my old Max .15, but you'll have to run the control cable to the arm on the carburetor if you use the newer .15s.

Covering and Waterproofing: I covered my Drake II entirely with Monokote. It is waterproof, and if you overlap all the seams by at least one quarter of an inch, you can totally encapsulate the surfaces except for the required openings

Continued on page 124

where the Model 2 received its current registration, NC11Y.

Transcontinental and Western Air, Inc. obtained NC11Y from NAT on November 27, 1931. The Alpha Model 2 carried loads of cargo for TWA until February 1932, when she was flown to the Stearman plant at Wichita for modifications over to the Model 4A specifications. A total of 1,826:38 flying hours had been accumulated by NC11Y by this time. As a Model 4A, NC11Y shared in TWA's 24-hour coast-to-coast service and shared in the mishaps, also. The first incident was at Columbus, OH, on March 1, 1932, when a bent streamline wheel fairing resulted from mud collecting in it and freezing. NC11Y suffered several delays due to tire blowouts, plus hitting obstructions at airports when boundary lights had been moved without notification to the Alpha pilots. TWA pilot Ted Hereford was flying Number 12 (TWA's assigned fleet number for NC11Y) on March 15, 1933, when he collided with a bird. The departed feathered creature caused a six-inch deep, 18-inch-wide dent in the leading edge of the wing.

NC11Y would feel the hands of fame on February 21, 1933, as Col. Charles A. Lindbergh took command of her cockpit. Lindbergh, who was serving as Technical Advisor for TWA, departed Newark, NJ, air terminal at 10:30 a.m., stopping at North Beach Airport, NY, to pick up Ernest R. Breech, president of General Aviation Mfg. Corp. Landing at Baltimore, Lindbergh and Breech made an inspection of the single-engine General GA-43 aircraft, after which the Alpha 4A and the "Lone Eagle" would return to Newark at 5:35 p.m.

Number 12 represented TWA until April 26, 1935, when she was sold to Frederick B. Lee of New York. Lee outfitted NC11Y with floats, hoping to fly the Alpha around the world, a dream that was never fulfilled. The Model 4A was converted back to a land-plane, and in August 1937, another New Yorker, Harry Spaulding, bought NC11Y, only to sell the craft to Richard E. Connely of Ridgefield, CT, in December 1937. Passing through several owners, the Alpha would be acquired in May 1946 by Foster Hannaford, Jr., of Winnetka, IL. Hannaford would search the country for Alpha airframes and accessories with the purpose of preserving this remarkable aircraft for posterity. However, he passed away in 1971, and NC11Y, with part of a sister Alpha, was bequeathed to the Experimental Aircraft Association in Hales Corners, WI.

EAA stored the Alpha assemblage at Burlington, WI, and in the fall of 1974, a trade for the Model 4A to the NASM for their North American XP-51 Apache was arranged. The Smithsonian contacted Trans-World Airlines to determine if the Alpha could be saved and made presentable for the July 4, 1976 bicentennial dedication of the National Air and Space Museum.

Alpha Project was set in motion by TWA volunteers in March 1975. The Alpha collection was gathered from EAA's storage barn and transported to the TWA Technical Services Center at Kansas City, MO. A restoration project of such magnitude would normally require two or three years, yet volunteer TWAers logged more than 3,500 total man-hours and completed the job in eight months.

The TWA Stearman-Northrop Alpha 4A was unveiled in public ceremonies at TWA's giant 747 hangar, Kansas City, on January 26, 1976, and then the gleaming gem was presented to the National Air and Space Museum on February 2, 1976, as a gift to aviation history in celebration of TWA's Golden Anniversary and the U.S. Bicentennial.

Safety/Preston

Continued from page 69

and on the way back after a flight. Check them when you walk the lines for kinks and on the way back again. . . . One last check to make is a pull test. Each plane and each set of lines should be pulled once a day. Just give a good pull on the handle while someone holds the plane. If you're going to pull the guts out of it, it might as well be on the ground."

We would like to draw attention to the pull test chart which can be found in the current AMA rule book on page 15. If beginners feel that the forces specified in this chart appear to be excessive, we would ask you to watch the film footage on two multi-engine Scale CL models in the AMA film, *Modeling's Grand Illusions.* The angle at which the fliers have to lean to restrain their models is a most graphic example of the forces that can be generated in the lines.

To wind up the discussion of CL safety, we have some suggestions on engine mounting from Doug Dahlke of Oshkosh, WI. Doug sent us a sketch of a stunt model with profile fuselage which showed how the engine bearers were continued rearwards to terminate above and below the wing. Doug calls this approach "profile proof" and states, "This is the single most important thing you can do to a profile to improve engine run and safety together." Apparently, there are profile kits on the market in which the bearers terminate some distance ahead of the wing, creating a weakness that could lead to the engine parting company from the fuselage.

One final note before signing off for this month. In our last safety column we stated that, despite some stories that are going around in modeling circles, gasoline does not dissolve either Sullivan or Kraft fuel tanks. During this last month, we have heard that Byron Originals has issued a bulletin advising against the use of gasoline in the Sullivan tank that has apparently been supplied with their kits. Despite their advice, we have no evidence to change our previous position.

John Preston, 7012 Elvira Court, Falls Church, VA 22042.

Drake/Willard

Continued from page 68

for access. Those openings—the hatch hole and the wing area—must be sealed carefully. To seal the hatch, tailor the hull structure to fit the hatch structure so it is almost a press fit. Then, when you fly off water, run vaseline along the edges so it oozes out when you insert the hatch. For added

safety, encase the receiver in a plastic bag, and do the same with the battery pack.

Use wing saddle tape to seal the wing opening. The rubberband retainers will press fit the wing to the tape and keep water out except if you dunk the model and the wing shifts.

The odds are that you will dunk the model sooner or later. Therefore, be prepared for it. Coat the entire inside of the hull with several coats of dope.

Note that no switch mounting is shown. Instead, the hatch is readily removable when you use the Du-Bro Hatch Latch, so you merely coat the edges with vaseline, turn the switch on, latch the hatch in place, and fly, leaving the switch inside the hull.

Flying: The Drake II is really very docile in the air, and is flown just like any other sport model. There are a couple of things to remember in water handling, though. First, don't try to taxi too fast as you maneuver. The engine is up there on a pylon and will tend to push the nose down into the water, so always keep the elevators up when taxiing. When you get crosswind, the fins make the model want to weathervane into the wind, and you may have to give a slight burst on the throttle to get it headed downwind. Then, as you turn into the wind for takeoff, apply throttle gradually, with full up elevator. The model will plow slightly, then come up on the step. At that time, neutralize the elevators, keep the wings level by using the rudder as needed. A slight back pressure, and the takeoff run is done and the model is airborne. Incidentally, if you use full throttle, it all happens pretty fast.

The Drake II is sufficiently unorthodox as to attract a lot of attention just sitting on the dock, or runway. But when it taxis out and takes off, it's as conventional in performance as any trainer or sport model. If anything, with a good .15, it's a bit overpowered—but that seems to be the way most modelers like to have it.

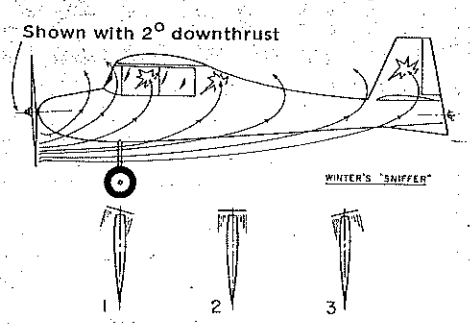
So build it, enjoy it—and tell us about your experiences.

For Fun/Winter

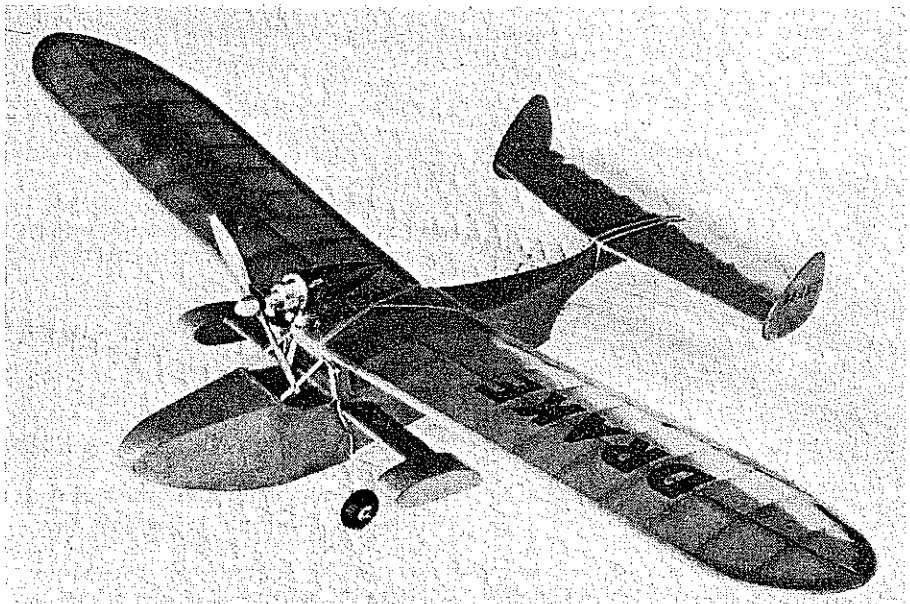
Continued from page 13

bisecting the fin/rudder to yield straight flight? But add high cabin area, and it wouldn't have worked. So where is the thrust line—high or low, at what angle? Twenty years ago we couldn't help Dick Korda determine why his Powerhouse FF wouldn't turn left on power. Neither would Denny Davis' championship FFs. If they faded left—curtains! If Dick had added left thrust, he must have cracked up. So maybe this diagram is the answer—it is the answer on our Sniffer.

Incidentally, the Sniffer has two degrees down. We note this helps establish a faster level flight cruise as does the thickness of the lifting stab. In



Why our Sniffer turns right on power (watch out!) with straight thrust, and goes almost straight with right thrust. Aside to engineer critics: this stuff ain't in textbooks. Only model builders defy Mother Nature—or do they really? See text for deep-stuff guesswork.



This is the original Drake, designed in 1951, forebearer of this month's featured design. It was a ½A Free Flight, with K&B .049 engine and 36-in. wingspan—very popular at the time.