A-HOY

Chuck set some design goals for his flying boat and ended up with a winner. The A-Hoy can do just about any maneuver you ask including knife-edge flight. Add this to your stable of aircraft and you won't be sorry.

Flying radio controlled models from water is fun. It does present a different set of problems than flying from land. Solving these problems is part of the fun. I first started water flying by equipping my Hooker design with floats. The Hooker is a very gentle landing aircraft so it was a natural to equip with floats. At the same time I built a pair of foam floats for my Powerhouse Old Timer. Talk about getting off of the water easy, just bounce and into the air, but getting back down again is a different problem. Ever try and shoot touch and goes with an old timer that is designed for climb? Kinda tough. Full down elevator to aim at the water, then let off at just the right time. Too early and the aircraft climbs out again, too late, and you've stuck it into the drink. The Hooker was fun to fly on floats, but one day I was flying, the wind was about fifteen mph, and the lake reasonably choppy. I shot a touch and go, just a bit cross wind to the wave pattern, snagged a float and did the quickest water loop you ever saw. Result — the tail end of the Hooker parted company from the rest of the aircraft. I'd been thinking about building a flying boat, and that convinced me that it was time to do so. Thus, the A-Hoy was born.

I wanted a reasonably large aircraft, powered by a .61 engine, and with good wing area. I wanted it to be acrobatic to fly, allowing the pilot to do something more than just shoot touch and goes. I wanted it to be rugged to take the banging around that happens on the rocks and broken obstacles found along most lake shores. I wanted it to be easy to build and maintain and, above all, I wanted it to be fun to fly. The A-Hoy does all of the above.

When I set about designing the A-Hoy I used the basic premise that the hull would be simply a large float. The design on the hull would be exactly the same as the foam floats that I had been using for a couple of years. I looked back through past issues of RCM and other magazines to see what other flying boats looked liked and how they were set up, and found that everyone else had used about the same idea. The finished A-Hoy looks very much like several of Ken Willard's designs, and well it should, because Ken is really the Grand Daddy of flying boat model designs.

I designed location of the wing, engine, horizontal stab and hull line to give an aircraft that would break water easily, would be aerobatic, and would land easily. The wing is fully symmetrical, and is the same airfoil that I have used ever since I developed it for the Hooker. It is 20% thick, has spars to help turbulate the air flow and operates very well through a wide speed range. The stab airfoil is the slightly lifting type that has proven to be very helpful when slowing an aircraft down for landing. The tail end of the aircraft keeps flying at very low landing speeds. The horizontal stab was placed up above the fuselage line for two reasons. First, to put it up in the engine wash. It is just about in a position in relation to the wing that it would be on a low wing pattern type aircraft. The second reason was to remove it from the water wake and try to keep it as dry as possible. The rudder is tall to keep it up in the prop wash, giving a good amount of rudder above and below the engine thrust line, preventing squirrely flying.

The force set up of all of the above worked out very well. The A-Hoy can do just about any maneuver that can be asked of it. Knife-edge flight is great, augmented by all of the hull side area. In fact, it takes very little rudder for knife-edge. If you apply full rudder up she goes in a side loop. That great big flat hull provides a good amount of lift. Landings can be floated in with the nose held high, just dropping down to kiss the water or land, as I found out on my second test flight. I had lost engine power at a point where I couldn't get back to the water. She just came in and gently touched down on the shore line.

A-Hoy is very rugged and is built to take hard knocks. Because most of the lake shores are less than clean, and because hidden hazards are always around, I recommend that you cover the bottom of the hull and the sides with lightweight fiberglass cloth and resin. A-Hoy was designed to fly on a .61, but after flying her for a season, I feel that if you wanted, you could do well with a .40. Naturally, the take-off run would be longer, but at an all-up weight of only 6 to 6.5 lbs. (mine weighs in at 6½ lbs. and a wing area of 800 square inches) it can easily be flown with a lot less power than the Speed Webra puts out. The engine pylon mount is very rugged and well-locked into the hull structure. There is plenty of room for radio equipment. I used lots of silicon seal to

A-HOY

DESIGNED BY:
Chuck Cunningham
TYPE OF AIRCRAFT
Sport Flying Boat
WINGSPAN
68 Inches
WING CHORD
12 Inches
TOTAL WING AREA
800 Sq. In.
WING LOCATION
Shoulder Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
1½ Inch
O.A. FUSELAGE LENGTH
57½ Inches
RADIO COMPARTMENT SIZE
(L) 12" x (W) 7" x (H) 3½"
STABILIZER SPAN
24 Inch
STABILIZER CHORD (inc. elev.)
8½ Inches
STABILIZER AREA
198 Sq. In.
STAB AIRFOIL SECTION
Flat Bottom
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8 Inch
VERTICAL FIN WIDTH (inc. rud.)
7½ Inches (Avg.)
REC. ENGINE SIZE
.60-.61 Cu. In.
FUEL TANK SIZE
13 Oz.
LANDING GEAR
NA
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa, Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 104 Oz.
Wing Loading ..... 18.9 Oz./Sq. Ft.

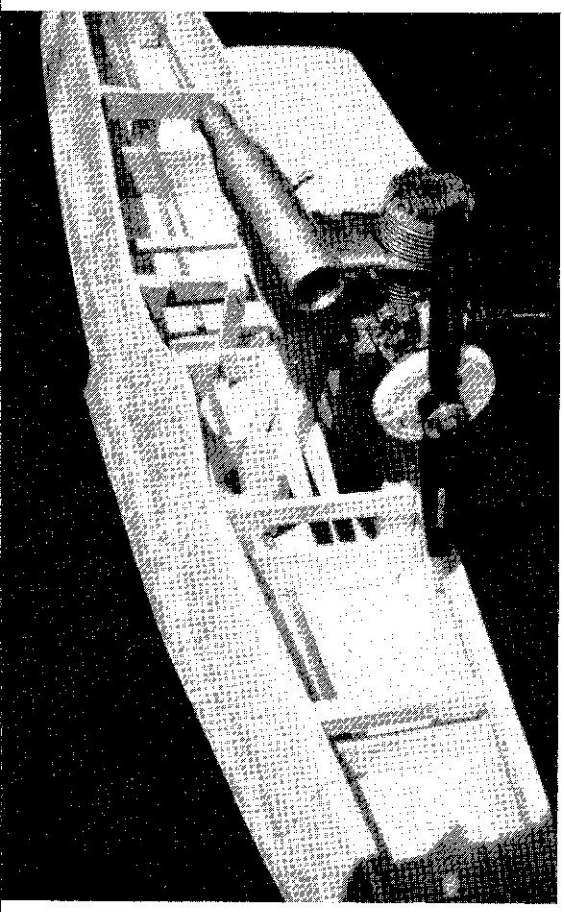
By Chuck Cunningham

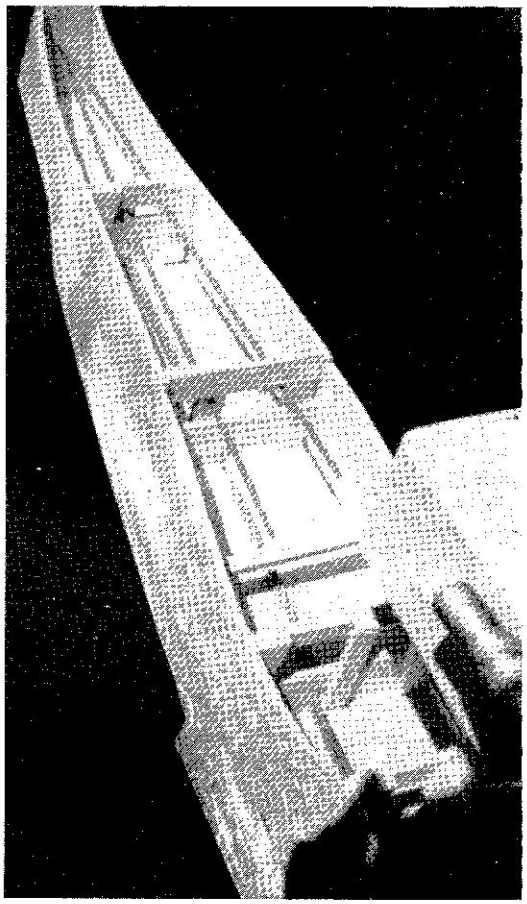
seal up the joint between the fuselage and wing, and did not trim off the excess amount that squeezed out. This gave further protection to any spray getting into this joint. I have found that the radio switch mounted on a Du-Bro fuselage switch mount works very well with the addition that I turn the switch upside down so that if any water does leak down the switch pushrod, gravity pulls it off and the switch remains high and dry.

While on the subject of keeping everything dry, I used 1/16" music wire for pushrods running through the outer covering of nyrods. A threaded link is soldered on the control surface end, and a Z-bend is made at the servo. I like this method for water flying better than standard pushrods, as no hole is left at the aft end for water to penetrate. Sure a bit of water can enter the nyrod covering, however, the movement of the aircraft once in the air will flush this moisture out. You can go a step further and pack this opening with petroleum jelly, which will let the wire rod slide, yet keep the water out.

The A-Hoy is completely covered with MonoKote. The secret to a long lived flying boat or water type model is to be sure that everything is covered and well-sealed. I always seal the hinge lines of all of my models, which is a must for smooth flying. All of the surfaces on the A-Hoy are hinged with regular size Klett hinges, then the hinge lines, both top and bottom, are

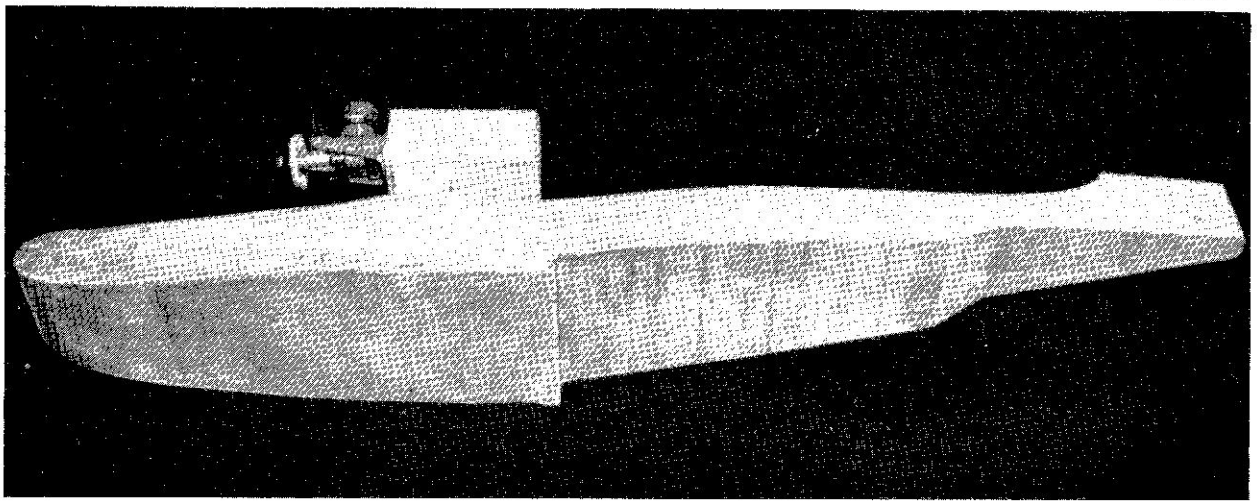
Hull is ready to close up the top. Plans show engine pod tapered at rear for improved looks.

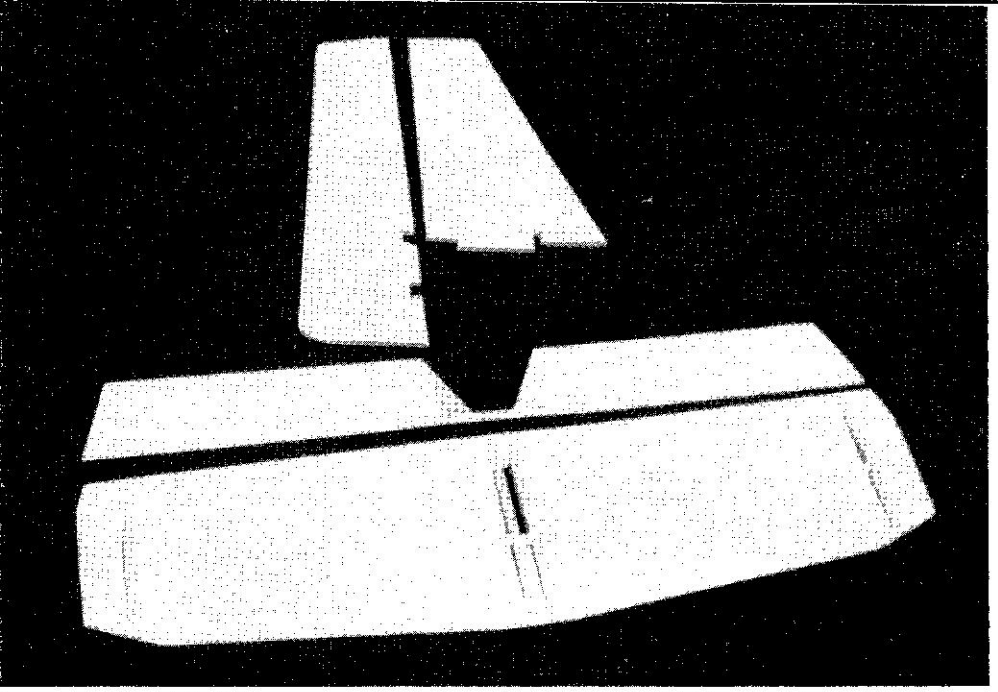




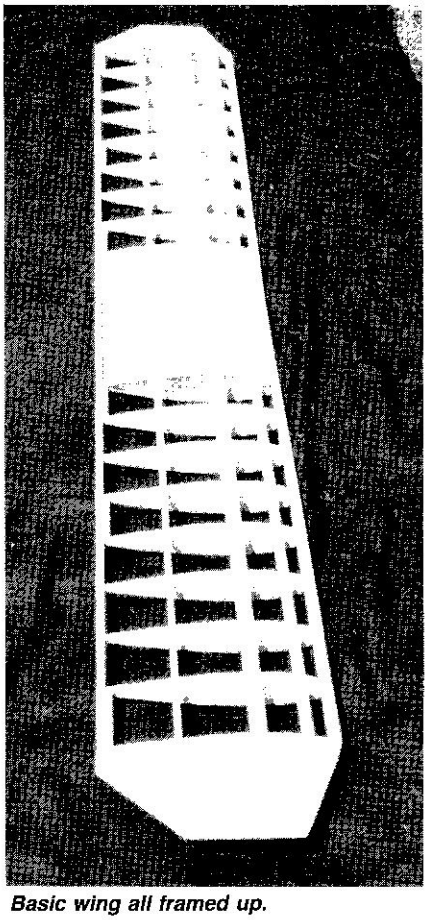
LEFT: Closeup of engine pylon mounting. Note it is tied into bottom keel. RIGHT: Aft end of hull — be sure and anchor pushrods securely.

BELOW: Bottom and sides of hull have been glassed and resined.





Completed tail group — stab has been changed to a straight leading edge per plans. Spar is one piece.



Basic wing all framed up.

sealed with 1" wide strips of MonoKote ironed on. If you have never done this, its high time that you should. Lay the strip of MonoKote on the wing trailing edge, centered on the hinge line. Iron it down to the wing trailing edge, making sure not to contact the surface of the aileron. Then flex the aileron down as far as it will go and iron the plastic strip to the flexed surface. Bring the aileron back to the level position and iron the material into the gap. Turn the wing over and do the same on the other side. Do this to all of the flying surfaces. You will have made a much better flying aircraft, and you will have prevented water from seeping into the hinge joints.

If you really want to provide yourself with a good flying aircraft, one that will give you lots of fun at the lake next year, then build an A-Hoy. You're going to enjoy her very much.

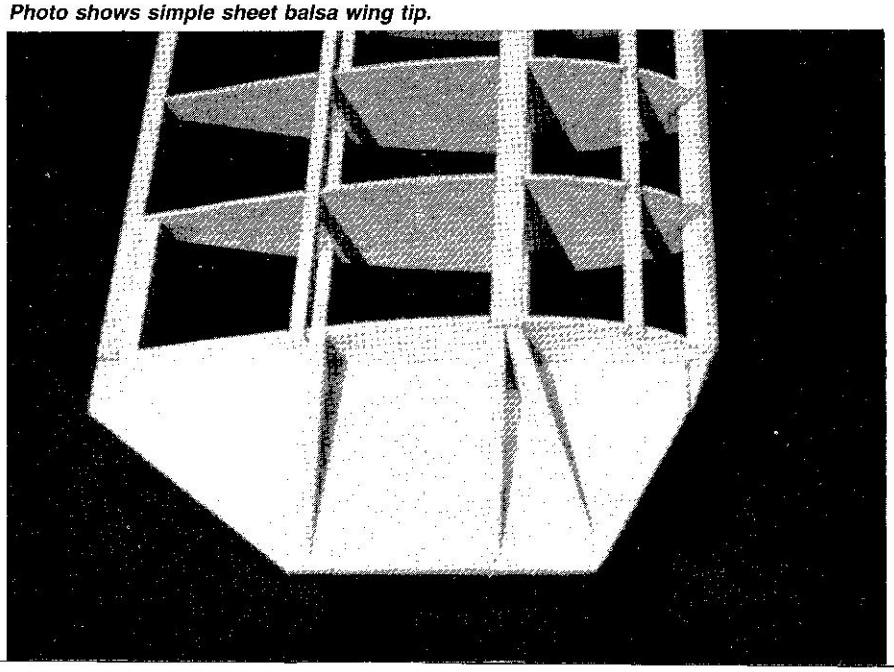
CONSTRUCTION

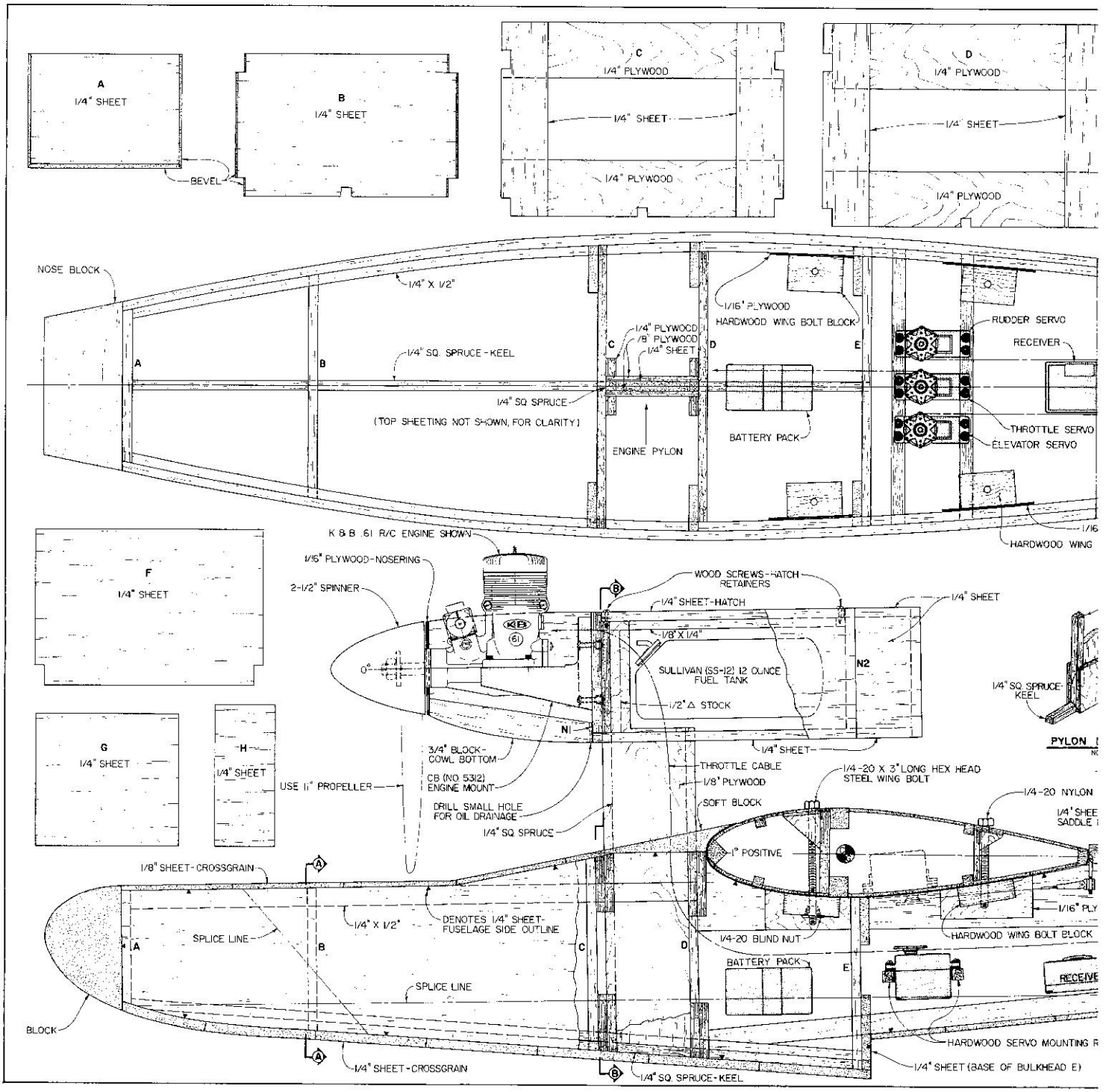
Wing:

The reason for building the wing first is that we need it to mate to the fuselage before the fuselage can be completed, so why not go ahead and get the wing out of the way. After all, it's very easy to build, and can be done in one evening using Hot Stuff or similar type CA adhesive. Note that there are three types of wing ribs. The center of the wing is sheeted on both sides with 3/32" sheet balsa, while the main ribs are unsheeted. The two ribs at each tip are sheeted on the **bottom** side only to provide an attaching point for the tip floats. After cutting out all the ribs, select good straight grained strong wood for the wing spars. Pin the 1/2" x 1/2" main spar to the building board. Take one 1/4" x 1/4" spar and pin it to the building board just ahead of the aft spar line. This will serve to prop the ribs up to the correct position on the main spar. Take a bit of scrap 3/32" balsa and pin to the spar brace at the location of the A and C ribs as these ribs are a bit thinner than the B ribs due to the 3/32" sheeting to be applied later. Now, slip the ribs in place on the main spar and glue with Hot Stuff Super T. Be sure to set the center rib in each wing half using the template to provide the proper dihedral. Next, slip the top main spar in position and glue in place. Add the front and rear top spars. Notch the trailing edge, slip in place and glue. Add the extra pieces to reinforce the hinge locations. Put the leading edge in place and glue. Remove the wing half from the plan and glue in the bottom two spars. Add a bit of scrap balsa to make the servo well. Remove the wing from the building board.

When both wing panels are ready, glue together at the center section, holding in place with clothespins. Use the main dihedral brace as a guide by placing along the main spar to see that the dihedral is correct. Now, very carefully cut away the ribs in each wing panel to allow the main dihedral brace to be slipped into position. Glue this in place with lots of Super T or 5-minute epoxy. When dry, cut the ribs to allow the aft dihedral brace to be slipped into position. Glue in place. When this is done, add the 3/4" x 3/4" wing bolt blocks to the dihedral brace in the correct location. Cover the center section, top and bottom, with

Photo shows simple sheet balsa wing tip.

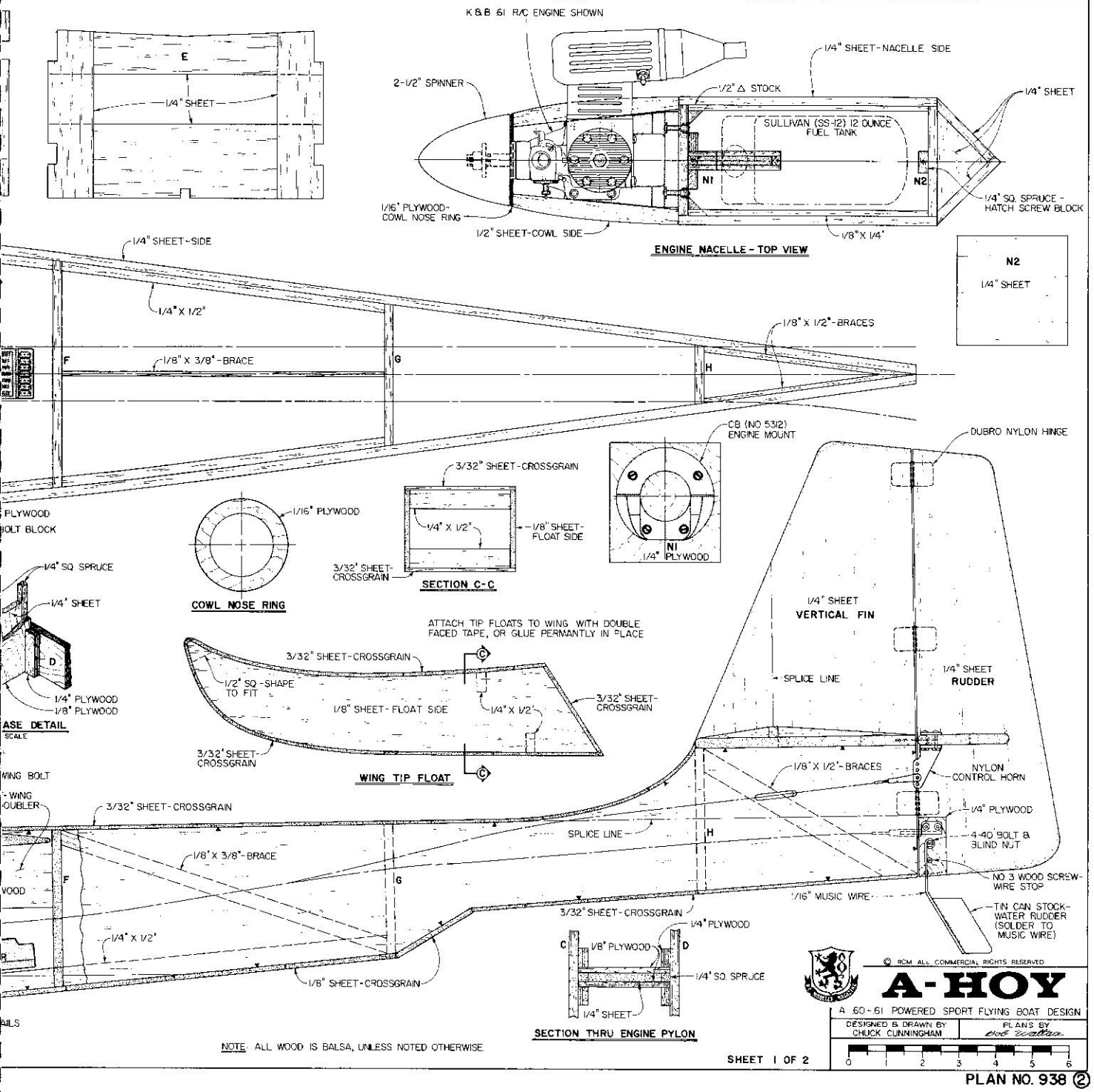




3/32" balsa sheet. Cover the bottom of the wing tip ribs with 3/32" sheet. Add the wing tip pieces made from 1/4" sheet and triangular scrap pieces. Sand the wing leading edge to a nice rounded, semi blunt section, see the side view of the aircraft to see the true airfoil. Make the ailerons, sand, and set aside.

Fuselage Hull:

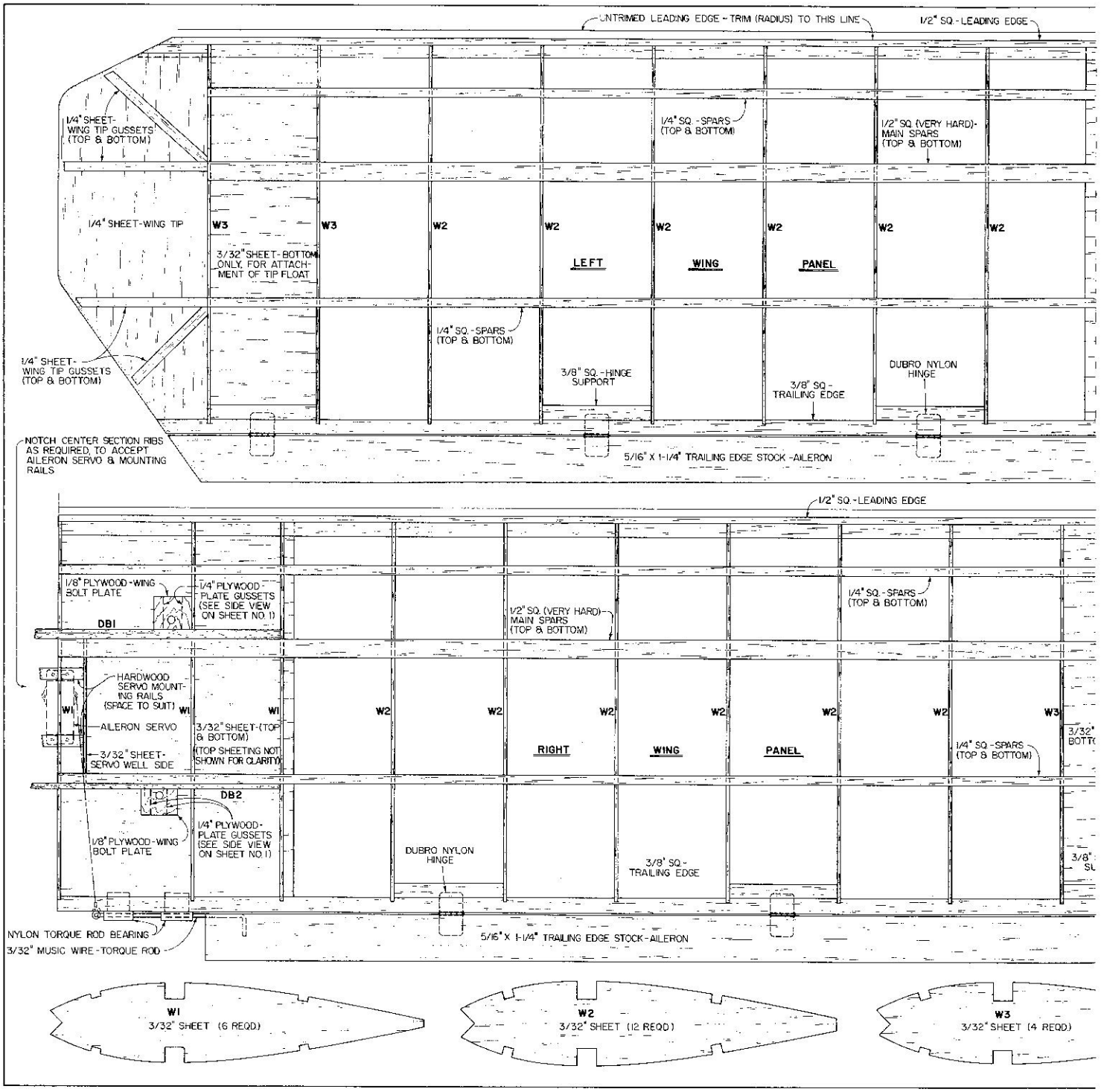
This part will consume most of the building time, but it is easy to do. Using CA adhesives, it can be done in pretty short order. First, splice all of the pieces in place to form the side of the hull. Make two. Then draw the outline of the hull on one side, pin to the other side and cut out both sides together. Note that most of the larger bulkheads are made up of strips. Cut out these strips and build the bulkhead as required. Make sure that you use plywood where it is called for. On the inside of each side piece, add the braces as shown and, with a marking pen, draw the location of the bulkheads. Glue bulkheads C and E to one side, then place the other side on these bulkheads and glue in place. Be sure that everything is square by placing the hull over the top view. Make sure that C and E are in the correct location, brace the hull to the drawing with scraps of balsa pinned to the work table. Bring the two sides together at the tail, making sure that the centerline is exactly correct. Glue the sides together at the tail, holding in place with clothespins. Next, keeping the hull still attached to the building board, bring the nose pieces towards each other and glue bulkhead

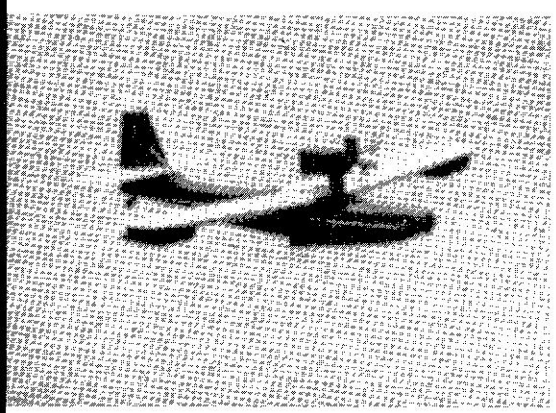


A in position.

Double check everything at this point to see that the sides are square and still in correct alignment. If everything is okay, add all of the remaining bulkheads except D. Slip it into place, but do not glue in position yet. Remove the hull from the building board and install the 1/4" square keel piece. Plank the bottom of the hull from the step forward with good strong 1/4" balsa. Plank the aft section of the hull, behind the step, with 1/8" and 3/32" as shown. Do not plank the top of the hull yet. Cut out the pieces for the engine pylon and build as shown. Remember, the side pieces stick down below the 1/4" square spruce and 1/4" balsa filler to lock around the keel.

When the pylon is completed, build the engine nacelle. You can streamline it front and aft if you want to. I left mine square with no bad effects. Glue the pylon to the engine box and make sure that everything is square. Glue the pylon to the hull, slipping it into place, locking it over the keel and between the braces on bulkhead C. Now, glue bulkhead D in place, completing the locking of the engine pylon in position. This will give you a very strong engine to hull connection that will be tough and very vibration resistant. Glue the wing bolt blocks in place inside the hull. Put the wing in place, make sure once more that everything is square. Drill the bolt holes through the wing blocks and into the hull blocks. Since you're using 1/4" bolts, be sure that the drill hole is only 13/64 to allow for a 1/4" tap. Only the aft blocks are tapped out for 1/4"

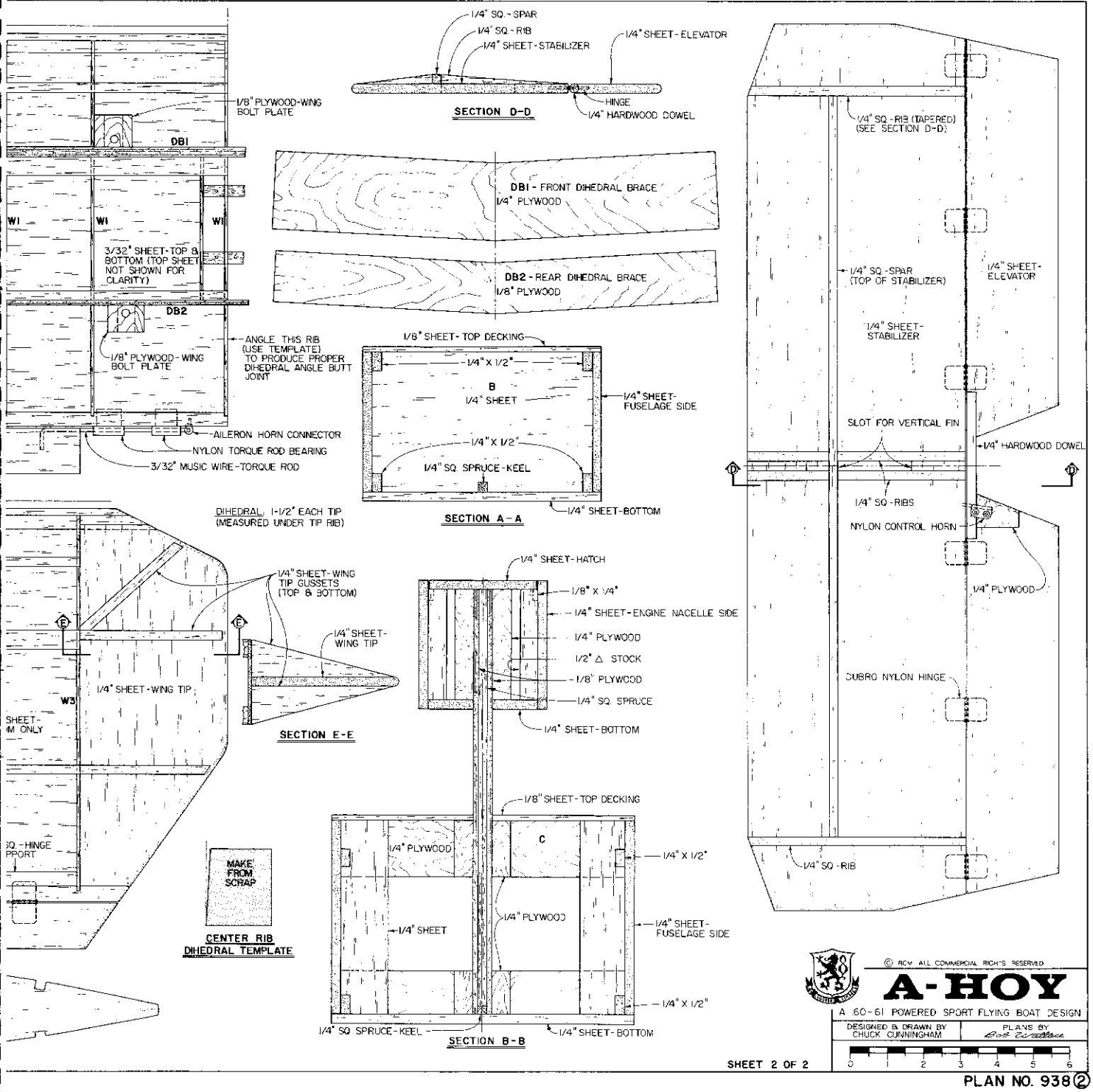




nylon bolts. The front bolts are too long for the standard nylon bolt, so a steel machine screw is used, fitting into a steel tee nut. Actually, a 3/16" bolt can be used. I used 1/4" x 4" steel bolts and tee nuts because I had some on hand.

With the wing in position on the hull, add the top soft block to provide the fairing around the engine pylon and the top of the wing. You will have to do some carving on the underside to accommodate the dihedral angle of the wing. Remove the wing and install the servos. The engine servo goes in the center to allow the flexible cable throttle pushrod to be placed alongside of the pylon. There is no need to bury it inside the pylon, simply lay it alongside. Make sure of the location, then remove and replace after the aircraft is covered.

The elevator and rudder servos are placed on either side of the throttle servo. Lay out the path of the nyrod outer pieces, punch holes in the bulkheads and slip into position. Extend through the fuselage sides and



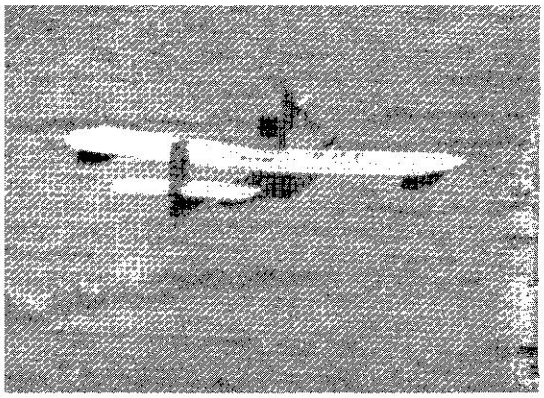
cut off at a bevel. Remove the servos, add the top planking to the hull and the nose block. Sand, keeping all bottom edges square, do not round off. Add lightweight fiberglass and resin to the hull.

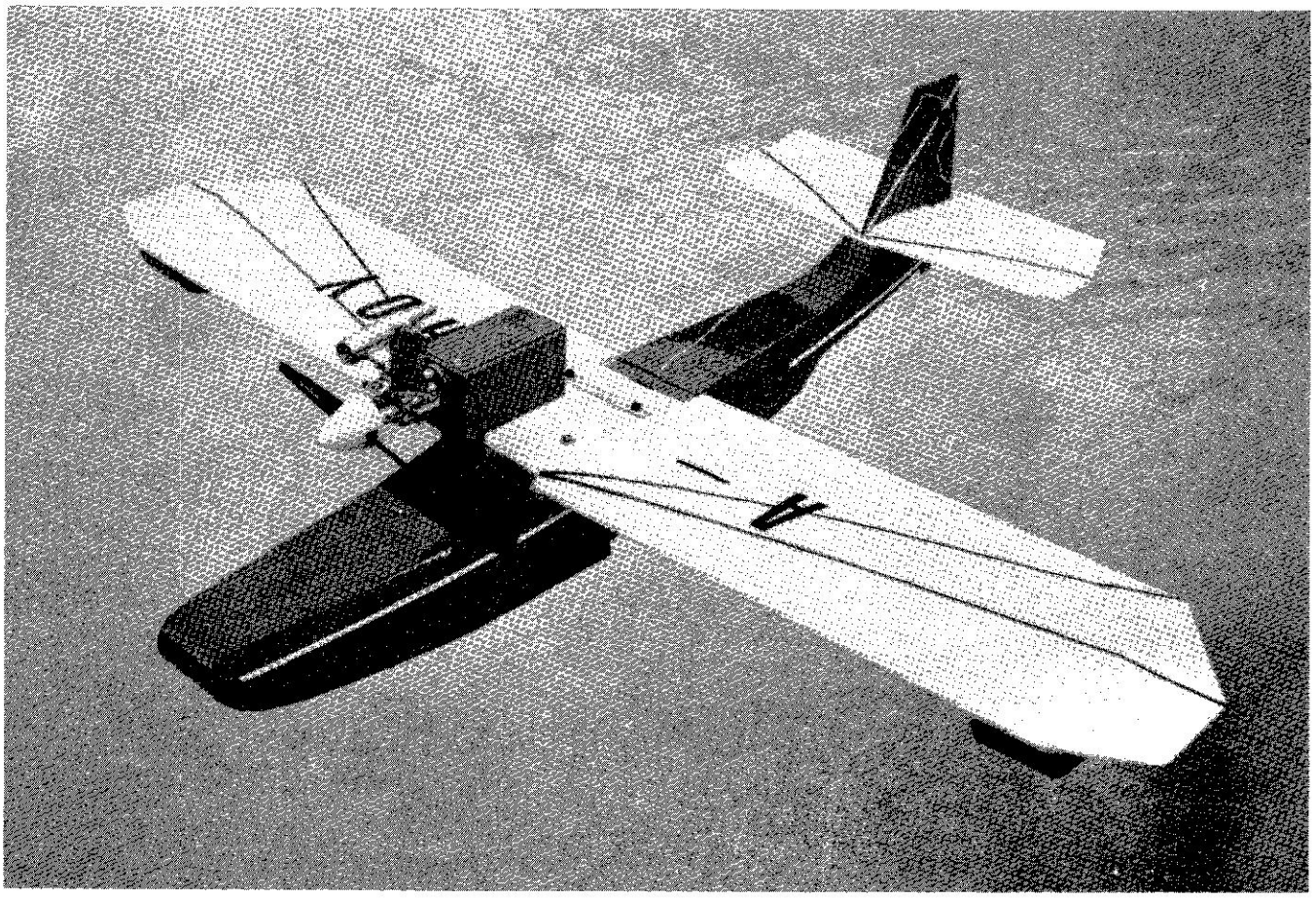
Tail:

The horizontal and vertical stabs are simple to construct as they are fabricated from sheet balsa. Add the spar and the ribs to the top of the horizontal stab to form the lifting section. Cut the slot for the fin to stick down through the horizontal stab. Sand everything to shape. The water rudder is made by soldering a piece of tin can stock, or a piece of brass shim stock to a short piece of 1/16" wire. This wire is, in turn, bolted to the rudder when the aircraft is completed.

Tip Floats:

These are of simple box construction. When they are completed and covered, they can be fastened to the wing tips with double faced tape, or permanently glued in place. If they are to be glued, then remove the covering from each of the





surfaces to be glued, squirt on the glue, then stick together.

Sealing:

It's a good idea, before you add the top sheeting to the hull, to go over all of the hull from the inside with silicone rubber caulking and caulk all of the little holes that you will find between the sides and the bottom planking. Then go over all of the outside, doing the same thing. Rub the caulking in place with your finger. Seal the joint all around the junction of the tip floats to the wing if you're gluing them in place. Also, after the horizontal and vertical stabs are glued in place to the fuselage, go over all of these joints with silicone caulking. Every place that you seal will be one less place that water can seep in and cause you problems.

Covering:

As I've mentioned earlier, the entire model is covered with MonoKote. Use any covering that you wish, just be sure that everything is well-covered and sealed. This is important for a long lived model.

Flying:

Flying the A-Hoy is really easy. For first flights, set up the elevator with 1/2" up and down, the ailerons with 5/16" up and down and the rudder with 1" side to side. You can change the movements to suit yourself after test flying. Make sure that the aircraft balances where shown, without fuel. If it doesn't balance at this point, add some lead stick-on weights until it does balance correctly.

Pick a day where the lake or pond is pretty smooth for first test flights. There's no sense learning to combat waves right off the bat. You really need a helper to carry your aircraft into the water, as a lakeshore can sometimes be pretty slippery. You could slip and fall with your model, and with a spinning prop, it all could be very dangerous. Another thought — always wear old tennis shoes when wading along the shore as a protection against any foreign objects you might encounter.

Start up the engine, check for good low idle, check the needle valve setting so that it's not lean at the top end. When satisfied, point A-Hoy straight into the wind and crack the throttle open. You don't need to touch any controls. She should track straight into the wind and begin to skip on top of the waveletts. In about thirty feet she will have built up enough speed to allow you to ease back on the stick just a tad. She will lift right off and be airborne very painlessly. Climb out to a reasonable altitude and begin to enjoy the first flight. Once all of the trims have been adjusted to your liking, it's time to set about making a landing. Come back on the throttle, set up your landing pattern, lift the nose just slightly and let her settle on down to the water. She will drop in light as a feather, and you will find that you're ready to goose the throttle for another go round.

I know that you're going to enjoy your A-Hoy. Water flying has never been more fun. □