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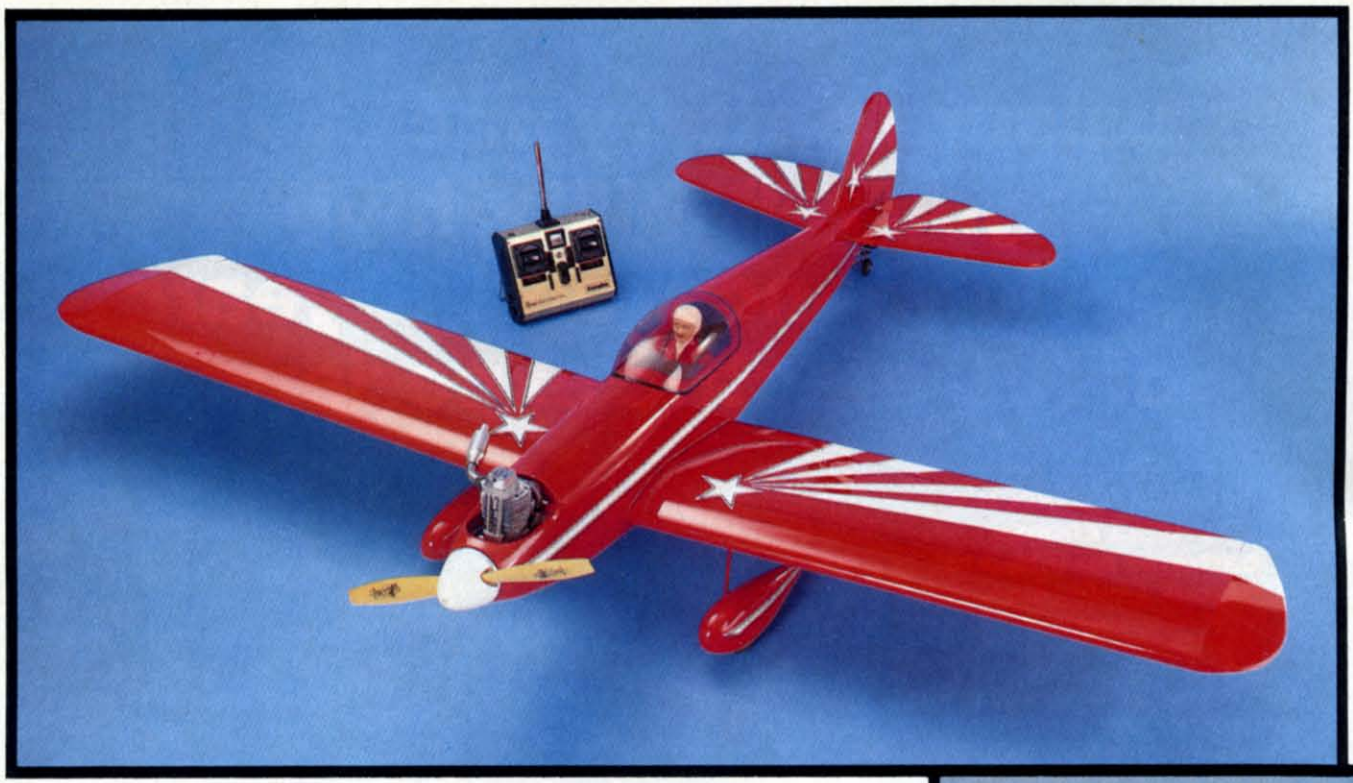


SUPER SPORTSTER 90/120

The definitive sport plane for 120 4-stroke power.

Back in 1973, a fellow named Joe Bridi designed a slick little 19 size sport plane called the RCM Sportster. Originally published as a construction article in November 1973 in RCM magazine, the RCM Sportster (Plan #542) has a flat bottom airfoil and, although it's stable and fun to fly, its aerobatics are not what you'd call precise.

Then in 1981 along came Don Anderson and Great Planes Model Manufacturing Co., who purchased the rights to Bridi's kits (including the RCM Sportster). Don redesigned the Sportster as a 40 size airplane with a symmetrical airfoil, a full cowl and lots of little improvements here and there. Thus the Super Sportster was born, to be followed quickly by the Super Sportster 60, Sportster Bipe and Super Sportster 20. I don't have to tell you that the Great Plane's Sportsters are all outstanding fliers. They're so popular that I'm sure most modelers have seen at least one, and a lot of you have owned one.

Now, I happen to be a 4-stroke fan and to me the 120's are the neatest thing since proportional radios. It annoyed me that the only kits I could find for the 120's were either big and slow or else originally designed for 2-stroke 60's. Dropping a 120 into a 60 size airplane is usually not very successful because there isn't enough wing area to carry the weight (including lots of tail weight) and propellers just aren't available that will put that much power to use in such a small airplane. Big and slow avoids these problems, but I like to hot-dog it once in a while. I also

By Jim Feldmann & Don Anderson

happen to like Super Sportsters, so there was never any doubt that I would build a 120 size Super Sportster. I did, and I **love** it. It performs like a Super Sportster 60 but it's easier to fly, and its size and sound impress **everyone.**

The story doesn't end here though. I had the pleasure of meeting Don Anderson a couple years ago when I put together the Super Sportster Twin (RCM plan #930). Don is one of the nice guys in this hobby and like most manufacturers, he is genuinely interested in the wants and needs of the average modeler.

I sent Don some pictures and told him how terrific the 120 Super Sportster is and suggested that he kit it. He was very complimentary but unconvinced. That's when the idea of publishing this article came up. But that isn't the end of the story either.

A couple of months later Don was in the area and I persuaded him to come over to our field and fly a little. One flight and Don was hooked. A short time later, the second prototype was flying in Illinois. It's now July, and the rush is on to complete the third prototype so we can get this article together and in print.

The point is: if you have a kit idea or a successful design, share it with your favorite manufacturer. At worst you'll get a nice letter back, and it's a tremendous kick if your idea/design winds up in worldwide distribution.

All right, enough of this — tell us about the airplane!

The Super Sportster 90/120 (that's 90 2-stroke/120 4-stroke) is big (6 feet), light (9 to 10 pounds) and sturdy (plywood and spruce used in high stress areas). It was designed specifically to duplicate the performance of the Super Sportster 60, but because of its size, it's smoother and easier to fly. If you have soloed anything beyond a basic trainer you can fly this airplane. With a regular 120 swinging a 14 x 8, the Super Sportster 90/120 will do the entire FAI pattern and it flies like it's on rails. With an O.S. 120 Surpass turning a 14 x 10, the SS 90/120 is faster than most 60's, and has almost unlimited vertical performance, yet it lands slower than the 60. And when it goes by in a low pass it gives you such a visceral feeling of power that it's almost addictive.

All right, let's assume you'd like to build one. You have some decisions to make up front. Before you do anything else, decide on an engine. The Super Sportster 90/120 will fly on a .75 to 1.08 2-stroke or a .90 to 1.60 4-stroke. That's a large range of power and the choice affects the way you should build the airplane.

Right thrust. 2-stroke engines generally don't have the problem, but if you punch the throttle with a big 4-stroke the airplane will turn left. I recommend about 2° right thrust for the 4-strokes.

Lightening Holes. The lightening holes shown on the plans save about 4 to 6 ounces depending on the density of the wood you're using. This savings is more important for the smaller engines than the larger ones, but is not critical in any case. The choice is up to the builder.

Control System. When using the O.S. 120 Surpass, 160 4-stroke, or a 108 2-stroke, the air loads on the elevators and ailerons approach the limits of a single standard servo. I used one standard servo for **each** elevator and one for **each** aileron. This not only doubles the available servo power, it also increases your chances of saving the airplane if you lose a servo in flight. I used a Sanyo 800 mAhr battery to cover the increased current draw. The total set-up, including two extra servos, the extra elevator pushrod, and the larger battery, added 4 ozs. to the airplane, which I made up for by using the lightening holes. Our regular 120 powered prototypes have used a standard 4 servo set-up with no problems.

Made your choice? Okay, now send off for the canopy and wheel pants from Great Planes, plans from RCM, and wood from your favorite supplier, then sit back and daydream about being the center of attention at your field.

SUPER SPORTSTER 90/120
Designed By:
Jim Feldmann & Don Anderson
TYPE AIRCRAFT
1.2 4-stroke Sport/Pattern
WINGSPAN
72 Inches
WING CHORD
13½ Inches
TOTAL WING AREA
950 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Constant Chord
DIHEDRAL (each tip)
1½ Inches
OVERALL FUSELAGE LENGTH
60 Inches
RADIO COMPARTMENT SIZE
(L) 13½" x (W) 4" x (H) 3"
STABILIZER SPAN
26½ Inches
STABILIZER CHORD (Incl. elev.)
8 Inches
STABILIZER AREA
190 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8½ Inches
VERTICAL FIN WIDTH (Incl. rud.)
9 Inches
REC. ENGINE SIZE
.75-1.08 2-stroke
.90-1.60 4-stroke
FUEL TANK SIZE
13-16 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply & Spruce
Empennage ..... Balsa & Ply
Wt. Ready To Fly .... 144-160 Oz. (9-10 Lb.)
Wing Loading ..... 22-24 Oz./Sq. Ft.

CONSTRUCTION

The Super Sportster 90/120 is not hard to build, but it's complex enough that some previous experience with either scratch-building or kit Sportsters will give you an edge. The 90/120 doesn't build exactly like the smaller Sportsters but it's close.

Tail:

Construction begins with the tail surfaces. These are built-up and sheeted rather than solid balsa, as in the smaller Sportsters. The built-up method takes longer, but it's less prone to warping, and much lighter.

Start by laminating two pieces of 1/8" lite ply for each of the control horn supports.

Build the outline framework of the stabilizer, elevators, fin and rudder over the plans using 1/4" x 3/4" balsa.

Install the 1/4" balsa sheet stab center and fin bottom, and the 1/8" x 1/4" balsa ribs.

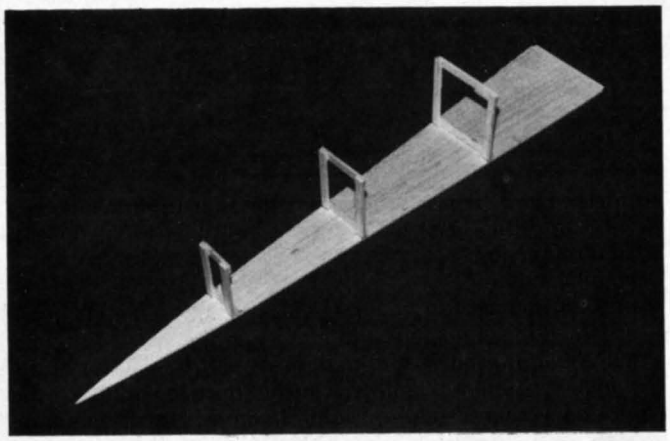
Remove these assemblies from the board and sand to the proper outline.

Build the skins by joining 1/16" balsa sheets together as required. Make the skins about 1/4" bigger all around than the framework. Sand the outside of the skins smooth before you glue them on.

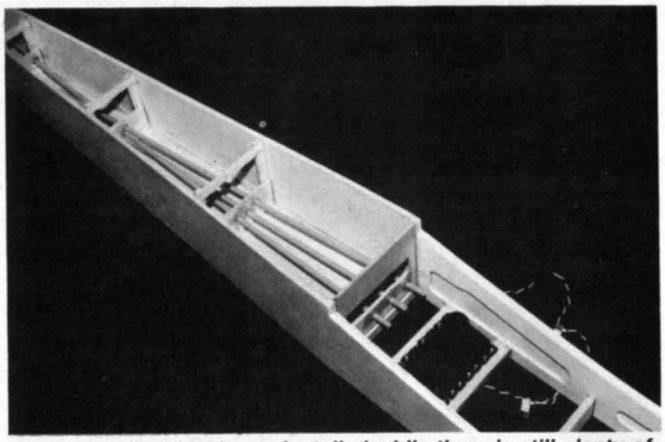
Use a flat surface to make sure you don't build in a warp; glue the skins to the framework. Round the leading edges of the stab and fin and the trailing edges of the elevators and rudder. Sand the leading edges of the rudder and elevators to a "V" as shown on the plans. Drill a 3/32" hole in the rudder and relieve the leading edge as required for the tail wheel strut.

Wing:

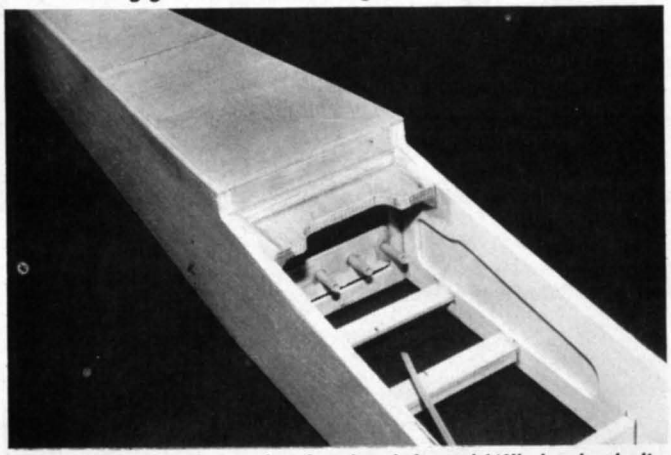
The landing gear blocks may be purchased, or fabricated from 3/16" plywood. In either case, cut two main blocks 7½" long and two upright blocks 1¼" long. Glue the upright block to one end of the main blocks,



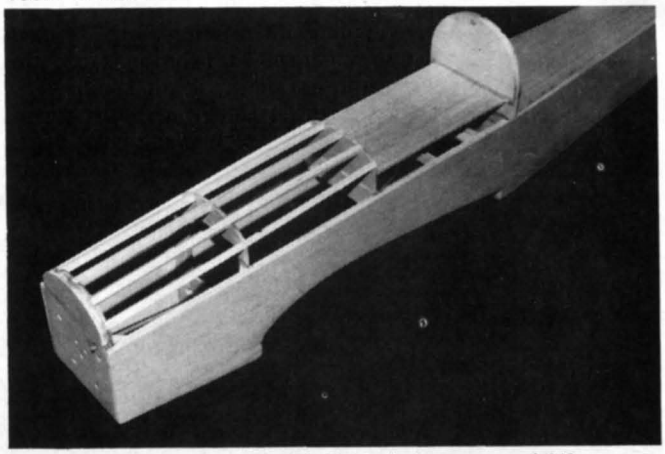
Formers 4, 5, and 6 are built up and glued to the rear deck base before being glued into the fuselage.



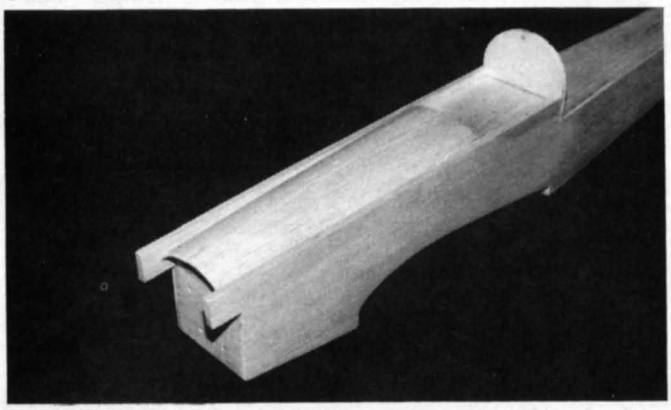
Servos and pushrods are installed while there is still plenty of room to work.



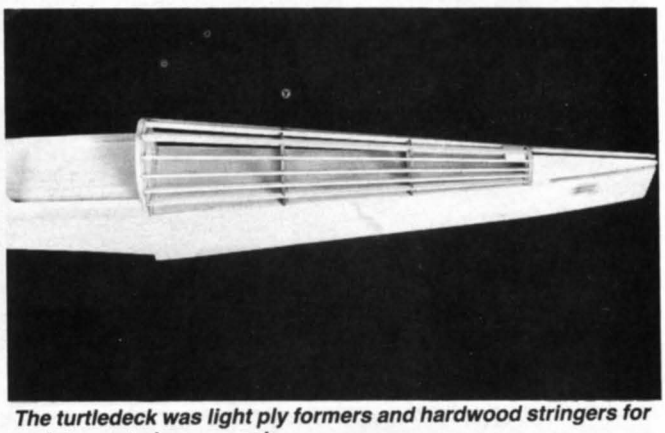
Cross-grain sheeting and a triangle reinforced 1/4" ply wing bolt plate completes the fuselage bottom.



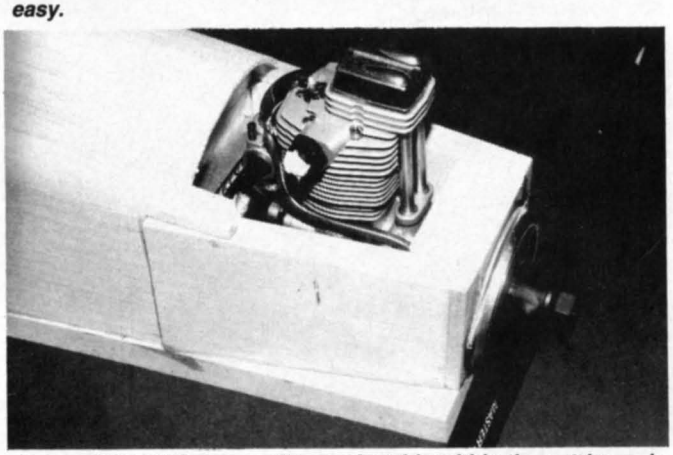
The front hood is framed with light ply formers and 1/4 square balsa.



Balsa sheeting and straight corner pieces make hood shaping easy.

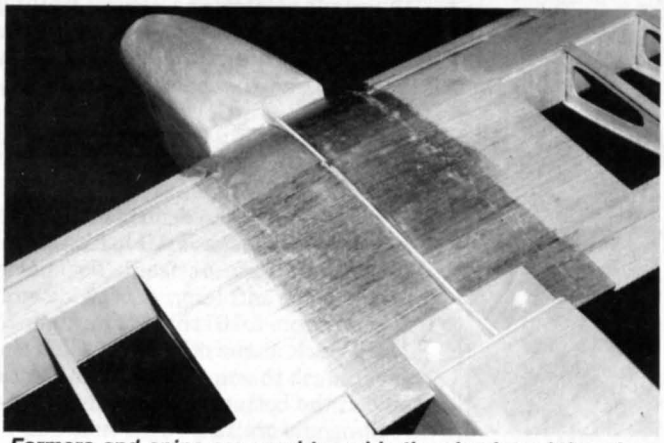


The turtledeck was light ply formers and hardwood stringers for resistance to hangar rash.

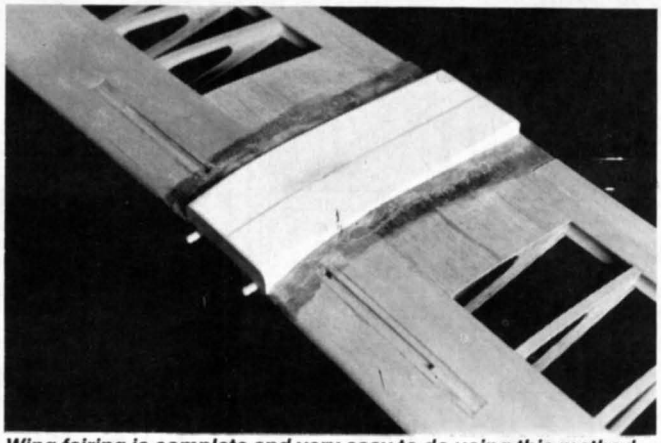


A new O.S. 120 Surpass sits comfortably within the untrimmed cowl blocks.

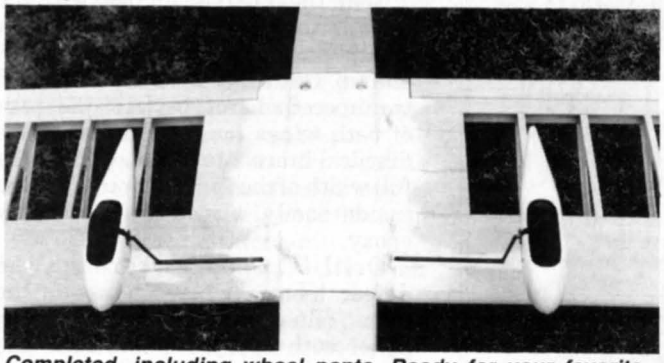
The cowl has been rough sanded to shape. Note easy access to carburetor and mounting bolts.



Formers and spine are used to guide the shaping of the wing fairings.



Wing fairing is complete and very easy to do using this method.



Completed, including wheel pants. Ready for your favorite covering material.

Ready to cover. Performance with the O.S. 120 Surpass is spectacular!

high and the length of the wing from scrap balsa, and tack glue the 3/8" x 1/2" balsa trailing edge to it.

Pin the lower spar over the plans, then, using several ribs as a positioning guide, pin the trailing edge support to the board. Now glue all of the ribs in place making sure the doublers face the correct way.

Glue the leading edge to the ribs with its top 1/8" above the top of the ribs. (Note: The leading edge should extend 2" past the tip rib.) Install the top spar, then glue 3/8" balsa triangle reinforcements to the front of the gear block ribs as shown on the plans.

Glue the 1/8" plywood dowel plates to the back of the leading edge in the center bay, and glue 1/16" balsa sheer webs to the back of the spars in all bays except the center.

Support the leading edge with scrap balsa. Sand an angle on the front edge of the 3/32" x 4" balsa leading edge sheet to fit the back of the leading edge, then glue the sheet in place.

Now remove the wing from the board and detach the trailing edge support. Sand the trailing edge to match the airfoil. Working on a flat surface, glue the 3/32" x 1" balsa trailing edge sheeting on top of the trailing edge.

Add the 3/32" balsa center sheeting and the 3/32" x 3/8" balsa cap strips. This will be easier if you support the trailing edge with some scrap balsa.

Turn the wing over and sand off any glue drips. Install the gear block. Note: the main block extends 3/32" above the ribs so that it will be flush with the sheeting, and the upright block goes toward the root end of the wing. Glue a piece of 3/8" balsa triangle stock under the outboard end of the main block.

Now add the bottom leading edge, trailing edge and center sheeting, and the cap strips, cutting the leading edge sheeting to fit around the gear block.

Cut the spars, trailing edge and sheeting flush with the tip rib. Do **not** cut the leading edge. Glue the wing tip in place, centered on the tip rib and centered on the back of the leading edge. Add the four tip braces, the aileron filler, and the aft tip filler pieces.

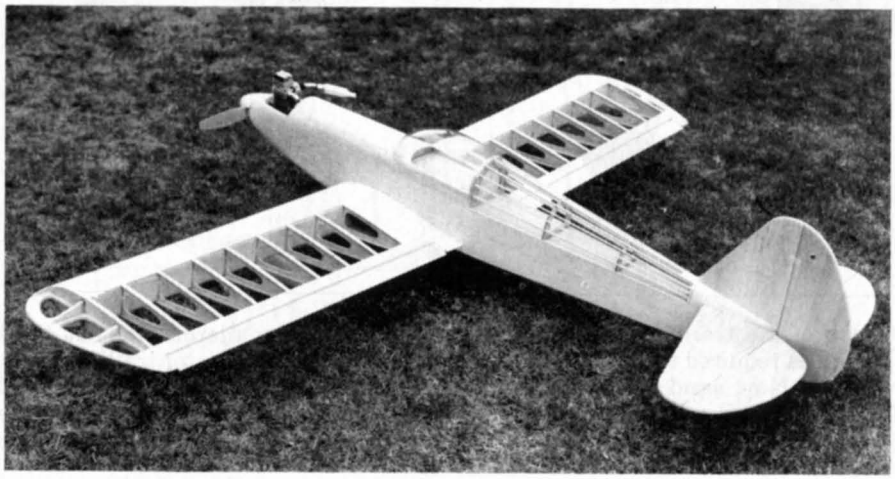
Left Wing:

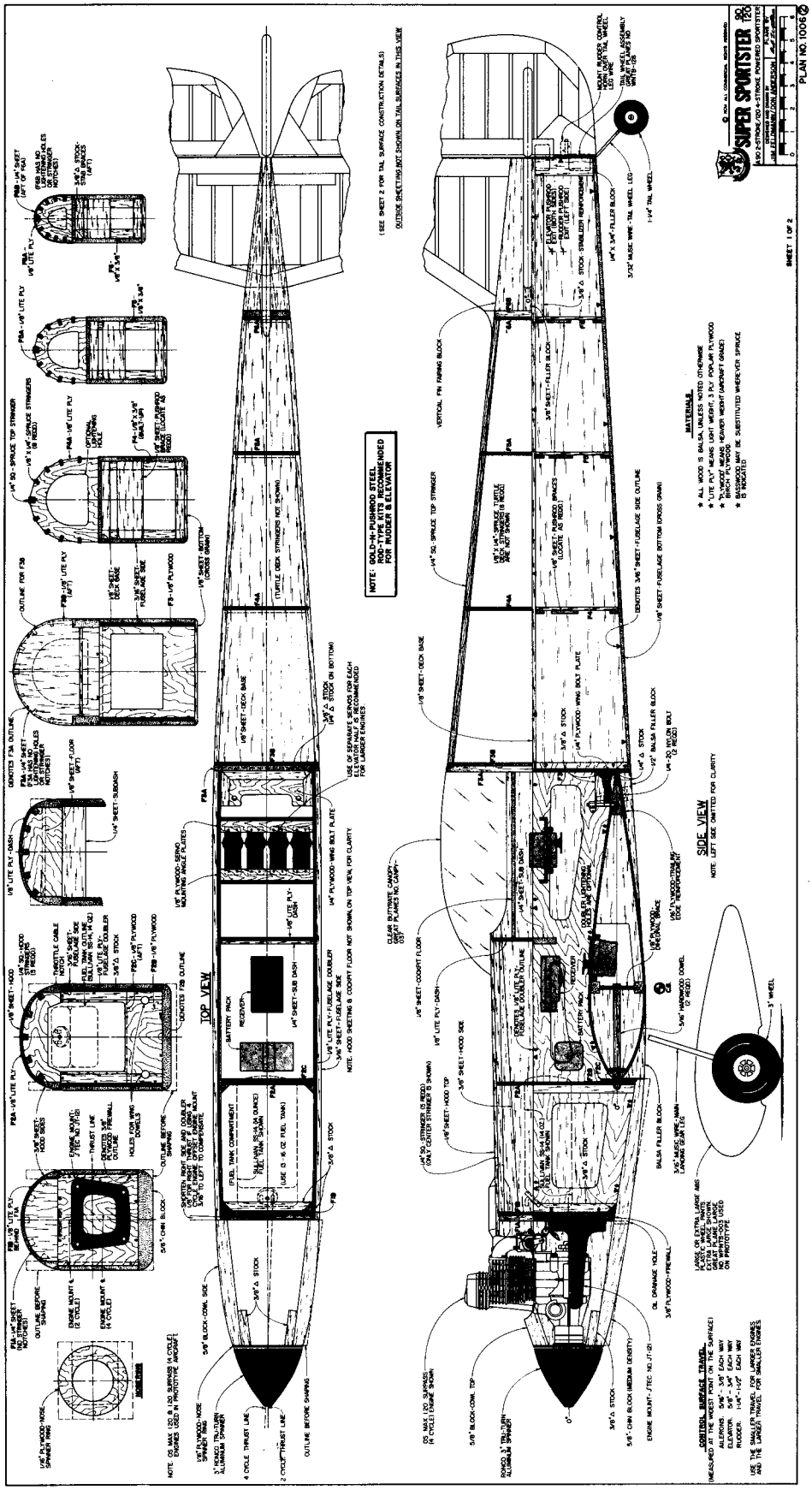
The left wing is built over the same plan, using the same sequence **EXCEPT** that you are building this wing upside down so the notches for the gear blocks go on top and the gear block is installed before the top leading edge sheeting.

Finishing The Wings:

Sand the leading edges to shape using a template made from the plans to check your progress. The shape of the leading edge is very important to the way an airplane flies, so take your time on this step.

Glue two pieces of aileron stock together to make each aileron 5/8" thick at the leading edge. Sand the trailing edge of the ailerons to 3/32" thick. Tack glue the ailerons to the





back of the trailing edges and sand them as required to match the airfoil shape. Now sand the wing tips to match the ailerons' shape, and finish sand the entire wing panels.

Remove the ailerons and cut 4" off each one for the center trailing edges. Cut the nylon tube torque rod bushings to length, slip them over the rods and then bend the rods to match the plans. Notch the center trailing edges to cover the torque rods, glue the bushings to the center trailing edges and then glue the center trailing edges to the back of the wing.

Sand the leading edge of the ailerons to a "V" shape and drill 1/8" holes for the torque rods.

The center tapered rib is made from a "tapered sheet" available from some balsa suppliers, or from 3/8" balsa sheet. It is 14" long, 2½" wide and tapered from 5/16" thick at one side to 1/32" thick at the other side. Glue the tapered rib to one wing with the thick side at the bottom of the wing and the leading and trailing edges centered on the ends of the tapered rib.

Trim the tapered rib flush with the airfoil, then check the dihedral. It should be 2½" to 3" measured under one tip. Cut away the center ribs and the tapered rib from between the spars of both wings for installation of the dihedral brace. Make the opening the full width of the spars so you can reach inside easily with a stick to apply epoxy.

Drill 5/16" holes through the dihedral brace where shown on the plans. Glue the brace into one wing panel with epoxy. Now recheck the dihedral and trim the brace as required.

Join the wing together with epoxy, making sure that the leading and trailing edges match. Apply 6 oz. (heavy) fiberglass cloth 6" wide to the wing center with resin or epoxy. **Don't skip this step.** Both the brace and the fiberglass are required to prevent wing failure in flight.

Smooth the edges of the fiberglass with sandpaper and filler, being careful not to sand into the balsa wing sheeting.

Cut the servo hole in the top of the wing and install plywood servo mounts. Drill the dowel holes in the leading edge and glue the 5/16" hardwood dowels in place with epoxy. Glue the 1/16" plywood trailing edge reinforcements to the bottom of the wing.

Fuselage:

Cut one 1/4" plywood firewall and one 1/8" plywood firewall and glue them together. Draw a horizontal line on the front of the firewall 1½" down from the top. Draw a vertical line either in the center of the firewall (2-stroke engine) or 3/16" to the **right** (pilot's left) of center (4-stroke engines). Center your engine mount over the intersection of the two lines, drill the mounting holes and install the blind nuts. Also drill all necessary holes for the fuel lines and the throttle cable.

Build formers 4, 5, and 6 over the plans using 1/8" x 3/8" balsa. Also cut pushrod braces from scrap 1/8" balsa.

For **4-stroke engines only;** cut 1/8" off the **right** (pilot's right) fuselage side and doubler.

Glue the 1/8" lite ply fuselage side doublers to the fuselage sides, being sure to make one left side and one right side. Pin the sides together and sand to match. Also sand the wing saddle to fit the wing at this time.

Mark the former positions on the fuselage sides. Glue former 2C to the back of former 2B. Cut a notch in 2B for the throttle cable.

Glue formers 2B and 3 and the sub dash to one fuselage side making sure they are perpendicular to the side. Now glue the other fuselage side to this assembly, making sure that the top edges of the fuselage sides are parallel.

Tack glue the tail end of the fuselage sides together, pin the fuselage to the top view on the plans to maintain alignment, and epoxy the firewall in place. (Note: for 4-stroke engines; since the fuselage is upside down, the side thrust is opposite from the dotted line on the plan.)

Glue 3/8" balsa triangle to the front of former 2B and to the rear of the firewall. Separate the tail end of the fuselage and glue a piece of 1/4" x 3/4" balsa to one side. Sand this piece to a wedge shape.

Pin the deck base over the plans and glue formers 4, 5, and 6 in position on the deck base. Now with the deck base and the fuselage pinned to the board, glue the fuselage to the deck base. Glue the tail end of the fuselage sides together, and glue the 3/8" balsa triangle stab reinforcements along the deck base between former 6 and the tail end.

Install the servo mounts, pushrods and pushrod braces. (For smaller engines, mount the servos just in front of the sub dash.)

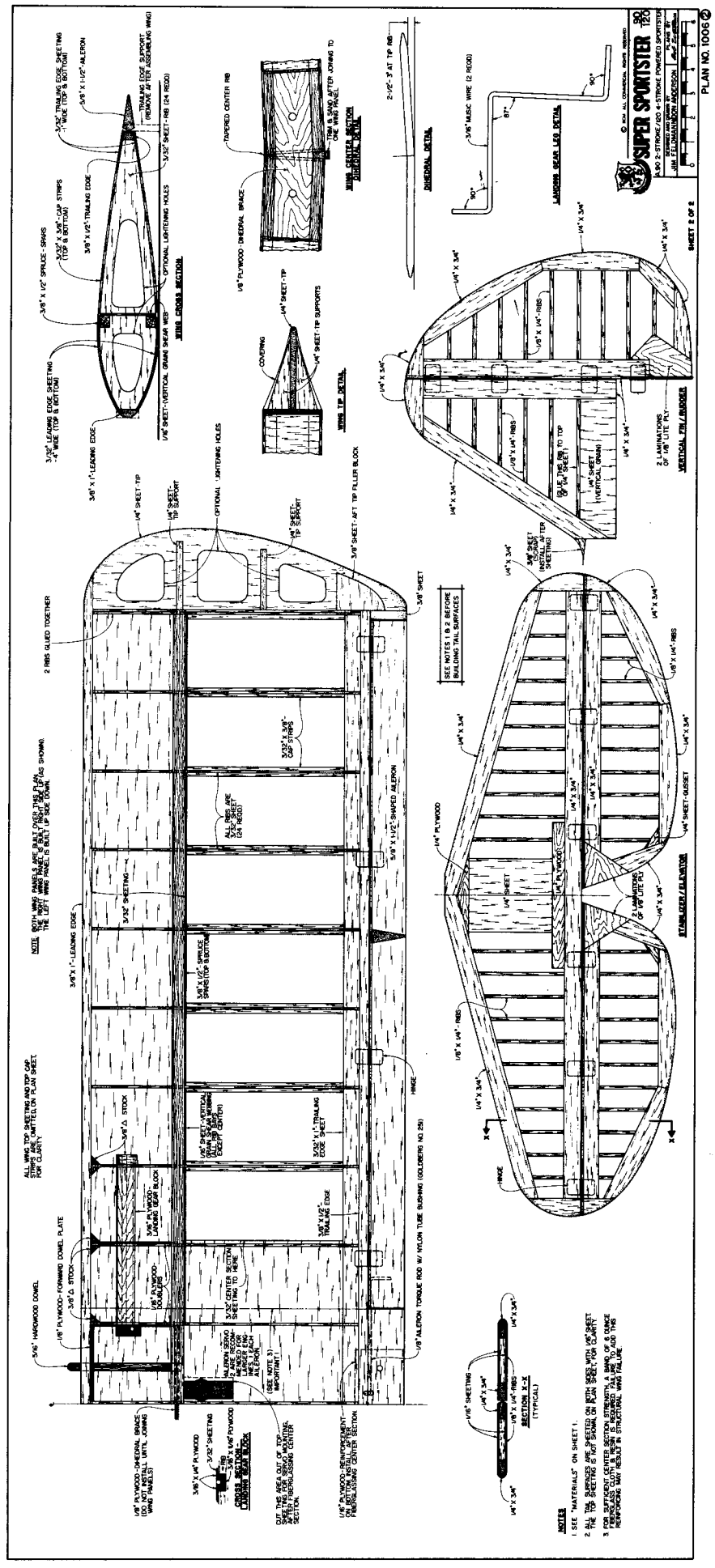
Glue 3/8" balsa triangle to the top of the wing bolt plate along the rear and both sides. Glue this assembly into the fuselage with epoxy. Add 1/4" balsa triangle reinforcements to the bottom of the bolt plate.

Install the 1/8" balsa cross-grain bottom sheeting. Remove the fuselage from the board and sand the sheeting to shape.

Carefully transfer the location of the wing dowels to the back of former 2B and drill 5/16" holes through the former. Fit the wing to the fuselage, making sure that the wing is parallel to the top of the fuselage side. (0° incidence.)

Drill and tap the wing bolt holes, bolt on the wing and check the aileron torque rod clearance inside the fuselage. Remove the wing and set it aside.

Glue former 1B to the back of 1A and former 3B to the back of 3A. Mark



FULL SIZE PLANS AVAILABLE — SEE PAGE 314

the floor position on the front of 3A and the back of the dash.

Glue formers 1A, 2A, 3A, the dash and the floor in position. Add the 1/4" x 1/4" balsa hood stringers. Sheet the hood with 1/8" balsa sheet, extending 1" in front of the firewall and 1" behind the dash. (Note: The sheeting ends at the outboard edge of the outboard stringer on each side.)

Sand the edges of the sheeting to match the formers and then glue the 3/8" x 1¾" balsa hood sides in place. (Note: The hood sides run from former 3A to 1½" in front of the firewall.) Sand the hood sides and cockpit area to shape as shown on the plans.

Glue the former 6B to the back of 6A. Using the vertical fin as a guide, glue former 6A to the deck base.

Glue two 1/8" x 1/4" spruce stringers together to make the 1/4" x 1/4" top stringer for the turtle deck. Glue this in place. Add formers 4A and 5A and then the rest of the stringers.

Using the horizontal stab as a guide, glue a 3/8" balsa spacer to the deck base behind former 6B. Pin (but don't glue) the fin and stab in place. Using 5/8" balsa scrap, make two stab filler blocks and cut them roughly to shape. Glue these blocks to former 6B and the spacer. **Do not glue the blocks to the fin and stab.** Remove the fin and stab immediately to be sure they don't get stuck in place.

Temporarily replace the fin and stab with 3/8" spacers and sand the filler blocks to match the fuselage shape. Make the dorsal fin from 3/8" scrap, glue it to the vertical fin and sand to shape.

Cowl:

After fitting the tank and fuelproofing the tank compartment, glue the 5/8" balsa chin block in place. Tack glue 1/16" plywood scrap spacers to the back of your spinner and then tack glue the 1/16" plywood spinner ring to the back of the spacers, lined up with the spinner.

Install your engine on the engine mount and the mount on the firewall. Now sand the front of the chin block until it just touches the back of the spinner ring when the spinner is mounted on the engine. Glue the spinner ring to the chin block.

Fit the cowl sides between the firewall and spinner ring and glue in place. (Relieve the inside of the cowl sides as necessary to clear your mount.) Glue the cowl top block between the cowl sides.

Remove your engine, then carve and sand the cowl and chin block to shape. If any gaps appear between blocks behind the spinner ring, add 3/8" triangle to the inside corners. Drill a drain hole through the chin block just in front of the firewall.

Final Assembly:

Bolt the wing onto the fuselage. The wing fairings may be made from shaped balsa blocks or filler. To use filler follow these steps: Make front and rear formers from scrap 1/8" lite ply and glue to the wing. Join the formers with a 1/8" lite ply spine. Sand the formers to match the fuselage shape and the spine to match the plan side view. Make the fairings with "light spackle" type filler, using the formers and the spine to guide the shape. Careful shaping will minimize the final sanding necessary. Remember to give these fairings a coat of Balsarite to make the covering adhere properly.

Cut clearance holes for the wing bolts down to the plywood. (If you used filler, harden the edge of the holes with thin CA.)

Temporarily slip the fin and stab in their slots and draw a line along the edge of the filler blocks. The area inside these lines is the gluing area and should not be covered.

The next step is to cover everything. Use the iron-on film of your choice.

Install hinges and control horns and the tail wheel strut. Bolt the wing to the fuselage and then glue the tail surfaces in place, making sure that they are parallel to the wing and perpendicular to the fuselage.

Install your pilot, trim and install the canopy. Build the wheel pants and install the landing gear.

Install the engine, tank and radio. Use the control surface travels and balance point that are shown on the plans.

Flying:

Like any new airplane, treat the Super Sportster 90/120 with respect until you get to know it.

Best of luck, and have a ball!

□