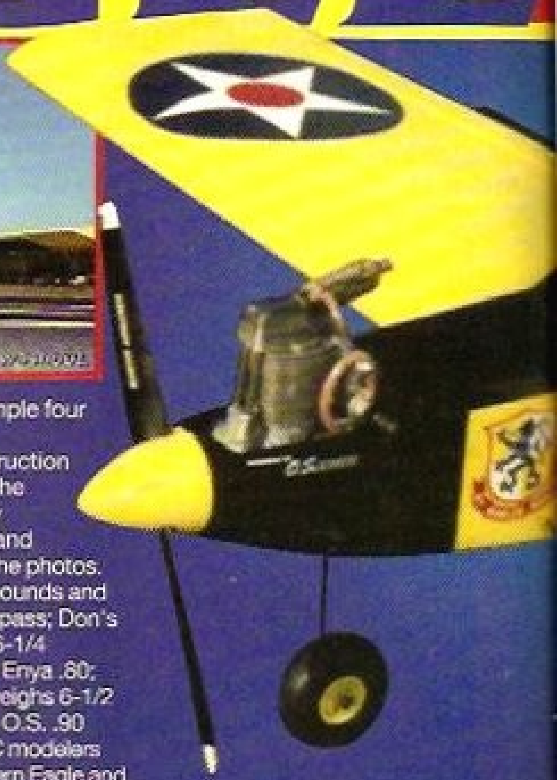
Southern EAGLE

Wing's washout is apparent. Airliners and fighter jets use similar washout.



Introduction

The Southern Eagle as presented in this RCM construction article was designed by Bill Proffitt (center) and is one of those truly great flying models. It has its heritage in the successful American pattern/competition models of a few years back. The Southern Eagle tracks in flight like a Tomahawk cruise missile seeking its target … it goes where you point it! It's a wonderful flying sport model and it will take a wide variety of engines from .70-.91 4-stroke, and .45-.61 2-stroke, and it will control nicely with a simple four channel radio.

The plans and construction text are by Bill Proffitt; the building sequence is by Don McGeorge (right); and Stu Richmond (left) did the photos. Bill's model weighs six pounds and flies with an O.S. .70 Surpass; Don's Southern Eagle weighs 6-1/4 pounds and flies with an Enya .80; Stu's (in these photos) weighs 6-1/2 pounds and flies with an O.S. .90 Surpass. These three R/C modelers hope you'll build a Southern Eagle and have the flying fun they're enjoying.

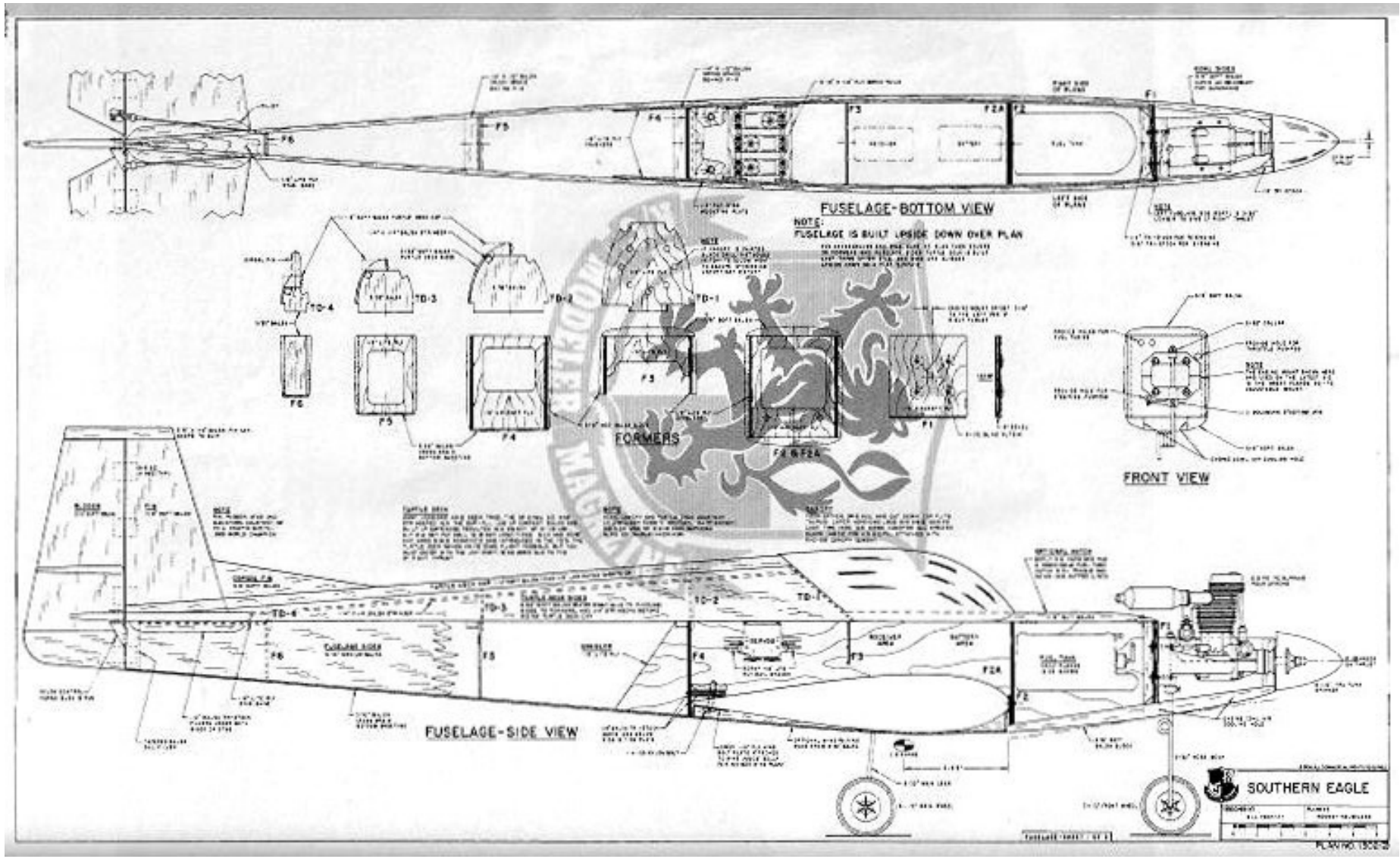
A Super Sport Flier For .45-.61 2-Stroke or .46-.91 4-Stroke Engines

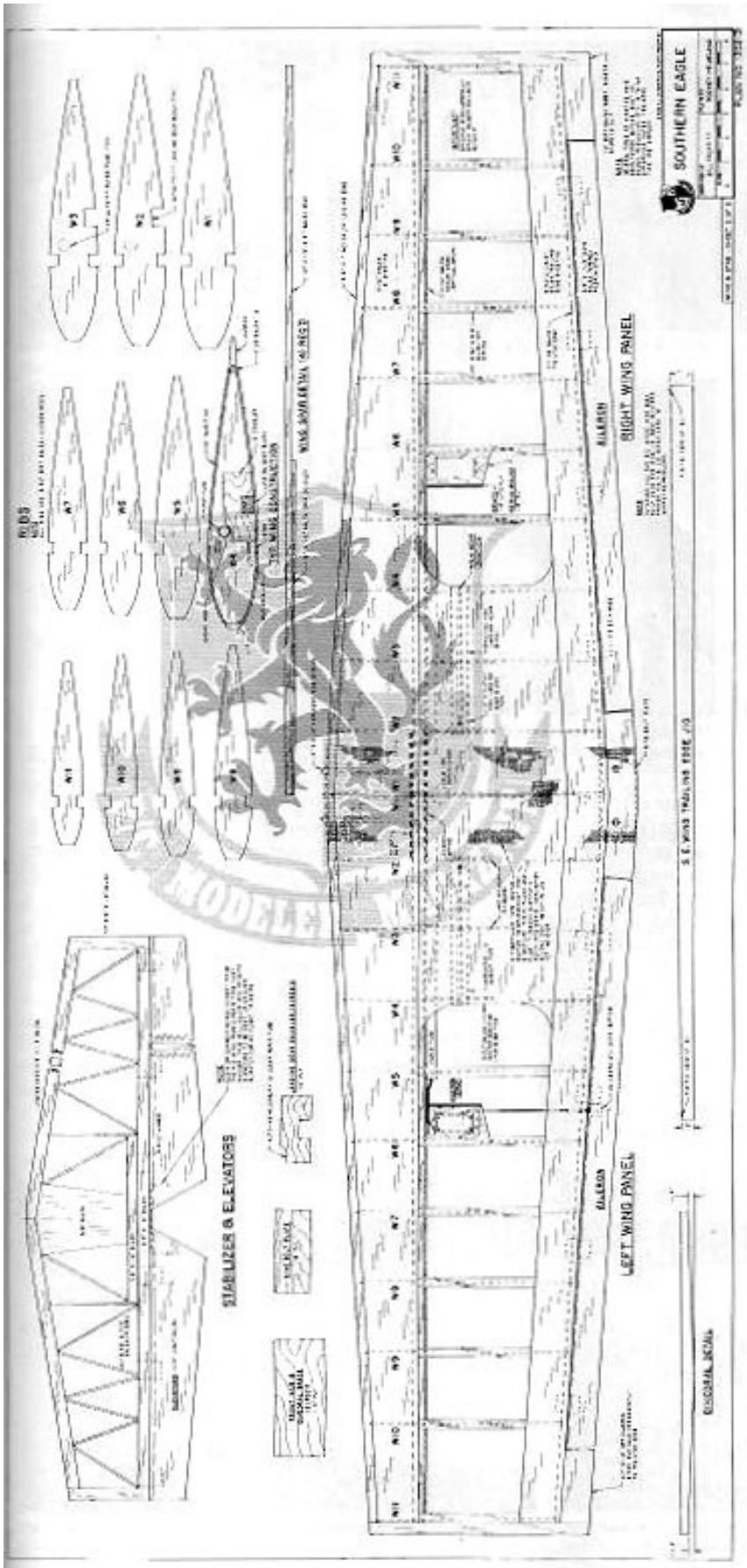
By Bill Proffitt, Stuart Richmond, and Don McGeorge

The Southern Eagles Squadron of which I am a member is mostly comprised of retired seasoned citizens who have grown up in this hobby. Almost all of us started out building rubber powered stick and tissue models before World War II. We were lamenting recently how extremely fortunate we have been to have experienced those "Good 'ol Days." This discussion invariably led to a "Can you top this" parade down memory lane. One grizzled member remembered winding the rubber band of his escapement equipped, rudder only Live Wire Trainer. Another remembered flying his Smog Hog controlled with a Bob Dunham Orbit Reed outfit. I remembered a patient Cliff Weirick teaching me to fly Mode I proportional. We all flew Mode I, having recently switched from Reeds, except for a few guys like Joe Bridi and Pappy DeBolt, who flew single stick.

Back in those glorious days most of us flew what was known as Class C pattern aircraft. There were hundreds of designs, and they were great performers. Timeless aircraft like Phil Kraft's Kwik Fli, Doug Spreng's Stormer, Joe Bridi's Sun Fli and Kaos, Bob Dunn's Astro Hog, Ed Kazmirski's Taurus, and Jim Whitley's Daddy Rabbit can still be seen flying at almost any flying field today, almost forty years later.

The Southern Eagle is a nostalgic salute to all these R/C pioneers and their design contributions to that exciting era. The Southern Eagle, like all the Class C aircraft of that time has a host of ancestors. Different airfoils, tail moments, and shapes were used with the thought in mind that we were seeking a docile type model that would be a great Sunday flier and at the same time be able to


FUSELAGE-BOTTOM VIEW
NOTE:
FUSELAGE IS BUILT UPSIDE DOWN OVER PLAN
FORMERS
FRONT VIEW
FUSELAGE-SIDE VIEW
SOUTHERN EAGLE



SOUTHERN EAGLE

Designed by:
Bill Proffitt, Stuart Richmond, Don McGeorge

TYPE AIRCRAFT
Sport

WINGSPAN
62-1/2 Inches

WING CHORD
11-1/2 Inches (Avg.)

TOTAL WING AREA
725 Sq. In.

WING LOCATION
Low Wing

AIRFOIL
Symmetrical

WING PLANFORM
Double Taper

DIHEDRAL, EACH TIP
1-1/4 Inches

OVERALL FUSELAGE LENGTH
56 Inches

RADIO COMPARTMENT SIZE
13-1/4" (L) x 3-3/4" (W) x 2-1/4" (H)

STABILIZER SPAN
23-3/4 Inches

STABILIZER CHORD (inc. elev.)
7-5/8 Inches

STABILIZER AREA
159 Sq. In.

STAB AIRFOIL SECTION
Flat

STABILIZER LOCATION
Mid-Fuselage

VERTICAL FIN HEIGHT
8 Inches

VERTICAL FIN WIDTH (inc. rud.)
8-1/2 Inches

REC. ENGINE SIZE
.45-.61 2-Stroke/.46-.91 4-stroke

FUEL TANK SIZE
12 Oz.

LANDING GEAR
Tricycle

REC. NO. OF CHANNELS
4

CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.

C.G. (from L.E.)
4-3/8 Inches

ELEVATOR THROWS
3/8" Up — 3/8" Down

AILERON THROWS
5/16" Up — 5/16" Down

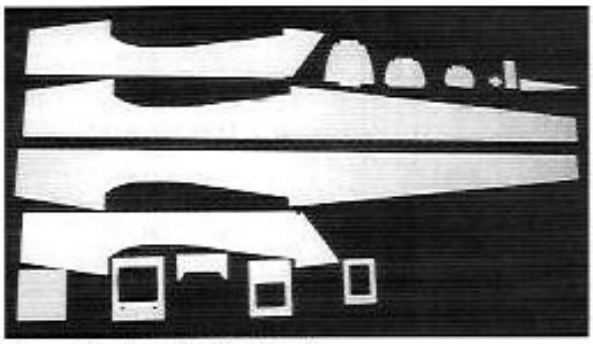
RUDDER THROWS
1-1/2" Left — 1-1/2" Right

SIDETHRUST
2° Right

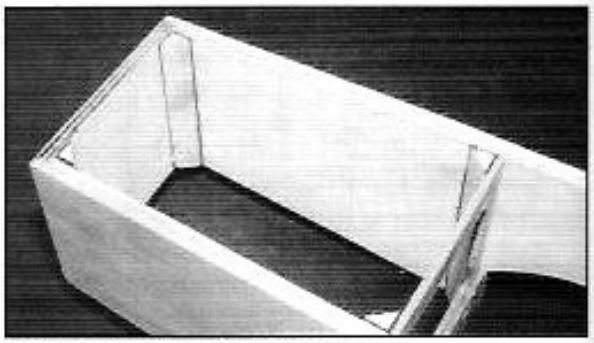
DOWNTHRUST/UPTHRUST
0°

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply, & Lite Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready To Fly	96 Oz. (6 Lbs. 0 Oz.)
Wing Loading	19 Oz./Sq. Ft.



These pieces form the basic fuselage.



Note the use of triangular stock for strength.

compete in today's novice pattern events. The model itself had to be simple to construct with a minimum building time so that more time could be spent at the flying field. Many of you will recognize the plane as having a different name akin to "OLD FOGEY" emblazoned on the wings. We changed the name to comply with R/C Modeler's stellar reputation as a family magazine.

I think you will find the Southern Eagle as easy to build as it is to fly, therefore construction notes will be kept to a minimum.

All the balsa, lite ply, and hardware used is noted on the plans and is sold in the local hobby shops. Try to select the straightest and lightest wood available, except where noted for strength. Anyone who has built a trainer or two should have no problem scratch-building the Southern Eagle. With moderate control throws it makes an ideal step up from your high wing trainer. Having evolved from over eleven variations and modifications, the airplane is simple, honest, true, and will make you appear to be a better pilot because it has absolutely no bad habits.

CONSTRUCTION

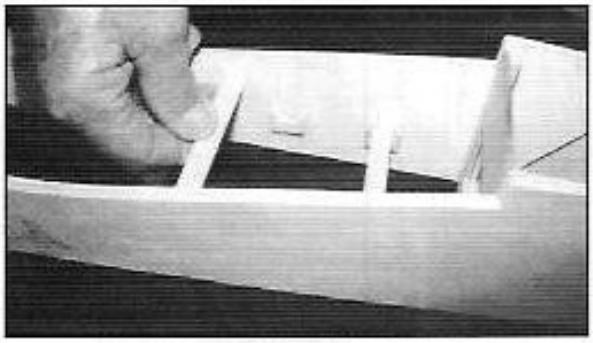
Fuselage sides are medium 3/16" balsa with 1/8" lite ply doublers. Cut out the formers and note that F1 is laminated from two pieces of 1/8" ply.

The basic fuselage is built upside down over the plan's top view.

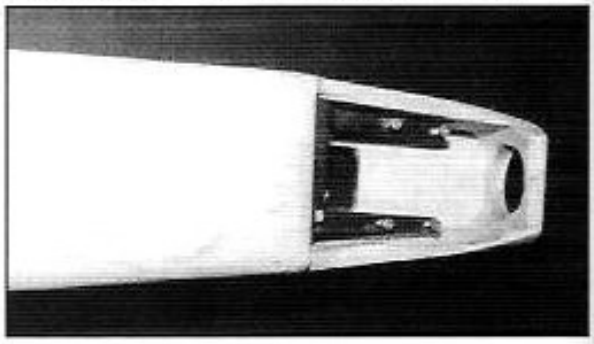
Cut out two 1/8" ply wing plate mounts and laminate them together. Note: The fuselage is built upside down over plan. Pin cross braces and stabilizer mount to plan, then square up formers and fuselage sides. Note that the left fuselage side is 3/32" longer to give 2° right thrust. The turtledeck is built last, after the stabilizer and wing are aligned upside down on flat surface. Install the elevator and rudder tubes before sheeting the rear portion of the fuselage with soft 3/32" balsa, applied cross-grain. Install the engine blind mounting lugs to F1, taking care to offset them 3/16" to the left side to allow for the 2° right thrust. Install the 5/8" soft balsa bottom nose block and rough carve to fit a 2-1/2" spinner. We cut out a large cooling hole under the engine to allow access to the nose gear steering arm, inspection of the adjustable engine mount, and throttle connection. **Do not glue on the top block or turtledeck yet!**

The fin, rudder, and dorsal fin are 3/8" soft balsa. Note grain direction and the 3/8" x 1/2" fin top. Shape and sand to airfoil and bevel the leading edge of the rudder to the angles shown on the plans. The horizontal stabilizer is a simple 3/8" x 1/2" medium balsa frame with a 3/8" balsa center section installed cross-grained as shown. The ribs are 3/32" x 3/8" balsa trusses. Sand the leading edge round, but leave the trailing edge square. The elevators are cut from soft 3/8" balsa. Sand to airfoil shape and bevel leading edges as shown before joining. The elevator connecting rod is bent from the wire of a heavy duty pants type coat hanger. This will allow one or both of the elevators to be bent up or down slightly during flight trimming. This is so simple, I don't know why it took me thirty years to figure it out.

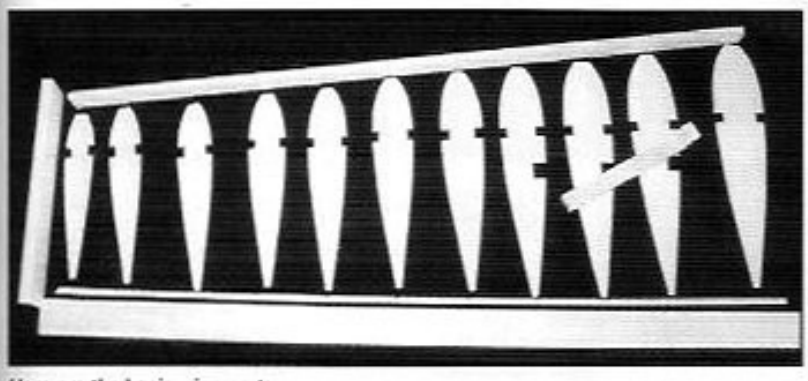
Over the years we have experimented with every possible wing planform and airfoil. We tried rectangular wings ala Kraft's Kwik Fli, straight trailing edge with swept back leading edge ala Bridi Sun Fli, straight leading edge with swept forward



Note servo rail supports. All radio gear installs rearward. Battery pack is installed last to achieve final balance.



This Du-Bro #727 mount holds a Surpass .90. Notice the 2° of right thrust.

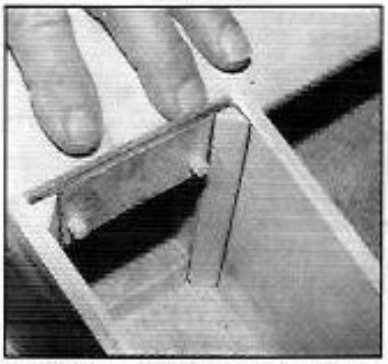


Here are the basic wing parts.

Top/bottom wing sheeting forms a structural "D" tube.

Wing is positioned and 1/4" dia. holes are drilled to accept the wing's leading edge dowels.

The washout jig is cut per plans and is pinned in place before wing assembly starts. The Southern Eagle won't fly right without this washout feature.



1/4" dia. dowels are trial-fitted and glued in place.

trailing edge ala Mooney ... you name it. Bottom line is, if you want to fly in windy conditions you must have a double tapered wing with a thick, tapered symmetrical airfoil with minimum of 2° washout at the wingtips, just like the big guys. Ed Kazmirski's old Taurus wing comes closest to perfect for windy Florida. Our wing is a simple D-Tube construction that when built on the balsa jig, goes together quick and is strong as a surfboard. We use a servo on each aileron. Use any shape wingtip you like. We squared ours off like the current bunch of Extras, etc. Dihedral isn't all that critical. Anything from flat on top to 1-1/4 inches is okay. Just be sure to balance the wing laterally. Oh yeah, take time to build the bottom fuselage fairing. You'll hate yourself if you don't.

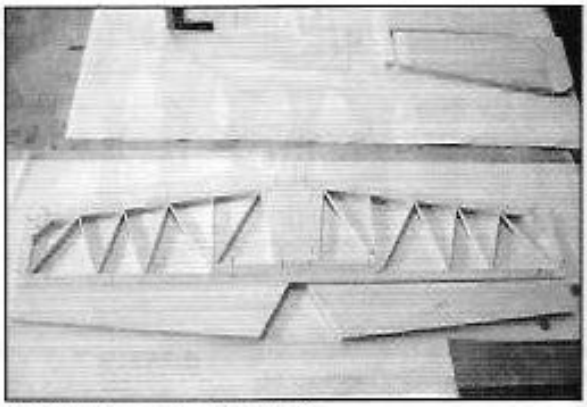
After assembling the wing, fit it carefully to the fuselage upside down on a flat surface. Align the wing with the stabilizer. With the wing held firmly in place, drill 13/64" holes down through the 1/16" ply wing bolt plate and through the 1/4" ply hold-down mounts in the fuselage. Re-drill the holes in the wing to 1/4". Cut threads in the ply hold-down blocks in the fuselage with a 1/4-20 tap. Now harden the threads you have cut with thin CA. Fasten the wing on with 1/4-20 x 2" nylon bolts cut to proper length.

Now, you can install and carve the top block and build the turtledeck as

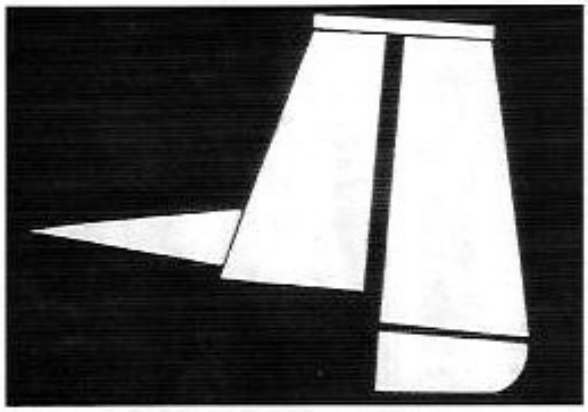
Wing is "squared" on the fuselage before the wing bolt holes are drilled, then a 1/4-20 tap cuts the threads for nylon wing hold-down bolts.

Southern Eagle uses a servo on each aileron. Note the holes cut for the servo pigtails to exit the top center section. The center section then gets glass and epoxy wrapped for strength.

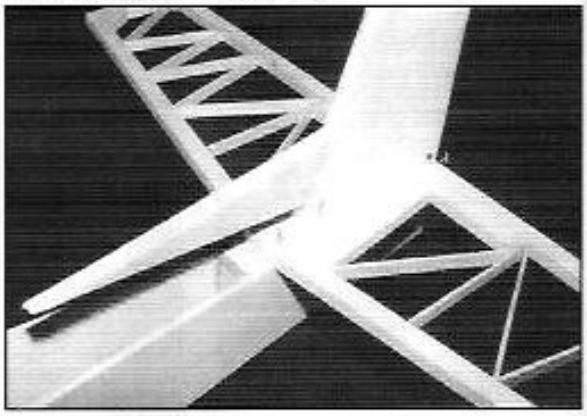
Dampen the outside surface of the balsa sheeting behind the cockpit. It will then curve easily to fit the bulkheads. The canopy (in the foreground) is the Great Planes CANPF040.



Stab/elevator construction is basic.



Wood for the fin/rudder can be soft/light.



Here's a trial-fit at the tail.

The Great Planes multi-sander's smallest diameter nicely rounds the leading edge.

Ready for covering.

Materials List

Balsa Wood

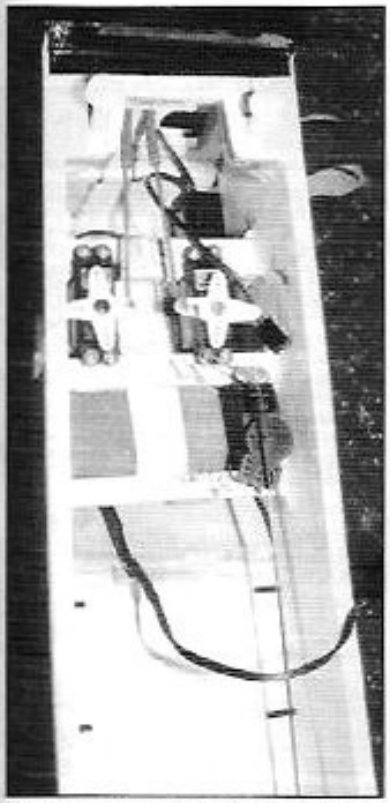
2 — 3/16" x 6" x 48", hard (fuselage sides)
2 — 3/8" x 4" x 36", soft
1 — 3/4" 4" x 36", soft
10 — 3/32" x 4" x 36", medium/soft
1 — 1/2" x 3" x 36", soft
1 — 1/2" x 36", triangular stock
2 — 1/4" x 1/2" x 36", medium
1 — 3/32" x 3" x 36", medium
4 — 1/4" x 1/4" x 36", medium
1 — 3/8" x 6" x 36", soft
2 — 3/8" x 1" x 36", soft
4 — 1/4" x 1/2" x 36", hard (wing spars)
2 — 3/8" x 1-1/4" x 36", hard (tapered aileron stock)

Hardwoods

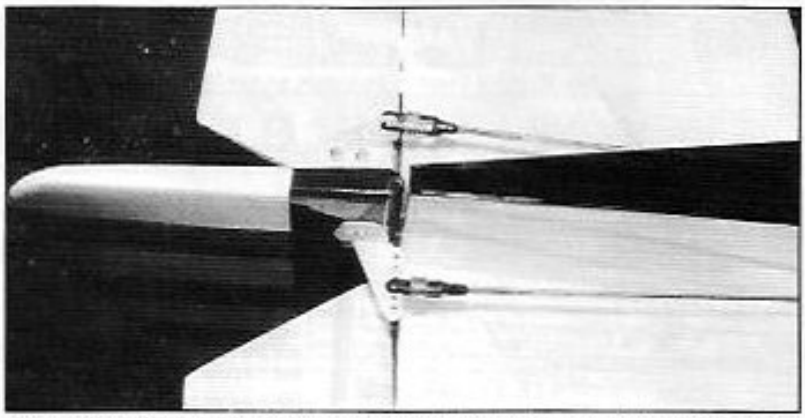
1 — 1/8" x 6" x 12", high grade plywood
1 — 1/4" x 6" x 12", high grade plywood
2 — 1/8" x 6" x 24", lite ply (fuselage doublers)
1 — 3/8" or 1/2" x 36", triangular stock
1 — 1/4" x 36", birch dowel

Miscellaneous

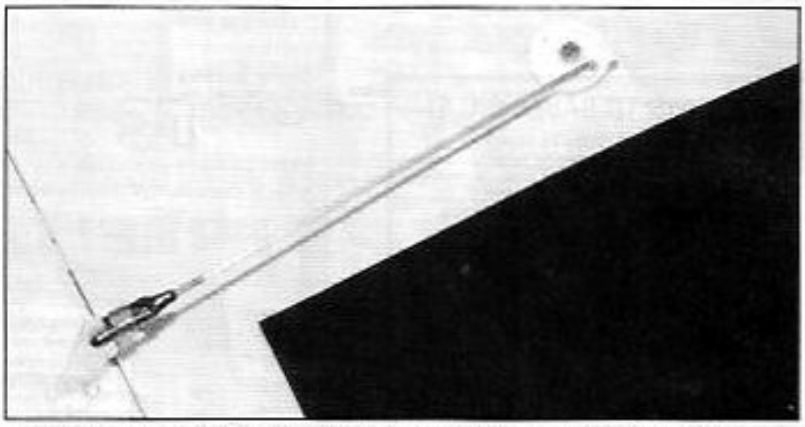
R/C system with four flight control servos of at least 40 inch ounces of torque, plus a throttle servo
.70 to .91 4-stroke engine (or .45-.61 2-stroke)
propeller(s) as needed
1 — 2-1/2" spinner
3 — 2-1/2" wheels
1 — engine mount to suit
1 — steerable 5/32" nose wheel strut
1 — 5/32" x 36" landing gear wire
6 — 5/32" wheel collars
1 — 12 to 14 ounce fuel tank and fuel line
1 — cockpit canopy and pilot
2 — 1/4" nylon bolts (wing attachment)
rudder, elevator, aileron, throttle horns, links, clevises to suit
CA-type hinges
2-1/2 6' rolls of covering, plus trim colors
4" wide x 36" medium glass cloth
1 ounce thin CA
2 ounces medium CA



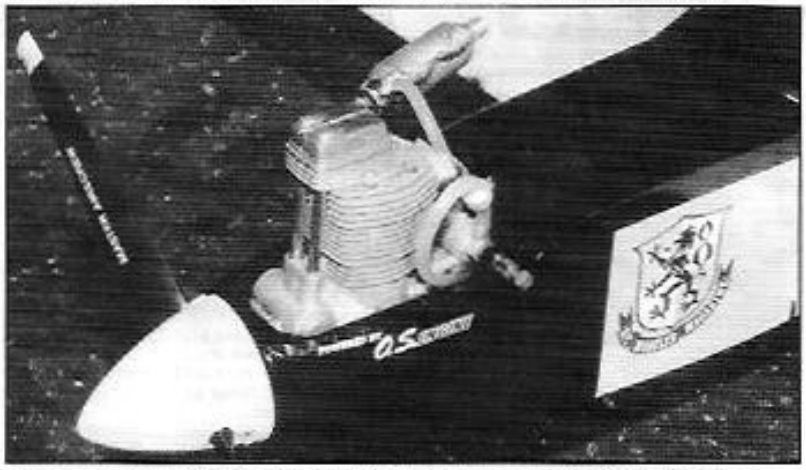
Servos/receiver are installed rearward -- behind the cockpit area. With the O.S. .91 Surpass installed, the battery pack is placed rearward in a hatch between the wing and stab for proper balance.



Solid wire pushrods are Great Planes GPMQ3716 with steel-pinned Klett clevises, fuel line retainers for added security.



This photo shows the left aileron's servo that's been simply covered over in place.



The .91 size 4-stroke is most popular, a 13 x 6 MAS prop and a 2-1/2" Du-Bro spinner.

shown on the plan. Trial-fit your choice of canopy or leave the cockpit open. We have used many brands of commercially available canopies. I used an Ace Bingo canopy on my present plane, spraying the inside with black Rustoleum paint for visibility. Don McGeorge trimmed down a Great Planes Ultra Sport 60 canopy and it looks good.

Assemble, finish, and trim your plane to your liking. Just keep it light. The first three or four were silked and doped. All the later ones were finished in film. The planes in the construction photos were artfully built by good friend and master builder Don McGeorge. All the photos were taken by my good friend Stu Richmond, master test pilot, who has test flown and trimmed out every one of my versions of this plane for over ten years. Stu, Don, and a handful of us old-timers are the only Mode I pilots left in our area, and I am honored to be graced with their experience, expertise, excellence, and advice.

Presently, several Southern Eagles are being flown from the Carolinas to South Florida. They are powered by a wide array of engines from .46's to .91's. And their pilots love them.

When I fly mine with its O.S. .70 4-stroke purring, it is truly a comfort to me in my old age. I'll bet yours will be too!

Questions? Contact me through R/C Modeler magazine, or e-mail me at:

Kaynbee@aol.com