PHARAOH

Using both slats and flaps, this .40 powered sport flier is your ticket to some "slow flight" fun!

By Steven Galea

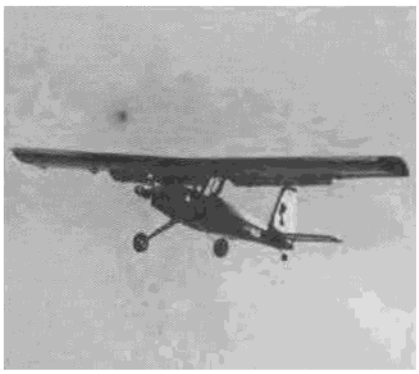
The Pharaoh is a 60" span model designed for short take-off and landing and safe slow speed flying. I had intended to design and construct a model of this type for quite a long time, and now at last, after finishing other projects, I have gotten around to doing it. A high aspect ratio and high lift wing section was called for, so as to produce safe slow flying characteristics. The parasol wing also helps in this respect as well as making the Pharaoh look a bit different from the rest. Flaps and slats were added to make an effective **STOL** machine. Construction of the model is very simple and should be of no problem to any of you balsa cutters.

CONSTRUCTION

Fuselage:

Fuselage construction is the standard box type with rounded top decking. The best way is to prepare a kit of all the parts needed. Fuselage sides are made from 3/32" medium hard sheet balsa, to these, 1/4" sheet doublers and 1/4 sq. in. longerons are added. Note that the fire wall has a small amount of side and down thrust; therefore, the front doublers have to be cut keeping this in mind. At this point, be sure to make one left and one right fuselage side. Next, all formers can be added and the sides joined together, making sure that everything is glued straight and square.

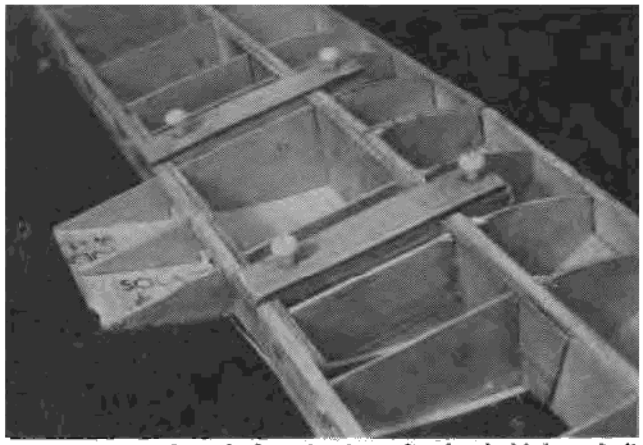
The fuselage is nearly complete and all that is left is to put the top longerons in place, add the front decking, and sheet the fuselage bottom with 1/16" balsa. Before

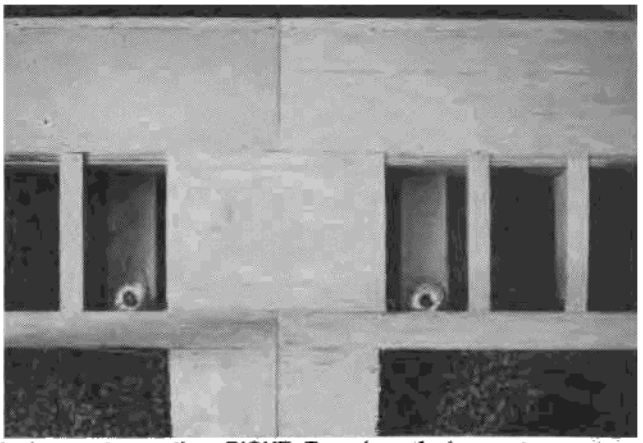


PHARAOH
Designed By:
Steven Galea
TYPE AIRCRAFT
Sport
WINGSPAN
63 Inches
WING CHORD
9 Inches
TOTAL WING AREA
567 Sq. In.
WING LOCATION
Parasol
AIRFOIL
Clark Y (Mod)
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1 Inch
OVERALL FUSELAGE LENGTH
44 Inches
RADIO COMPARTMENT SIZE
(L) 6" x (W) 3½" x H 3"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
6 Inches (Avg.)
STABILIZER AREA
114 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
9 Inches
VERTICAL FIN WIDTH (incl. rud.)
6½ Inches
REC. ENGINE SIZE
.40 2-stroke
FUEL TANK SIZE
10 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4 (5 w/Flaps)
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., Flaps
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready To Fly	80 Ozs. (5 Lbs.)
Wing Loading	20 Oz./Sq. Ft.

covering the front top decking, the wing struts should be bolted in place to the ply plates. The bottom sheeting should be done cross-grain so that maximum strength is obtained. The rear top decking can be covered with balsa, but there is no structural need. I preferred to cover with heat shrink fabric, at the same time saving a bit of weight.





LEFT: Bottom view of wing structure showing hold-down bolts and wing center section. RIGHT: Top view of wing center section.

Wing:

Wing construction is all built-up from balsa and ply. Start by cutting all ribs and spars needed as specified on the plan. Pin spars to the board and glue ribs in position. Add the upper spars in place and after the glue sets, add the 1/16" balsa sheeting on the L.E. and T.E. Capstrips should be added at this stage. You can now detach the panel from the board and complete the other panel in the same manner.

Flaps and ailerons should be cut away from the wing and their construction completed, keeping in mind horn and flap hinge attachment points. Ailerons and flaps are best permanently attached to the wing after covering is complete.

The wing panels can now be joined together with the 1/8" ply dihedral braces at the angle specified on the plan. At this stage, the ply plates for the wing attachment can be glued in place and drilled to accept the captive nuts after aligning with the fuselage.

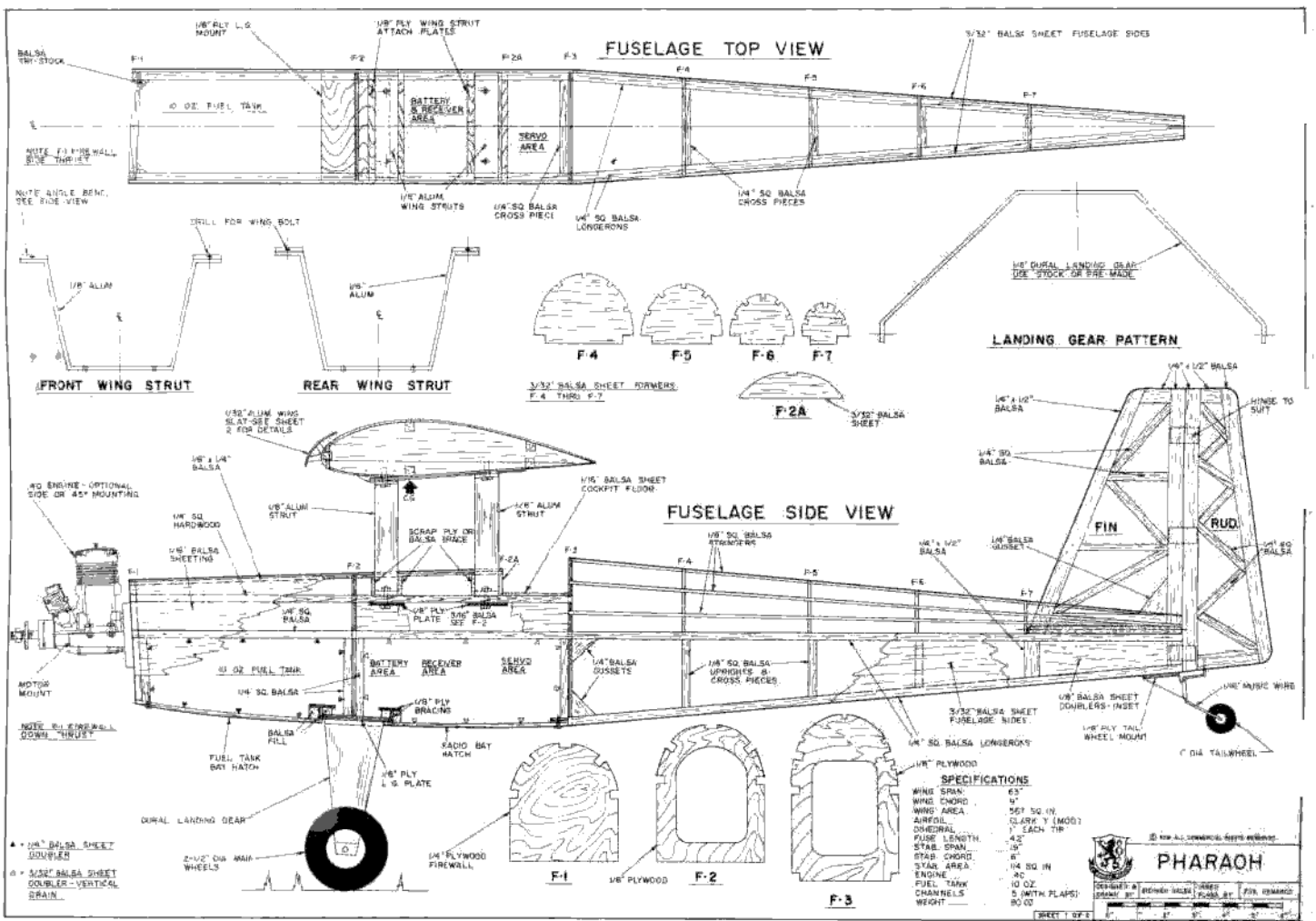
I made the slats out of 1/32" aluminum sheet, formed over a suitable circular section and attached to the L.E. as shown on the plan. If aluminum sheet is not available, the slats can easily be made out of balsa. Care should be taken when installing the slats as it is important that the gaps between the slats and the wing are made as shown.

Tail Feathers:

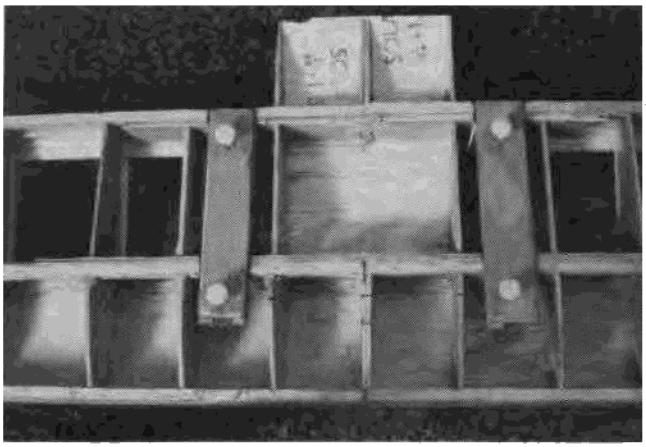
The horizontal stabilizer and vertical fin are from 1/4" square balsa. Lazy guys may prefer to make them out of sheet balsa, but the built-up construction is obviously lighter and looks better.

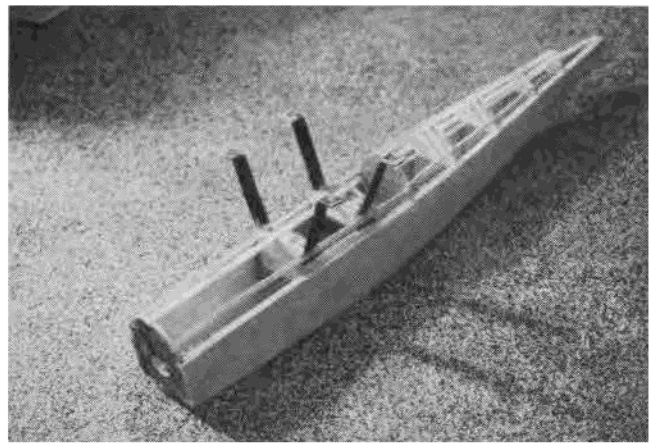
Radio and Engine:

There is ample space in the radio bay to fit all servos and rx equipment without any problems, the engine and fuel tank installation is straightforward. The tank bay offers space for a fuel tank up to 12 ozs. in size which is more than enough for the .40



FULL SIZE PLANS AVAILABLE — SEE PAGE 192





LEFT: Nylon wing hold-down bolts allow wing to break away if crashed. RIGHT: Cabane struts.

engine I used.

Covering and Finishing:

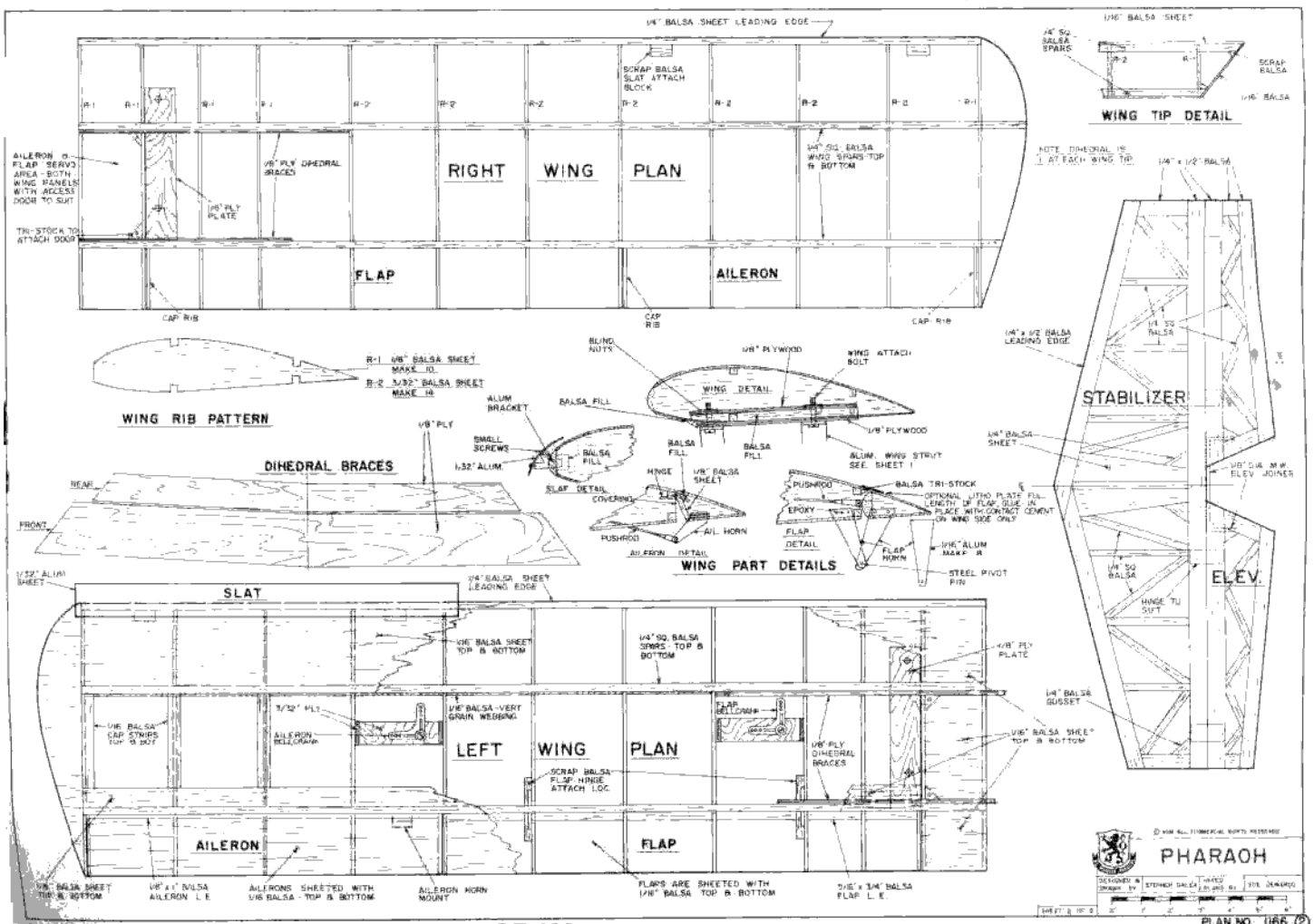
I covered all open structure with opaque heat shrink fabric. This is very attractive, especially when the model is flown on a sunny day and the wings are lit up by the sun. The sheeted areas are sprayed with cellulose paints, preparing in the usual manner with dope and sanding sealer.

Flying:

After checking for correct C.G. position, correct direction of movement on flying surfaces and a range test, you can do the test flight with no trepidation. The Pharaoh is generally well behaved and has no vices.

Bill of Materials

- 6 — 3/32" x 4" x 36" sheet balsa (fuselage sides, ribs, formers)
- 2 — 1/8" x 4" x 36" sheet balsa (fuselage sheeting, ribs, doublers)
- 6 — 1/16" x 4" x 36" sheet balsa (wing sheeting, fuselage top decking)
- 4 — 1/16" x 3" x 36" sheet balsa (wing sheeting)
- 4 — 1/8" x 1/8" x 36" strip balsa (longerons)
- 3 — 1/2" x 1/4" x 36" strip balsa (stab and fin structure)
- 16 — 1/4" x 1/4" x 36" strip balsa (wing spars, longerons)
- 1 — 1/4" x 1/4" x 36" strip spruce (cabane attachment points)
- 1 — 4" x 4" 1/4" ply sheet (F1)
- 1 — 12" x 6" 1/8" ply sheet (F2, F3)
- 1 — 1/16" x 3" piano wire for tail wheel
- 2 — yards covering material
- 4 — horns (rudder, elevator, ailerons)
- 2 — 2 1/2" dia. wheels
- 1 — 1" tail wheel
- 11 — hinges
- 1 — 10 oz. fuel tank
- 1 — motor mount
- — 12" silicon line
- — 1/8" aluminum sheet for landing gear — wing struts
- — 1/32" aluminum sheet for slats



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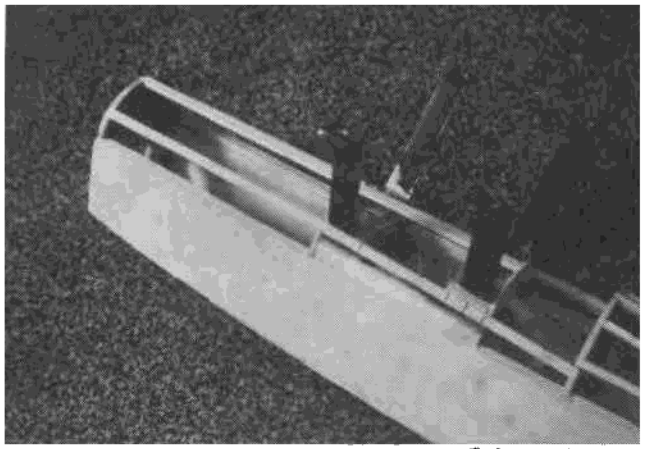
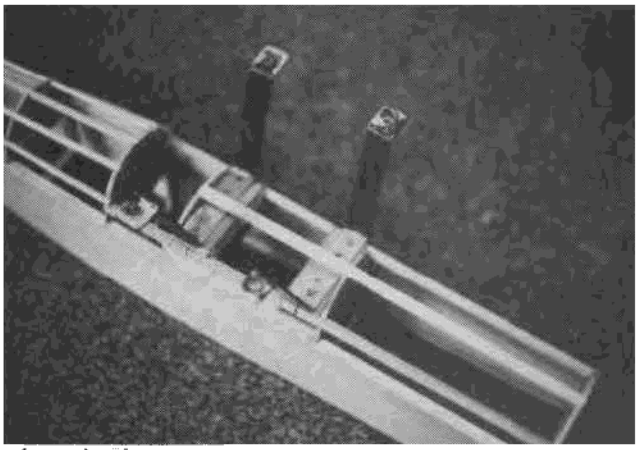
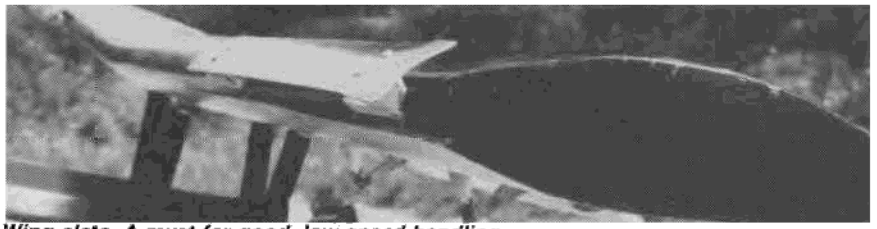




Cabane struts and fuselage structure.



Wing slats. A must for good, low speed handling.

Take-off is the usual procedure for taildraggers; a touch of right rudder to keep the model tracking straight into wind until speed builds up, then a touch of up elevator will get you airborne. After a few familiarization circuits you can start trying out the slow speed handling and flaps. When the flaps are deployed, there is little trim change. The slats really work and I strongly recommend that you fit them, as slow speed handling is greatly improved. To spin the model is almost impossible, with full up elevator, the model just mushes around. When you get used to the flaps, flying does get interesting with steep approaches and short take-offs. My favorite maneuver is to hover on the threshold at around 100 feet with full flaps applied, then cut the throttle and push down elevator for a steep dive and flare out to a landing. With a 10 knot wind you can hover, and in anything stronger you can actually fly backwards and land with no forward speed. It is also possible to make a landing from a low loop over the runway, by deploying full flap when inverted at the top, let the model drop towards the ground and flaring out for the landing. I can assure any of you who build a Pharaoh good fun flying, lots of excitement, and unusual maneuvers. □

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