Medicine · Man
60" trainer/sport sailplane for thermal or slope flying.
Designed and drawn by Ryan Grosswiler Autumn 2008
Wing Leading Edge: 1/4" sq. hard Balsa.
Wing Trailing Edge: 1" x 1/4" Balsa T.E. Stock.
Right Wing
Left Wing
R-2
R-3
R-4
R-5
R-6
R-7
R-8
R-9
R-10
R-11
R-12
R-13
R-14
R-15
W-1
W-2
3/8" x 3/16" Spruce Spar.
Dihedral Brace/Spar Carry-Through
Note: top 1/16" balsa sheeting omitted in this view.
Note: all ribs 1/16" sheet Balsa.
notches as called out in Step 1.
* Bevel top side of W-1 to accomodate wing L.E.
Make from 3/8" x 3/16" Spruce.
Dihedral Brace/Spar Carry-Through
C/L
Wing Construction:
Step 1. Cut pieces of 1" x 1/4" balsa T.E. stock to shape, (2) for each wing, to create wing trailing edges.
· Accurately mark and cut 1/8" notches on these pieces for rib trailing edges as shown on plan.
· Pin and glue in place 1) wing trailing edges, 2) part W-2, 3) wing spar, 4) part W-1, and 5) 1/16" balsa center section sheeting aft of spar. Note that ribs R-1 and R-2 will lie on top of this sheeting, and that sheeting forward of spar is not installed until later.
Step 2. Fit and glue ribs R-2 through R-15 to wing trailing edge and spar.
· Glue 1/4" sq. Balsa leading edge in place, and allow assembly to dry thoroughly.
Step 3. Remove from plan. Mark and cut wing tip curves in the same manner as the tail surfaces. Match and sand to ensure symmetry.
· Sand wing leading edge to a consistent curve as shown in R-1 cross-section, found at fuselage side view.
· Shape and sand spar at wing tip, tapering it to meet the edges of W-1 and W-2. Shape and sand joint of wing T.E. pieces (in the vicinity of R-14 and R-13 trailing edges) to a smooth surface.
Step 4. Block-sand wing root edges to a perfect straight edge. Pin one wing panel back to plan, and mate the other in place with its tip raised 6 1/2" above the work surface. Block-sand the centerline joint until fit is perfect.
· Make Dihedral Brace from 3/8" x 3/16" spruce.
· Glue wing centerline joint, mate wing panels, and block non-pinned wing back up 6 1/2". Install ribs R-1.
· Glue and clamp Dihedral Brace in position forward of wing spar. Allow to dry thoroughly.
Step 5. Remove from plan. Cut, glue, and install remaining 1/16" center section sheeting.
· Sand completed wing for consistent smoothness.
Important: install 1/8" wing washout here after covering.
Hint: spar will sand at a slower rate than surrounding balsa. To keep area smooth, sand from spar outward.
W-1 3/16" sht.
W-2 3/16" sht.
Note: Bevel at hinge line.
· Remove rudder and elevator. Block-sand bevel at leading edges as shown on plan. Re-install hinges and set aside.
Step 3. Remove from plan.
· Cut slots for hinges and temporarily attach elevator and rudder to their respective assemblies.
· Sand around perimeter, first to refine curves at tips, then to round all outside edges.
Step 2. After building both horizontal and vertical stabilizers in this manner, remove from plan when glue has dried thoroughly.
· Hold plan up to light. Line up tail parts to back of plan view and pin in place. Lay plan back down, and punch holes with a pencil through plans into wood at 1/8" intervals; thus transferring shape of tip curves to wood.
Tail Construction:
Step 1. Lay plan flat on pin-permeable board. Cover with wax paper.
· Cut glue, and pin parts into position on plan, building up a 'perimeter' with outside parts first, then following with interior structure. Cut each part carefully, test fit, and adjust by sanding.
H-1 (Elevator) 3/16" Balsa Sht.
Elevator Control Horn: Install after covering.
Elevator Joiner: Cut from 3/16" x 3/8" Spruce
Horizontal Stabilizer
Note: tail framework is 3/16" x 1/2" balsa, except where noted.
Note: if this is your first model, go to your local hobby shop for general assistance...
(For more detailed photo instructions see "Make" magazine issue #17
... and start here
To Shape Nose:
1. Laminate (6) 3/16" balsa pieces...
or: use 2" x 2" x 1 1/4" balsa block.
2. Glue to nose at St. 1 after 3/16" fuselage sheeting has been attached. Allow to dry overnight.
3. Draw plan view of nose on top (a). Block-sand to shape (b).
4. Repeat for side elevation view (c).
Note: Top 3/16" balsa sheeting omitted for clarity.
Use (6) #64 rubber bands criss-crossed between dowels to mount wing.
3/16" Balsa Sheet, crossgrained.
Note: all fuselage framing 3/16" sq. balsa, except where noted.
3/16" hardwood wing mount dowels.
★ 3/16" Scrap 'Sliver': insert and glue (top + bottom) after sides are joined.
Note: 'taper', as called out in Step 1, begins at this point and continues aft.
Be sure to create a 'left' and 'right'!
Servo Tray: Build from scrap.
Adjust this dimension to suit Servo size.
3/16" sq Balsa
3/16" x 3/8" Spruce
ACME MICRO SERVO
Pushrod Axes
Covering - use diagram. Ultracote, Monokote, or similar.
72"
34"
32"
7.5"
5.5"
26"
wings
fuselage
5"
2"
vert. stab.
horizontal stab.
spare
not to scale
Fuselage Construction: Step 1.
· Build (2) fuselage sides on plan side view, one at a time.
(x2)
· Remove from plan, pin together, and sand perimeter to match. Drill 3/16" holes for wing dowels. Separate and block-sand to taper inner faces of extreme aft end (see note).
Step 2. Referring to plan top view, cut cross-members for Stations 1 through 7. Make a 'top' and 'bottom' for each.
· Stand fuselage sides up 90° on plan.
· Pin in place at Sts. 3 and 5.
· Glue and pin top and bottom cross-members at Sts 3 and 5.
· Make sure resulting 'box' is absolutely square and allow to dry thoroughly.
Step 3. Keeping fuselage pinned accurately to plan, clamp tail (St. 9) together and glue (a).
· Glue and pin in place remaining cross-members.
· Finish by gluing and 'trapping' St. 1 cross-members using bricks or similar to pinch together fuselage sides exactly over plan (b).
· Allow glue to dry thoroughly. Dreaded 'banana' fuselage shape can be further avoided by spraying completed frame while pinned with a 4:1 alcohol/water mixture to relieve tensions in the wood.
Step 4. Remove fuselage from plan.
· Fit and glue 'slivers', top and bottom, at St. 8.
· Glue top and bottom 3/16" balsa nose sheeting.
· Laminate and glue nose block at St. 1, and tow hook mount at St. 3.
· Allow to dry and shape nose block according to instructions at left of plan.
· Drill 3/16" holes in F-3 and St. 8 for elevator and rudder pushrods.
Equipment Bay Hatch: tack-glue only between these points. Cut loose after sanding.
Secure with 1/16" balsa 'tongue' at each end.
R-1
3/16" dia. holes for wing-mount dowels: fore and aft of wing.
F-1 3/16" Balsa Sht.
F-2 3/16" Balsa Sht.
Pushrod support.
Elevator Pushrod
Rudder Pushrod
F-3 3/16" Balsa Sht.
Note: cross-members at St. 3 and 5 are 3/8" x 3/16" spruce
★ Tow Hook Mount: Laminate from (2) 1" lengths of spruce.
★ Cover fuselage underside 3-ply between Sts. 3 and 5 for better durability if landing on dry straw.
Note: fuselage cross-member locations are indicated in side view by shaded patches.
Optional 3/16" scrap balsa fillets for aesthetics.
Hinge Locations
3/16" Balsa Sht.
V-2 (Rudder)
V-1 3/16" Balsa Sht.
.032" Music wire tail skid.
Landing Skid:
Cut to 6 1/2" length from .016" x 1/4" brass strip. Round ends and drill 1/16" holes as shown.
Stick to fuselage after covering with small (< 1/4" dia) rolls of masking tape to provide spring action. Secure at each end with small sheet metal screw.
Tow Hook.
Note: Carets ("▲") denote outline of fuselage sides as called out in Step 1.