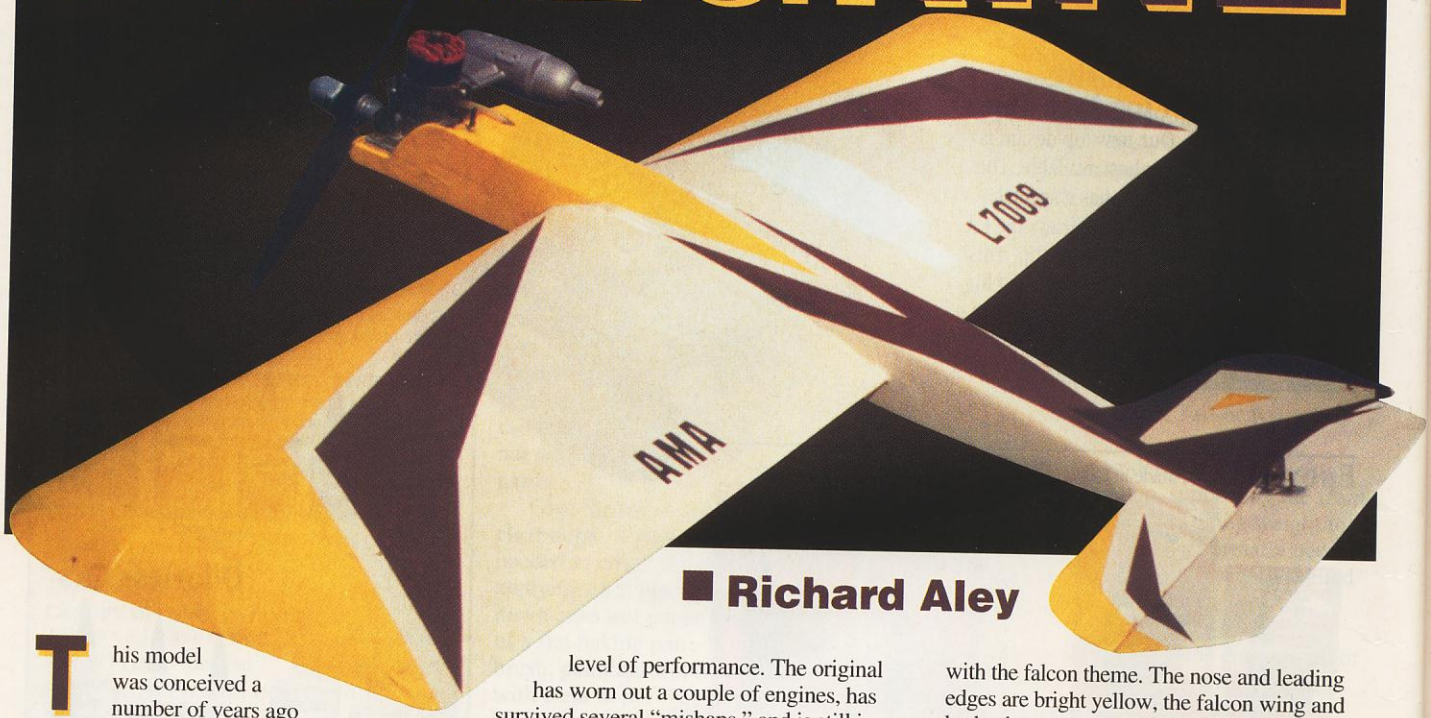
PEREGRINE



■ **Richard Aley**

This model was conceived a number of years ago while I was attending college. The goal was to design a light, strong, maneuverable, .35-powered airplane for Slow Combat and general sport use. The model had to be easy, fast, and cheap to build (Starving Student Syndrome). To this end all structure is of the simplest, tried-and-proven design, with a couple of modifications to increase strength.

The model was dimensioned so that standard-size wood could be used wherever possible. This resulted in wingspan of 36 inches, less tips; a wing leading edge width of three inches; and a fuselage depth and stabilizer width of two inches.

The results were better than I had dared hope for. The design has been successfully flown with a variety of engines from .19 to .35; all performed well. The choice is yours, depending on your flying skill and desired level of performance. The original has worn out a couple of engines, has survived several "mishaps," and is still in flying condition.

Really outstanding maneuverability is achieved by using a relatively thick airfoil and short nose and tail moment arms, in the fashion of Hal deBolt's Stuntwagons. However, like most other things in this world, you don't get something for nothing.

Because of the short tail moment arm, the acceptable center of gravity (CG) range is quite narrow, and the airplane must be balanced at the point shown on the plans. Too far back and the elevator will be very sensitive; too far forward and it will glide like a streamlined brick when the engine quits—even with full up elevator!

The name was taken from the peregrine falcon—noted for its swift attacks. This seemed appropriate for a Combat model. The paint design is an attempt to carry through with the falcon theme. The nose and leading edges are bright yellow, the falcon wing and body chevrons are chocolate brown, and everything else is white.

CONSTRUCTION

Wing construction is a standard D-tube except that the D is closed with vertical webs between the two spars. There are also vertical webs between the two sheet trailing edges. These webs close the leading and trailing edge triangles, and are crucial to the wing's strength. The strength of this wing is in the structure, not the covering. (The original Peregrine was covered with silkspan and finished with dope. However, any of the iron-ons will work well.)

The wing airfoil is an original section that has been replotted for this article on SoarSoft's excellent Compufoil computer program. For those who have this program, or would like to have a copy of the computer plot to use as a construction template, send me a

Intermediate-level model is lightweight and durable

Photos by the author Graphic Design by Carla Kunz

Simple, clean lines produce a very attractive model. A McCoy .35 Red Head powers the original.

SASE and I will send you a copy of the Compufoil coordinates and the airfoil plot.

A flat surface, soft enough to accept pins, is essential for a true wing. Cover the plans with waxed paper and pin a ¼ square spar in place. Put scraps of 1/16 sheet between the spar and plans at each rib location to allow for the 1/16 inch sheet leading edge. Temporarily shim up the rib trailing edges with the other ¼ square spar so that all rib TEs are parallel to the building board.

Pin and glue all ribs in place, making sure they are perpendicular to the spar in both the horizontal and vertical directions. Glue the ¼ square LE and one of the 1/16 x 1 TEs in place. Remove the ¼ square spar that was used as a shim and glue it in place on top of the ribs.

When the glue is dry enough to remove the pins in the LE and top spar, pin and glue the top LE and center section sheets in place. Carve or sand the top of the LE to match the ribs before gluing on the LE sheeting.

Allow the whole assembly to dry thoroughly (preferably overnight) before removing from the plans. Turn the wing over and cut holes in the left-hand ribs for the leadout wires. Install the bellcrank mount, bellcrank, leadouts, pushrod, wingtips, leadout guides, and tip weight. Leave the pushrod extra long for now; it will be cut to size later when it is hooked up to the elevator. Pin and glue the other 1/16 LE and center section sheets in place. You will have to cut a slot in this center section sheet for the pushrod exit. Make the slot as small as possible and try to locate it as close as possible to the final position. Once the stabilizer and elevator are installed you will have to enlarge the exit slot to provide pushrod clearance for the full range of elevator travel.

Now comes the most important step in the wing construction:

Pin the wing to the building board with the one installed TE sheet on the bottom. Pin the TE flat against the board! Use scrap ¼ square shims under the bottom spar to ensure that the wing is flat. Now glue the other TE sheet in place, and glue the webs between the front spars and the TE sheets. Allow the glue to dry thoroughly and you will be assured of a flat wing.

Remove the wing from the building board and sand with 100-grit paper to remove all rough edges and to shape the LE and the tips.

PEREGRINE

Type: CL Slow Combat/Sport

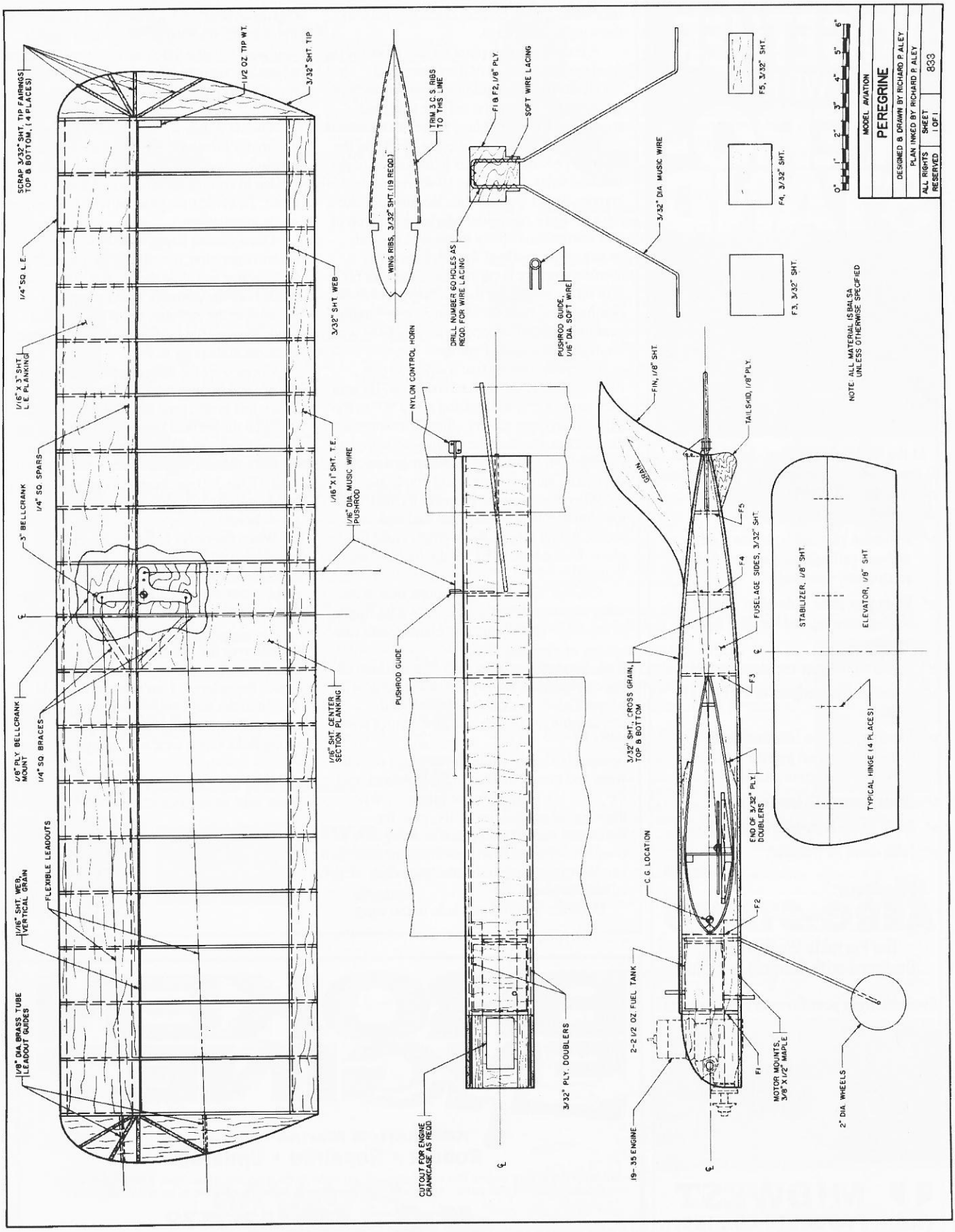
Wingspan: 38 inches

Engine: .19-.35 two-stroke

Construction: Built-up

Covering/finish: Silkspan/dope or film

Author adjusts needle valve for another successful flight.


SCRAP 3/32" SHT. TIP FAIRINGS TOP & BOTTOM, (4 PLACES)
1/2 OZ. TIP WT.
3/32" SHT. TIP
1/4" SQ. L.E.
1/16" X 3" SHT. L.E. PLANKING
3/32" SHT. WEB
3" BELLCRANK
1/4" SQ. SPARS
1/16" X 1" SHT. T.E.
1/16" DIA. MUSIC WIRE PUSHROD
1/8" PLY BELLCRANK MOUNT
1/4" SQ. BRACES
1/16" SHT. CENTER SECTION PLANKING
1/16" SHT. WEB, VERTICAL GRAIN
FLEXIBLE LEADOUTS
1/8" DIA. BRASS TUBE LEADOUT GUIDES
WING RIBS, 3/32" SHT. (19 REQD.)
TRIM 3 C.S. RIBS TO THIS LINE
F1 & F2, 1/8" PLY
SOFT WIRE LACING
3/32" DIA. MUSIC WIRE
F5, 3/32" SHT.
F4, 3/32" SHT.
F3, 3/32" SHT.
DRILL NUMBER 60 HOLES AS REQD. FOR WIRE LACING
PUSHROD GUIDE, 1/16" DIA. SOFT WIRE
NYLON CONTROL HORN
PUSHROD GUIDE
CUTOUT FOR ENGINE CRANKCASE AS REQD
3/32" PLY. DOUBLERS
FIN, 1/8" SHT.
TAILSKID, 1/8" PLY.
GRAIN
F5
F4
FUSELAGE SIDES, 3/32" SHT.
F3
3/32" SHT., CROSS GRAIN TOP & BOTTOM
C.G. LOCATION
END OF 3/32" PLY. DOUBLERS
F2
F1
2-2 1/2 OZ. FUEL TANK
19-35 ENGINE
MOTOR MOUNTS, 3/8" X 1/2" MAPLE
2" DIA. WHEELS
STABILIZER, 1/8" SHT.
ELEVATOR, 1/8" SHT.
TYPICAL HINGE (4 PLACES)
NOTE: ALL MATERIAL IS BAL SA UNLESS OTHERWISE SPECIFIED
0" 1" 2" 3" 4" 5" 6"
MODEL AVIATION
PEREGRINE
DESIGNED & DRAWN BY RICHARD P. ALEY
PLAN INKED BY RICHARD P. ALEY
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SHEET 1 OF 1
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Finish sanding with 220-grit and set aside.

Fuselage: The fuselage nose strength is derived from the plywood doublers and the hardwood engine bearers extending back to the wing leading edge.

A common weak point on any model is the fuselage just forward of the horizontal stabilizer. By maintaining a constant fuselage width all the way to the tail, the side load strength of the aft fuselage is greatly increased.

Begin fuselage construction by gluing the 3/32 inch plywood doublers to the inside of the fuselage sides. One of the 10-15-minute epoxies works well for this. Be sure to make a left side and a right side! Mark the location of five formers and epoxy the 3/8 x 1/2 engine mount to the inside of the fuselage sides. While the epoxy is curing, use a number 60 drill bit to drill F2 for the landing gear bindings, and bind the 3/32 music wire landing gear to it with soft copper wire. Lock the wire binding with a coat of epoxy.

Carefully glue all five formers to one fuselage side at the marked locations. Be sure they are properly located and are at 90° to the side. When these are dry, glue the other side to the formers. Position the engine and trim the fuselage sides and bottom as required to clear the needle valve, exhaust, and crankcase.

When the engine is properly located, drill the engine mounts. Install the fuel tank and secure it with scrap balsa wedges glued in place. Drill a hole in F1 for the fuel line as required.

Caution: The fuselage is quite thin in the wing cutout area and as a result is a bit fragile at this stage of construction. Handle with care!

Tail: Sand tail surfaces smooth and round all edges except the lower edge of the vertical fin where it glues to the fuselage. Install the elevator hinges and the elevator control horn.

Assembly/finish: Slide the fuselage over the wing and glue it in place. Double-check that the wing is square with the fuselage. When the wing/fuselage joint is dry, glue the horizontal stabilizer in place, making sure it is square with the fuselage centerline and parallel to the wing. Glue the plywood tailskid in place.

Open the pushrod exit hole in the wing center section planking as required for clearance. Put the bellcrank and elevator in the neutral position and bend the pushrod to connect with the elevator control horn. You can use Z bend or a 90° bend and wheel collar to retain the pushrod on the control horn. If you want to get a little fancy you can use some of our RC friends' hardware and solder on a threaded rod adapter and screw on a threaded clevis.

The 1/16 music wire pushrod is routed externally for simplicity. However, because it is unsupported, it will tend to bend when loaded in compression (down elevator, in this case). To avoid this, proceed with the pushrod guide installation.

Once you are happy with the control system operation, disconnect the pushrod from the elevator and slide the 1/16 soft wire pushrod guide onto the pushrod. Reconnect the pushrod to the elevator, insert the pushrod guide through the fuselage sides at the proper location, and epoxy to F4.

Check over the tank installation, then glue the top and bottom fuselage sheet in place. When this is dry, sand the fuselage to shape and glue the vertical fin in place. Be sure to locate it with the offset shown on the plans.

Give the entire framework a final sanding with 220 or 320 sandpaper. You are now ready to cover the wing, and to apply the finish of your choice.

When the finish is complete, install the engine and attach the wheels. If you want to dress the model up a little, you can add a canopy and a pilot, although I didn't do so on the original.

Check over the whole airplane. Pay particular attention to the engine and control system. Check the balance. Don't be afraid to add weight to the nose or the tail if required. Take a few photos for the record, and proceed to the flying field. Good luck and happy landings. ✈

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