



Pert and saucy, this functional cabin job may remind you of many real planes—Cessna Bird Dog, for example. As shown at left, it could be a homebuilt at some country airport. Anyway you look at it, right, it's a "happy" airplane.

M. K. Sportster

Easy flying free-flight with pleasing lines does nice ROG's on 049 power.

HOH FANG-CHIUN

Construction

FREE-FLIGHT sport models are rather rare nowadays. Magazines no longer regularly carry features on this type of design. And from kit manufacturers new creations, if any, turn up sparsely. Reason for this, of course, is the availability of small, lightweight radio-control systems. Designs originally intended for sport free-flight purposes simply became controlled free-flyers guided with these functional, low-cost outfits. However, for those of you who are fascinated by the charming flying of free-flight sport models, this machine should be what you have been waiting for.

The M.K. Sportster is a pleasing ship, both in shape and in handling. Once properly trimmed, the model possesses a most realistic and stable flying performance. Also, the large-diameter wheels located well in front of the center of gravity, provide safe takeoffs and landings at any reasonable field.

The model measures 39" in wingspan and approximately 205 sq. ins. in area. Suitable powerplants would be engines up to Half-A size. Any engine above 049 in capacity is not recommended because a big engine in a light machine always makes the flight adjustment much more tricky. Besides, there is no need to employ a big powerplant in a model of this category. Even if you install a 049, choose a mild one. The prototype was powered by an 03 (0.5cc) diesel engine. Swinging a 6 x 4" propeller, this little engine provided more than ample power for the flights, including unassisted takeoffs from grass surface.

Construction-wise, the M.K. Sportster is quite straightforward. The plan, showing Mark II of the design, differs from the prototype only in minor aerodynamical improvements and slight structural modifications.

Incidentally, the letters "MK" in the model's name stand for Middle Kingdom. Middle Kingdom or Middle Land actually is what China is called by the Chinese. Ancient Chinese thought their land was lying in the center of the earth, so in this way the country's name was originated.

Wing: Each half is built separately, joined at proper dihedral angle when ready for center balsa sheet covering. Pin down the unshaped leading edge, bottom spar, trailing edge and tip frame pieces on the plan, protecting the latter with wax paper. Be sure the notches are already cut in the trailing edge. Incidentally, when cutting these notches, make them a little undersize for a tight fit to the ribs. Cement all ribs in place except the center one. Note that rib WA is shallow by $\frac{1}{16}$ " on both top and bottom to allow for sheeting, so place scraps of $\frac{1}{16}$ " pieces beneath it for proper elevation. Add top spar while the panel still is on the board. Allow sufficient time (preferably overnight) for cement to thoroughly dry before removing from the work board.

Follow the same procedure for the other half. To incorporate dihedral, bevel-sand butt ends of each panel so they meet at correct angle. Use plywood dihedral braces to check alignment. When tight joints have been obtained, glue center rib and braces in position, holding the latter with spring-loaded wood clamps until cement dries. Add center-section sheeting, complete the tips as per section view X-X and sand the entire wing.

Fuselage: Select two sheets of $\frac{1}{16}$ " medium balsa, preferably quarter-grain stock for the sides. Laminated $\frac{1}{32}$ " sheet doublers to the sides as per side view. Note that the forward doublers should have wood grains run diagonally to obtain true flat surfaces. To locate doublers in place, use contact cement for instant and warpless assembly. Glue $\frac{1}{8}$ " square balsa longerons and stiffeners to sides aft of cabin.

Cut cabin bulkheads FC and FD. Glue fuselage sides to FC and FD and allow to dry. Be certain that the joints are at right angle. To lock fuselage, draw and cement sides at rear. Check alignment before glue sets, realign if necessary. Pull sides in at nose with two pieces of hardwood and rubber bands. Carefully tilt firewall FA to obtain 3 degrees down-thrust and 2 degrees right-thrust.

Proper amount of thrust off-setting is ob-

tained easiest by the following procedure: Cut front ends of both fuselage sides to indicated down-thrust as shown on the plan. To incorporate right-thrust, shorten $\frac{1}{16}$ " at front end of starboard fuselage panel. Locate the firewall flush with fuselage ends, using white glue for this installation. Construct landing gear assembly and epoxy it behind former FC. Install engine blind nuts on backside of the firewall before planking front top. Add the remaining formers, etc. and complete the structure as shown. Note that slot in the tail for stabilizer is made approximately $\frac{1}{16}$ " oversize to allow incidence changes which might be required for flight trimming. Shape and sand the entire body, round off all corners liberally. Construct fin and double cement it in place.

Horizontal tail: The stabilizer has been left until last. This unit is used to balance out the model. It takes quite a bit of weight in the nose to compensate a hanging tail, but only a slightly lighter stabilizer to accomplish the same thing. Should the model be decidedly nose-heavy (improbable), a harder and therefore heavier grade balsa should be used. It certainly is much wiser to use added structural strength than dead weight.

Construction of the stabilizer is self-explanatory. Note that the trailing edge is standard triangular stock. Pre-cement all butt ends to ensure a strong surface.

Finishing: Apply two coats of thinned clear dope or sanding sealer to all exposed wood; lightly sand the last coat. For all-round protection, cover the entire model with silkspan. Run grain length-wise on all surfaces. To save weight, use colored material, at least on wing and stabilizer. Colored material instead of painting with colored dope is preferred also with regard to future repairs. Now give the entire model several coats of clear dope until a slightly shining surface has been reached. To obtain a smooth finish, wet-sand between last coats.

To cover cabin windows, first make patterns of thick paper. When satisfied with the fit, cut window panels from sheet celluloid. Carefully cement windows to cabin frames, using epoxy glue for best result.

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Use masking tape to hold celluloid sheets in place while glue sets. Finally, epoxy wing dowels ($3/32$ " dia. wire) in position.

Flying: Before flight attempts, check center of gravity location and be sure that the model absolutely is free of warps. Test-glide the model before flying with power. Hand-launch the model—preferably over tall grass. If any sign of "hanging flight" or nose-heaviness, correct it by slight alteration in stabilizer incidence. Not more than $1/16$ " shimming should be permitted. Beyond that, correct by lead ballast to shift CG location.

For initial power-flights, use engine running at reduced speed. Time your engine run so first test is made with not more than 8-10 seconds of fuel. Flight-trim the model for a moderate climb and a slight turning tendency. For high-wing cabin designs, the normal flight pattern is left under power and right during glide. Do not forget to put your name and address on the model.
