

- If you are a shy person who doesn't want to attract a crowd when you fly, then maybe the Grasshopper isn't for you. It looks a bit out of the ordinary, with few curves; mostly straight lines, and it is a stable flyer, but highly maneuverable. It's been able to take anything I can dish out at the controls. Construction isn't difficult, but flying it without getting pleas from bystanders for a chance at it will be hard to avoid.

#### FUSELAGE

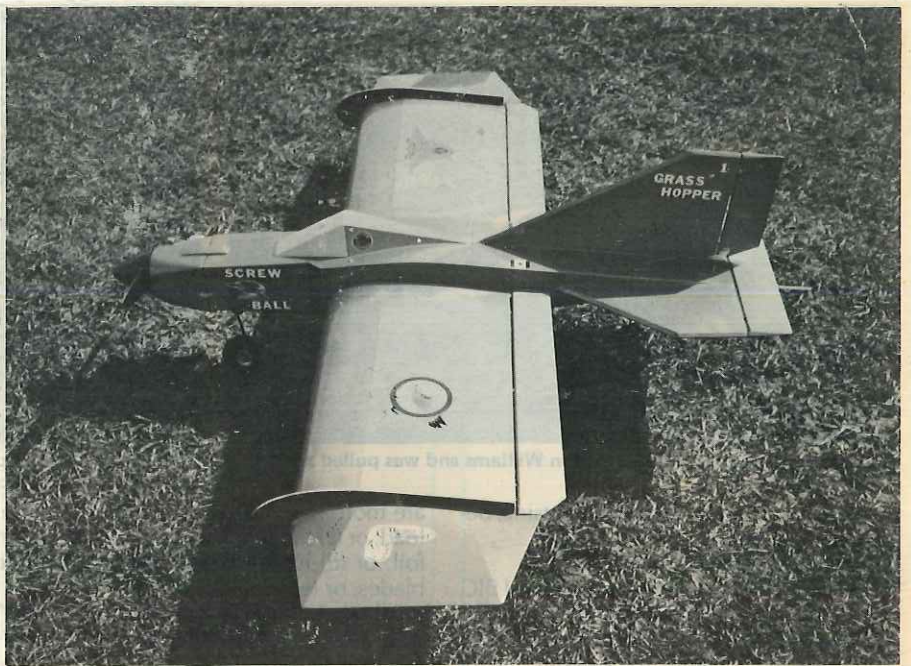
Draw a centerline lengthwise on both 1/4 x 4 x 36-inch sheets. Mark position of bulkheads and firewall. Cut to side-view shape on plan. Carefully cut out wing slot. Now cut off both sides 1/4 inch in front of wing leading edge (see top view). Cut firewall and main landing gear plate from 1/4-inch plywood. Drill and install blind nuts in firewall for nose gear and engine mount. Note that nose gear mounts on back of firewall, so blind nuts will be inset on front of firewall. Join main fuselage sides with 1/4-inch balsa bulkhead at wing leading edge position and 1/4-inch square balsa at tail end. Add 1/4-inch balsa bulkhead at stab location. Assemble firewall and front fuselage sides and glue in place on main fuselage using triangle stock as shown. Keep whole assembly square. Now add all 1/4-inch and 1/2-inch triangle stock.

Build stab and fin, and sheet top and bottom with 1/16-inch balsa. Note that left and right stabs are joined by 1/4-inch square spruce spar. Now slide completed stab over fuselage sides, line up perfectly, and glue in place. Sheet top rear of fuselage with 1/8-inch balsa. Line up and glue fin in place, adding 1/4-inch triangle stock reinforcement at base.

#### WING

Cut 17 ribs from 1/16-inch balsa sheet, pin them together, and sand to make them all exactly the same. Pin 1/4-inch balsa bottom spar to plan, place all ribs on spar, then put top spar in place. Do not glue any joints yet! Place a straight piece of 1/4 x 1/2-inch balsa on plan just ahead of trailing edge as shown on rib pattern. Now place weights on wing to hold all ribs down against this jig. Use a very straight 1/4-inch square balsa for trailing edge and glue in place against ribs. Make sure all ribs are vertical and aligned with spars, then glue all rib, spar joints. Add very straight 1/4 x 1/2-inch balsa leading edge. Now glue in 1/4-inch square balsa filler pieces at hinge locations. While wing is still weighted down, add 1/16-inch sheet vertical spar webs. Remove wing from plan and shape leading edge to rib contour. Sheet top and bottom of wing with 1/16-inch balsa sheet as shown. Now round off leading edge to shape shown. Wing tips will be added later.

Slide wing through fuselage, line up ribs with fuselage sides, make sure alignment is okay, then glue in place. Remove center rib as shown on plan. Glue in 1/4-inch plywood main gear mount and reinforce with triangle stock. Sheet top front of fuselage with 1/8-inch balsa sheet except for hatch area. Make up two pieces of 1/8-inch plywood for top hatch, place Saran Wrap over hatch area, and assemble hatch in place. Remove hatch and Saran Wrap and glue in 1/8-inch ply hatch retainers for top and bot-



# The Grasshopper

By J. COOK. . . Here's an unusual project for radio control using a .29 to .45 engine. It's looks are misleading—it is a stable, aerobatic flyer.

tom hatches. Slide aileron horn assemblies through small holes in fuselage at wing trailing edge and glue in place. Now sheet bottom rear of fuselage with 1/8-inch balsa. Make a removable 1/8-inch plywood plate the size of the open center section of wing.

Mark and cut out servo locations. Note that aileron servo is upside down. Mount servos and route golden rods for throttle, nose gear, rudder, and elevator. Install nose gear on back of firewall. Install eight-ounce fuel tank and necessary tubing. Use cyano and lock washers under screw heads for nose gear because mounting is not accessible after bottom is sheeted. Sheet bottom of fuselage with 1/8-inch sheet except for hatch area and main gear area. Make bottom hatch from 1/8-inch plywood.

Cut ailerons, elevator, and rudder from 3/8-inch balsa trailing edge stock. Install all hinges and horns temporarily. Make up wing tips and glue in place parallel to wing chord. Add 1/16-inch sheet filler pieces top and bottom. The canopy is built from 1/8-inch sheet balsa in two pieces. The rear piece is attached to the top hatch. Now sand the whole airframe smooth in preparation for covering.

Install all equipment—engine, wheels, radio, etc. Connect all controls and check for smooth operation. Attach hatches with small sheet metal screws. Now check balance side to side, adding weight to light wing tip. Make up wing fences and trial fit, but do not attach until wing is covered. Now take everything apart and cover with your favorite covering material. Attach horns and glue hinges in permanently. Attach wing fences. Now put all gear back in and on, and check fore and aft balance. Receiver and battery pack can be shifted around to attain balance. Install plastic tube for receiver antenna. Adjust nose gear so that plane rolls straight on the ground. Charge your batteries, do a range check, and you're ready to go.

The Grasshopper is very stable and yet very maneuverable at all speeds. It can take anything you can put it through, except a collision with mother earth! This design will stand full-power vertical dives with 90-degree pullouts, but don't do too many—it's very hard on engines. It's a real crowd pleaser; everybody will want to fly it. Have fun!