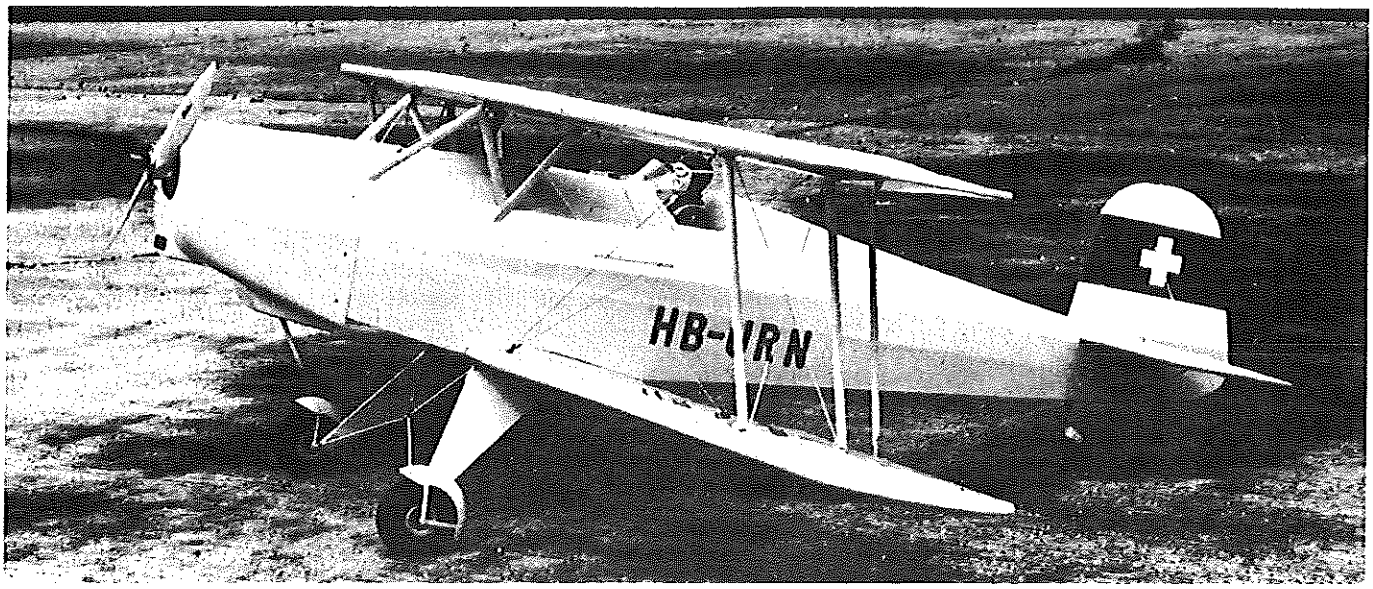

BUCKER JUNGMAN BU 131B

By GENE POND . . . Here's a lightweight BIG Bird in quarter-scale that will give you the realistic aerobatic capability you might only expect from a smaller model.

• The idea for this plane was born in the spring of 1980. I had wanted to build a new biplane to fly in IMAC competition. It had to be slow in flight and large enough to be highly visible. Also, it had to be fairly simple to build, yet have attractive lines.

I had been looking through full size aeroplane publications and various aeroplane books for ideas for a new plane. Then I found it . . . there it was, in Profile Publication No. 222, a Bucker Jungman BU 131B in Swiss markings, HB-URN. This particular plane was the property of a Swiss aero club, and had been converted to use the 180 HP Lycoming engine. The forward cockpit had been removed and forward turtledeck modified to fit the new engine and cowling. The paint job was simple but good looking. It was yellow overall with light blue and white stripes on the fuselage.

This plane had been flown by Arnold Wagner, a Swiss pilot, to eighth place in the 1964 World Aerobatic Championships at Bilbao, Spain. Once back in Switzerland, Wagner complained about the inverted flight capability due to the flat-bottom wing section. In the winter of 1965-66 the Swiss aero club authorized the firm of Max Datwyler, at Bleinbach, to install a new set of improved-performance wings (symmetrical section) designed to improve inverted flight. With these new wings attached, inverted performance of HB-URN was increased dramatically. Unfortunately good things don't always last. While flying HB-URN, one of the Swiss club pilots attempted an outside loop from an altitude of only 600 feet. The plane crashed inverted, totally demolishing the plane and killing the pilot.

Now that I had decided on the plane I wanted to build, I needed a good set of three-views to work from. I found that Bob Holman's catalog listed one for the Jungman 131B in 1/8 scale, Catalog No. 2956. These three-views show two Jungmans, one with the original 105 HP Hirth motor in British markings, the other one in Swiss markings, HB-URN. Just what I had wanted!

I scaled the model 3 inches to one foot (quarter scale), which comes out to 72-3/4 inch span and 1400 square inches area. The model, with the Quadra engine installed, weighs 15 lbs, 4 oz.

I originally designed the model to fly with a Fox Twin. I had one of the first production run models. I had a little problem with break-in and misfiring, so I sent the motor back to Fox for updating. During the time the engine was in the mail, I installed a non-piped Webra .90 on a belt drive (Cline Drive). This flew the model very well, but lacked the vertical performance I desired. I debated about installing a tuned pipe on the Webra .90 to obtain more power. Then found out I would have to cut out half the side of the cowl to install the pipe, so I gave up that idea. Then I installed an original model Quadra, and performance improved considerably. The plane will now make a full vertical climbing roll before it slows down. There is more than ample power for sport flying the plane with either the Fox Twin or the .90 on a reduction drive. But as I built the model originally to fly in IMAC competition, I could still use more power than I now have, to go through the vertical maneuvers. I am now looking at one of the new Super Quadras . . . maybe this would give me the additional power I want . . . Hmmm.

CONSTRUCTION NOTES

FUSELAGE

Cut out the 1/8 balsa side sheeting pieces and assemble pieces over plans. Mark locations of bulkheads and side framing on inside of sheet sides. Make sure you have one right and one left. Install 1/4 inch square longerons and vertical framing on inside of sheet sides. I used Willhold Aliphatic glue for all general construction, and epoxy glue for high stress areas. Install all fuselage doublers and wing saddle doublers. Crack fuselage sides and longerons at after end and bend in per top view of plan. Epoxy sides and longerons later, after fuselage assembly is completed.

Nail fuselage upside down on top of plans from F-3 to F-7. Block up after end back to tail post and square up tail post 90 degrees to board. Install 1/4 inch sq. cross braces and diagonal braces. Install 1/32 ply gussets on all cross braces to increase strength of joints.

Turn fuselage over and install bulkheads from F3 to firewall. Set the firewall at 2½ degrees right thrust. This is important . . . you need it. Install cabane supports and brackets on bulkheads No 1-1/2 and No. 3 with epoxy glue. Now install the rest of the bulkheads and stringers from F4 to F110.

You can either plank the turtledeck or use rolled sheet. I planked the whole thing, it was not the easiest way to go, but I think it makes the best looking job. Install the 3/16 x 1/2 tapered side

stringers. Notch out stringer for forward side sheeting from F3 to firewall. See the side view.

Install the 1/8 square fairing stringers on the fuselage sides top and bottom. NOTE: Before you install the fuselage bottom sheeting, see the Radio Installation notes. Install the tail wheel brackets and supports. Install the 3/32 bottom cross grain sheeting and bottom centerline stringer, along with 3/32 x 1/4 side fairing strips.

WINGS

I built the wings flat, with no dihedral. I reduced the wing dihedral to improve handling in point rolls and knife-edge flight. So far, it has worked out well. There is no adverse or positive roll factor induced by application of the rudder when the plane is in knife-edge flight. For those who wish to use dihedral, the scale dihedral is: top wing 1-1/2 degrees, bottom wing 3-1/2 degress. The wings are built flat over the plans and the ailerons are cut out after wings are completely assembled and finish sanded.

Start assembly by pinning front bottom spar down to plan. Block up bottom of trailing edge 9/16". Install ribs and top spars. Square up all ribs before gluing to spars. Install leading edge onto ribs. I used 3/8 x 3/4 stock for leading edge and cut it to shape after gluing to ribs. Shear web front and rear spars with 1/16 vertical grain sheeting. Note locations of 1/16 plywood shear webs at strut and wire attachment points on plan. Add wing tips and trailing edge fairing strips. Install dihedral braces. These are cut from hard balsa block and fit between top and bottom spars. Epoxy 1/8 shear webs on both sides of spars over the braces. Install leading edge and center section sheeting. Cap strip all ribs; pinch down and glue cap strips flat onto 1/8 sheet trailing edge.

Remove wing from plan, turn it over and nail it back down to plan. Install landing gear blocks, wing hold-down blocks, strut and wire attachment blocks. Finish sheeting on bottom of wing, install fairing strips and cap strips on bottom of wing. After wings are completed and finish sanded, cut out the ailerons. Add sheet facing to aileron cut out and leading edge to ailerons.

TAIL SECTION

The tail section is made of a center core of 1/8 inch sheet with a 1/4 inch sheet edging, 1/8 x 1/4 ribs, and 1/4 spars.

Start by cutting out 1/8 sheet cores. Transfer rib locations to both sides of cores. Pin cores flat to board and install edge fairing, ribs, and spars. After glue has set, turn surfaces over and pin back down to board and complete the other side. Add 1/4 inch square spruce blocks both sides for fin and stab stay-wire anchor points. Drill holes for 2-56 bolts. Sand surfaces to contour shown on plan. Inset 1/8 ply in bottom of elevators for elevator horns. Notch out tail post of fin and epoxy in 1/8 ply tail post, see fuselage side view.

COVERING

I covered the entire model with Super Monokote and painted the fuselage stripes and cowl with K&B epoxy paint. The K&B epoxy paint matches the yellow Monokote very well. The model can be covered with any shrink type covering desired, or it could even be silked and doped. I used Monokote for ease of construction and to keep the weight down.

STRUTS AND RIGGING

I made two wood spacers cut to fit between the top and bottom wing to hold the wings in the correct position while I fit the cabanes and interplane struts. I used an incidence meter to check the wings' incidence throughout strut and cabane installation. The cabane and interplane struts are designed to be adjustable, to change incidence or to remove wing warps, by use of washers inserted between ends of struts and wings.

Cabane struts are bent out of 1/8 inch steel welding rod, and are made in two halves to plug in from each side of the fuselage. After assembly and alignment of cabanes, cover struts with 1/8 x 1/2 spruce grooved out inside to fit on both sides of the struts.

Interplane struts were made from 1/2 inch streamline aluminum tubing with 16 Ga. steel bolting pads at each end. Interplane 'X' bracing was made from 1/16 music wire. Install the interplane struts after cabane struts are installed and secured. Fit the struts completely, make a dry run by bolting them in place to insure alignment before epoxying them. Remove struts and install a cotton dam about 3/4 inch down from the top end of the strut. Fill top ends with slow-setting epoxy and bolt struts back into wings. When epoxy has set, turn the airplane upside down and epoxy the bottom of the struts the same way.

Flying wires are functional (I have not flown the plane without them). Wires were made from 60 lb. test nylon coated fishing leader "STEELCORE" with "SEVENSTRAND" crimp type sleeves. Stay wires on fin and stab are 1/16 dia. music wire soldered into brass rigging pads. All pads were cut from .030 brass sheet.

Bend landing wire per plans. Wrap joints with copper wire and silver solder with hi-strength solder (Sta-brite). Cover landing gear legs with Super Coverite and paint with epoxy paint. I used four-inch Fox wheels on the original plane.

COWL AND FENDERS

I made a mold from one-inch styrofoam sheets laminated together to make a block 8 x 10 x 9 inches. Cut block to length of cowl. Make a ply bulkhead to outside of fuselage at No. 1-1/2, and one to outside of front view. Draw thrust centerline and vertical centerline on block. Glue ply shapes on each end of block. Shape foam to templates and fuse side view. Remove front template and round front to plan. Make radiators from sheet balsa per side and front view and glue onto shaped foam block. Coat mold with styromate ... two or three coats will do it. Cover mold with two layers of six-oz. glass cloth. Add reinforcements in way of corners and radiator openings. Fill all pinholes and voids. Finish sand outside of cowl completely before you dig out the foam.

Fenders: Make a block 5-1/2 x 5-1/2 x 2 inches. Epoxy a 1/2 x 6 inch dowel into center of block at right angles to 5-1/2 inch side. Chuck dowel into drill press, set on low speed and sand to five inch dia. with one-inch radius on edge. Coat mold with styromate and sand smooth. I used three layers of four oz. glass cloth wrapped continuously around the periphery of the mold. Lap glass down at least one inch from outside edge. Sand and fill all pits in fenders. Cut fenders to cover 120° of wheel arc, and to be 3/4 inch deep at center. Fender braces were made from .060 x 1/4 inch brass strip and bent to fit inside of fenders. Braces are at 90° to each other. Use 2-56 screws on each side of fender to hold it to braces. Solder (Sta-brite) braces to 3/16 wheel collars. This will hold both the wheel and fender in position.

RADIO INSTALLATION

If you are using a direct drive .90 or a Fox twin, locate radio gear in bottom wing saddle opening. If you are using a .90 on a drive unit or a Quadra, provide a bolted type hatch in the bottom of the fuselage between bulkheads No. 8 and No. 9 for radio gear.

I used Futaba S-15 servos throughout. Two servos were used on elevator; one servo each for ailerons and rudder has proven adequate. Use a 1200 mil airborn battery pack as the current drain is fairly high, especially if you are doing any aerobatics.

FLYING THE MODEL

The balance point of the model is four inches aft of the leading edge of the bottom wing, measured at the fuselage side. For trial flights, move the balance forward 1/2 to 3/4 inch. The propeller I found to be the best for either drive unit or Quadra was an 18 x 10. I used a dual-rate radio to fly the model. I set the control surfaces as follows; High rate for aerobatics, Low rate for normal flying.
Elevator up-dn Hi rate 1-1/2", Low rate 1"
Ailerons up-dn Hi rate 1/2", Low rate 3/8"
Rudder left-right, 2 inches both ways.

The plane flies very smoothly and is a slow and easy flying machine. You do need some coordinated rudder input with ailerons when making turns. Take-offs are a piece of cake, just a little right rudder and it tracks straight down the runway. Rolls are smooth and axial. Point rolls and knife edge flight are very good, crisp and sharp, no falling off of the points. Wheels-on landings seem to be the best and easiest to do. Reduce power to about 1/3 during landing approach, reduce power slowly when plane is in line with runway, keep some power on, don't chop the throttle until the wheels are on the runway. This plane slows down very rapidly when you cut the throttle. For dead stick landings, put the nose down, and keep the speed up. This plane has a lot of drag and sink rate is fairly high. •