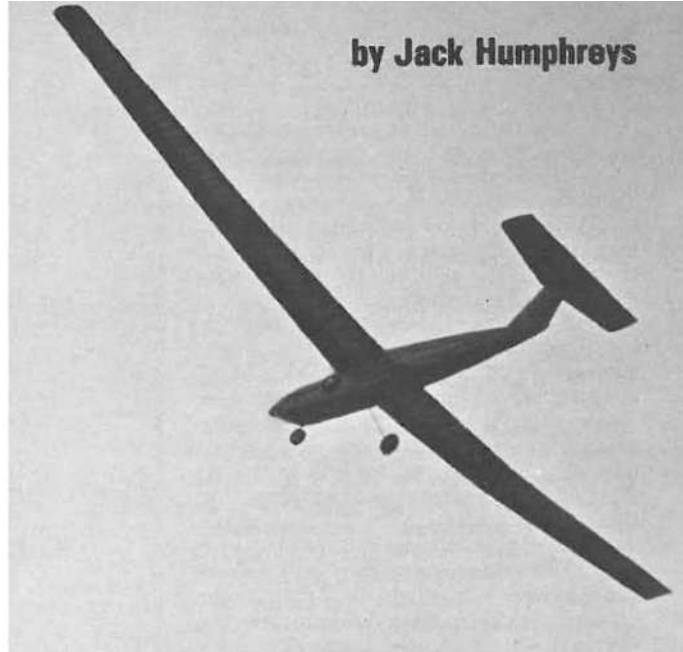


Behemoth

R/C Sky Darkener

by Jack Humphreys

Once upon a time, a big red Canadian bird took off. It flew just beautifully, but its shadow was too small. So Jack made the wing bigger and bigger. At 14 feet, it terrorizes lesser birds. Takes any kind of power, any radio and any wing. It's not particular.



Photos by the Author

A choice of wings. When the ship flew well with the standard wing, Jack gave thought to performance possible with an extended planform. The two photos here depict both versions. You might decide to increase the span of the panels drawn on the plan to suit your trainer/soaring and experimental ideas. The design excels in slow flight, ideal for novice flyers in that the aircraft is forgiving of error and allows time for a new flyer to react on the control sticks. Faster aircraft demand instinctive responses.

**FLYING
MODELS**

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I like big airplanes. There are all kinds of rationalizations to justify building this ship, but the real reason is that I like big, gentle airplanes. The basic configuration is that of a STOL aircraft, but old-timers will recognize traces of Henry Struck's "Bootstraps" cabin job of the '50's (an FM design), a model which gave many hours of fun as a Sport Free-Flight, and which was one of the most stable airplanes I ever flew. In this model I wanted an airplane which would be inherently stable, but capable of mild aerobatics, and most important, an ability to fly very slowly during approaches. The fuselage is large, relative to the wing, resulting in a transport configuration which allows any amount of equipment or experiments to be carried on without crowding.

The wing has a high aspect ratio for efficiency, an undercambered section of generous thickness for high lift at low speed and high angles of attack, and polyhedral for stability.

The "T" tail keeps the elevator controls out of the propeller slipstream and the downwash of the wing, allowing an almost linear trim response over a large change of pitch angle. This effect in conjunction with the very large elevator area allows a very wide range of speeds to be obtained with the trim control.

The Construction

Throughout the airplane, what might be termed "traditional methods" are used. It is an interesting and relatively easy structure to assemble.

The Fuselage

The basic framework is made of 5/16" square hard balsa in the same manner as a rubber job. Note that the diagonals in the frame go in opposite directions on opposite sides. The two sides are joined by the main cabin bulkheads and the rudder spar. All sheeting and fairing strips are added to the basic frame. The landing gear is similar to the system used on Carl Goldberg's "Falcon's." The only disadvantage to this system is the out-load or bursting stress produced in a fuselage designed to resist compressive loads. In this airplane, the vertical portion of the main gear wire is contained by a plywood box. The gear may be removed for straightening and the out-loads are taken by a threaded brass rod joining the ply boxes.

The cabin is glazed with 1/16" plexi-

glass. The side windows are flat and the windscreen is bent over an aluminum sheet form. An 8 ounce deBolt swivel tank was used in the original. The space between the firewall and the first bulkhead was filled with polyurethane foam, poured into place. This adds compressive strength to the area (I have sheared off nosewheel legs in bad landings, but the structure was never damaged), and prevents the tank from vibrating. Using the metal tank, I was able to seal the nose area completely using polyester resin and fibreglass cloth over the firewall and back for one inch along the sides, top and bottom.

If you use a plastic tank, you will have to leave a hatch in front of the windscreen.

The cowling is a polyester fibreglass molding, which was made by the standard 3-stage procedure. First a block, carved and finished, second, an epoxy female mold and third, the cowling.

The Wing Assembly

The wing is built directly over the plan, in four sections, joined by the dihedral braces. A "D" section sheeted leading edge is used for torsional rigidity. Compression struts prevent collapse of the leading edge and the front of the ribs when striking objects accidentally. The center-section is flat bottomed for ease of mounting to the fuselage. The undercamber starts at the first rib outboard of the fuselage.

The geometry of the wingtip produces automatic washout if the tops of the ribs are all lined up, and there is more taper on the trailing edge than the leading edge. The ailerons are lined up with the wingtips, which give them a negative angle relative to the average tip section.

The Tail Surfaces

Keep the tailplane as light as possible, particularly the elevator which could cause excessive servo loads from vibration if made too heavy. The elevator is mounted to the stabilizer, using plastic control horns cut down and bolted to the stab spar. A wire pin acts as the hinge.

Covering and Finishing

Red silk was used throughout, doped with butyrate clear. The original used clear dope dyed red (Marsh "T" grade marking pen ink) to make a vivid, transparent red finish.

Flying

The original ship is powered with a Super Tigre .40, which proved completely adequate, for this 10 lb. model flies on the wing, not the motor. Any engine from .29 to .60 could probably be used, although the .29 size most likely would experience difficulty in lifting the ship off a grassy field.

In take-off trim, on flat surfaces, the model rotates smoothly by itself when flying speed is reached. On landing, keep the nose high and about 1/3 power on for the lowest airspeed.

The model has been used as a flying test bed for a 14 foot glider wing and a spoiler system, some photos of which accompany this article. With this huge, extended wing, the "Behemoth" has been aptly dubbed the Behemoth "Sky Darkener." It has proven to be a most rewarding experiment and the ship is a different kind of animal in the air, with a majestic, floating glide and soaring abilities.

I fashioned a tapered six-foot center-section with plug-in connections to receive an idle pair of "Kurwi" wing panels, forming the 14 foot span. You might have similar opportunities with other wings about, or you might think about extending the center panels shown on the "Behemoth" plan to any reasonable (or unreasonable) extent. It's a most interesting variation and a fun way to fly. Your nerve ends will appreciate the calm, floating abilities of this big bird.

A future development of the "Behemoth" will be a set of Dornier or Junkers type flaps on the standard wing. This should allow even slower speeds and perhaps a steeper climb angle without over speeding. Remember, when flying very close to a stall, leave the ailerons alone and "walk" it in with the rudder. The application of rudder to correct an incipient wingtip stall yaws the airplane about the C.G., giving the dropping wing an instant increase in airspeed. Application of aileron in the same circumstances will increase the drag on the stalling wing, causing a yaw into the stalling wing, rather than opposite to it. This is called "the reverse aileron effect" and is most noticeable on high aspect ratio wings. Try it both ways at a safe height and you will see the effect clearly on this airplane.

Good luck with yours and fly it safely. ☐



Kurwi wing panels attached to a tapered six-foot center-section. A drooped look on the ground, but it assumed polyhedral under flight loads imposed. The trike gear with a steerable coil spring commercial nose gear. Original utilized Tatone engine mount on a turned aluminum base.



A T-tail configuration, high above the weeds and things. The polyhedral wing and the strip structure bring back remembrances of the 1950 decade. A huge, roomy fuselage for any experimental gear you might plan to try. It could mount cameras, carry payload. It flies well with the normal planform.

