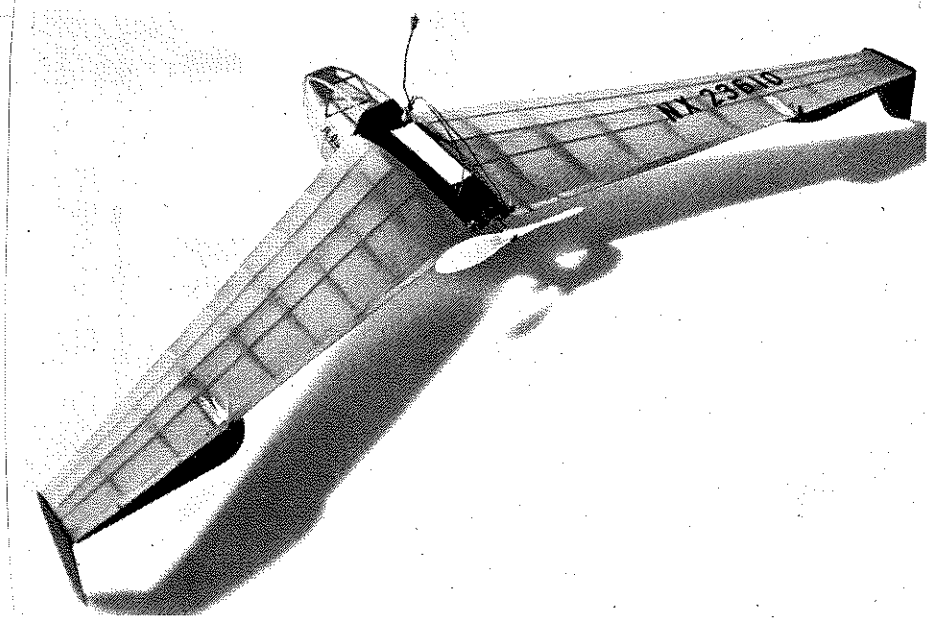


the ALIEN

By DANIEL WALTON

An interesting experiment in the use of pendulum control to maintain stable flight in a somewhat tricky design. A total success!

• The initial concept for the control system incorporated in the Alien was the result of a term paper. The system's purpose is to correct for the tendency of higher aspect ratio types of tailless aircraft toward spiral instability. Although two years lapsed between the term paper and the construction of the Alien, it was always felt the concept was viable if the mechanism could be kept light enough. Since none of the stock items available were acceptable, the system must be custom made. It may seem to be a time consuming extra to make, but if done well, it works like a champ. When flying, it can be upset by some fairly stiff gusts and correction is almost immediate. Pattern is a wide gentle left climb and glide, and flights average about one minute on a full liquid charge.

CONSTRUCTION

The keynote of this ship is simplicity, because a simple plane is usually a light one. The Alien is no exception, with a total finished weight of 1.3 ounces, trimmed and flying . . . so when building, keep it light.

The only things which should be of stiff, hard balsa are the L.E., 40% spars, keel, and main longerons of pod. These really take a beating, especially the keel area. Pod is basic box type, although you may wish to sheet the bottom (1/32 sheet) for added durability.

Because of this simplicity, only the pendulum movement will be elaborated upon. The mechanism itself must be as free from friction and binding elements as possible. Otherwise, more weight will be required on the pendulum. Here is one of those rare cases where it pays to have a little slop in a system rather than a tight fit.

Start by constructing the two bellcranks from 1/64 plywood and 1/16 dia. aluminum tube, as shown on the plan. Tubing should be secured with epoxy, being careful not to get epoxy in the tubing. Make sure the axis of the tube is perpendicular to the plane of the bellcrank. While this is curing, form all of the wire parts. Tails on the "Z" bends which go into bellcrank should be rather long so as not to hang up on slot in R-7. The washers on main pushrods are affixed with silver solder; also, note the bend, which is important.

When the bellcranks have cured, attach them, along with washers, to R-7 as shown on plan, being careful with the glue. They must move very freely and success or failure is very dependent upon this operation. Once the glue is dry, the outer wing panels may be built in the normal manner, starting with R-7 pushrods attached to bellcranks. Then slide each rib on over the rod, like a control line model. Also make sure R-1 is jigged for dihedral, using template "D". Washout is automatic because of the tapered wing. Just pin it 3/16 off board all the way along T.E.

Center section is built over plans, removed and then sheeted on top side only. Now glue on front support and cut out pendulum shaft hole. Next add front and rear 1/16 dia. aluminum tube bearings to assembly using epoxy, again being careful not to get epoxy in tubing. At this point, insertion of a piece of straight .025 piano wire will aid greatly in maintaining alignment during cure. Allow this assembly to cure at least five hours. The pendulum shaft should be partially bent so it resembles the letter "J". Add the washer as shown on plans. This is very necessary to keep the main push-rods from climbing the shaft. Install by inserting into rear bearing from T.E., with a slight bowing of shaft, and running through to front bearing. Now the bottom is sheeted.

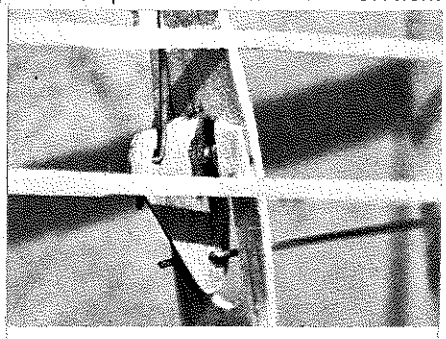
Assembly of center section and panels is done by inserting push-rods into center section through holes in R-1A and gluing R1 to R-1A with Titebond. When dry, push pendulum shaft back far enough to hook both push-rod ends, pull back, add bead and bend shaft down, making sure short and long arms are parallel. About 1/16 inch end play is also very desirable. Solder on 1/16 dia. brass tube and add wheel collar.

At this point, the wing is covered with tissue paper. Shrink with rubbing alcohol and dope assembly. Finally, attach elevons with thread hinges as indicated. They should move freely.

As for mounting the engine, Mr. Brown now has a single and a twin cylinder engine available. The Alien has been flown with both types, but you may wish to mount a second tank. Twin cylinder models seem to run 20 seconds maximum with a single tank. The second tank should be mounted on the left side of the pendulum shaft, mirror image fashion. Because of its ready accessibility, provision should be made for easy engine removal. One of the new Crocket engine mounting rings is well suited for this. The firewall is marked for single cylinder type engine. Twin will require 90° rotation of hole position. The discontinued single cylinder model with 3 hole mounting would also work on this model, but the engine itself is shorter and the firewall would have to be moved aft.

FLYING

Flying should present no problems whatsoever, if the ship has no visible warps. The original flew "right off the board" and was trimmed for optimum performance on the first day. Bank is controlled by differentially adjusting the "V" bends in elevon push-rods, and C.G. should be as marked on plans, at the 60% position of the center section.



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