



"EAGLET"

By TOM LAURIE

• The American Eagle "Eaglet" was designed and manufactured by the American Eagle Aircraft Company, located at Fairfax Airport in Kansas City, Missouri, in the 1930 period. The "Eaglet" came about largely due to the depression of that period, when American Eagle Aircraft was finding it very difficult to sell its more expensive biplanes (Yea, WCN, that was the reason).

Ed Porterfield, the president of American Eagle Aircraft, asked his engineering staff to come up with an airplane design that could be sold for about one thousand dollars. The configuration selected by Porterfield was the "Eaglet", which was the "brainchild" of Noel Hockaday, who had joined American Eagle when they acquired the Wallace Aircraft Company. The "Eaglet" was an ultra-light, four hundred and sixty seven pound, open cockpit, parasol monoplane. It was originally powered by a Cleone twenty six horsepower engine, and later by Szekley engines of thirty to forty five horsepower. Approximately sixty seven of the "Eaglets" were built through July of 1931. The "Eaglet" could be purchased for \$250 down and the remainder financed over twenty four months. This version of the "Eaglet" was the Model 230. The next version, powered by the Szekley 45 horsepower engine, was designated the B-31, and is the subject modeled in this article.

The three-view drawing which I used contains all significant specifications, performance and many construction details of the "Eaglet". The three-view is of exceptional quality, and it includes a color scheme and license number of a particular "Eaglet" which I chose for my model. The scale locations of the wing ribs and empennage structure members are shown, and were followed on the model. Also, considerable detail on the cowling sections and attachments around the engine are shown.

The source of the three-view was Don Pratt's fine article on the American Eagle Airplanes in an early issue of Sport Flying Magazine. A good copy of the American Eagle insignia is shown on the three-view and fits the model perfectly.

I originally selected the "Eaglet" as a subject for the Flightmasters Jumbo Scale Event. It has beautiful proportions for a flying scale model . . . good aspect ratio wing, long fuselage, nice sized tail surfaces (I enlarged the horizontal tail approximately 10%), a landing gear which lends itself to good shock absorbing qualities, and good propeller clearance if you are building a rubber version.

I used an opaque projector to enlarge the three-view drawing to the 48 inch wing span. The opaque projector reduces the plan enlargement from a lengthy, tedious job down to approximately a one hour job. The three-view was enlarged by a factor of 6.86 to obtain the forty eight inch wing span, so this would have required the use of a calculator for each measurement and the expenditure of an awful lot of time. I have found the projector very useful in selecting a subject for modeling. Just slip a three-view in the projector and you can see in an instant what your subject looks like full size. *(We'll publish an article on building this projector . . . if our readers ask for it. Hint! wcn)*

The "Eaglet" was initially powered by rubber because of the Flightmasters' Jumbo Scale Rules, which require rubber power. I later converted to electric power. Both versions are shown on the plans, however, the electric powered version is the primary version shown on the plans.

I used the VL Products, VO-101 Electric Flight System, which features the Hytork 48 Motor with a planetary gearbox driving the propeller at a re-

duced RPM. The system includes a three-cell "fast charge" battery, a switch incorporating a charge plug, and a field charger. The field charger uses a twelve volt wet-cell battery, a five-minute timer, a rheostat to control charge rate, and a meter to indicate the charge rate. The VL Motor is somewhat marginal for a model the size of the "Eaglet", however, it results in very realistic, scale-like flights (The scale speed of a forty-eight inch span model of the "Eaglet" is approximately ten MPH).

The "Eaglet" took second place in a Free Flight Scale Contest for electric power, sponsored by the Flightmasters, this past summer at Mile Square Park. It was judged first in scale points. As previously stated, the flights are most realistic, and the takeoffs a beautiful sight to see.

CONSTRUCTION

The model construction is of conventional scale model building. The wing attachment is a little unique in that it uses "Mini Robart Hinge Points" to attach the wing struts to the fuselage and wing. These hinges are normally used to hinge surfaces on RC models. They permit easy wing removal when you want it and they come apart rather easy in a crash situation, thereby saving the model from severe damage.

The wing attachment to the fuselage uses a small dowel which passes through holes in each spar, and through loops in the music wire struts. A rubber band holds the wing in place.

The tail surfaces were hinged with soft wire at the outset, but were soon glued in solid, as I was forever loosing tail surface adjustment. The thrust line of the electric motor is easily adjusted, and shifting the battery provides all the adjustments necessary for balancing.

Let's start construction of the model with the wing. The rib spacing is scale. The uneven spacing is from the three-view and not the result of "weak eyes" on the part of a tired old draftsman. Select good, straight-grained balsa for the spars, leading edge, and trailing edge sheets, as the wing depends on these members for its stiffness.

I used a hinged plywood board,

blocked up at each end to the correct dihedral angle, for assembly of the wings. This method allows complete assembly of the wing in one piece before removing it from the jig. Approximately two degrees of washout should be built into each panel. The location of the blocks for this purpose is shown on the plan.

The wing tips are laminated from 1/32 x 3/16 inch basswood, bent around a plywood form. Soak the wood pieces (four required for each tip) and "stretch around" the form. Hold in place with pins until dry. Remove from the form and coat with thinned-out white glue and return to form for drying.

The wing assembly is completed with addition of the dihedral braces and the balsa blocks at the wing strut locations. Drill 1/16 diameter holes through the spars at the wing center-line for the wing attachment, and at each of strut locations. Sand the wing smooth and take the time to coat all joints with glue again before setting it aside.

The stabilizer and elevator is constructed in one piece and the fin and rudder in one piece. The outlines are laminated by the method used on the wing tips. They are made from four pieces of 1/32 x 1/8 inch basswood. Spars and ribs are as noted on the drawing. Finish the surfaces by sanding smooth and again taking the time to re-glue all joints.

The fuselage longerons and uprights are cut from very hard 1/8 square balsa. Assemble the two sides in the usual manner, one on top of the other. Using the plan view, assemble the two sides with the upper longerons down, since they are straight. The fuselage is a constant width in the area beneath the wing, so start by gluing the cross pieces in this area. After this part is partially dry, cut the longerons (outside only) and align over the plans. Add the remaining cross pieces and the fuselage is now ready for the upper fairings, nose blocks, landing gear, and the wing support struts.

Glue the formers "C" through "J" to the top side of the fuselage. Cover the area between formers "C" and "D" with 1/16 sheet balsa. Add the stringers between "E" and "J" to the top side of the fuselage. The stringers have a slight curve between formers "E" and "F". Add the aft cockpit fairing which is made from 1/32 sheet balsa.

The wing support structure should be added on. Bend the supports from .031 music wire to the configuration on the drawing. The loops that hold the wing-attach dowels can be formed by putting a piece of .045 music wire in a vise and wrapping the .031 wire around it. It should fit the dowel rather snugly due to spring-back. Care must be

taken in forming these parts, as they determine the wing angle of incidence. The struts are faired to a streamlined shape using 3/32 x 3/16 hard balsa, notched slightly to receive the strut wire. Attach to the fuselage by gluing and wrapping with thread.

The nose structure is added next. Cut former "A" and the two "B" formers from plywood. Lightly glue the two nose blocks and the "B" formers to the fuselage and cut to shape, using the formers to control the contour. Remove these parts from the fuselage and hollow the nose blocks to the outlines shown on the plans. Glue the rear former "B" to the rear block and glue this assembly to the fuselage. Drill holes for the 1/16 dowel and the sheet metal retaining screw in the two "B" bulkheads. Now assemble the nose block and the two formers.

I used a piece of sharpened brass tubing to cut the holes for the engine cylinders. The cylinders were modified from Williams Bros. LeRhone one-and-one-half-inch scale parts. Details of the conversion is shown on the plan.

The landing gear is bent from .031 music wire with 1/8 O.D. aluminum tubing slipped over the wire to represent the tubing used on the full size "Eaglet". I used 1/4 inch lengths of 1/16 and 3/32 O.D. aluminum tubing to center the tubing on the wire. Use epoxy to hold the tubing in place. The two members of each side were bent from one piece of wire extending through the fuselage at the front members where it is sewed to the fuselage bulkhead. Don't forget to install the tubing as you form the gear, as you will have a helluva time putting it on later! A second piece of wire is used for the upper "Vee" in the front view of the gear. This part is also sewed to the same bulkhead. A third piece of wire forms the remainder of the gear and the wheel axles. Pieces of 1/16 O.D. aluminum tubing are used to enlarge the axles. Two inch Trexler Wheels complete the landing gear. Note that the extension of the rear legs of the gear extend through the bottom of the fuselage to provide shock absorbing ability in the rear and upward direction. A small piece of rubber band is used to tie the upper and lower landing gear Vee's together. Balsa disks are used to simulate the rubber compression discs used on the full size "Eaglet". The tail skid is formed from thin sheet aluminum.

A balsa block is used at the aft end of the fuselage from former "K" to the tail post. Notch it out to receive the stabilizer spar and leading edge. Glue the stabilizer to the block and glue to the fuselage. Now add the vertical tail.

The VL Motor installation uses 2-56 by one-half inch machine screws and blind nuts on the aft side of bulkhead

"B". The switch and charge plug is mounted on the bottom of the fuselage, using small sheet metal screws. (See view "A") The remainder of this section provides access to the battery and adjustment of the battery for pitch or CG adjustment. Two small rubber bands are used to attach the battery to the hard wood stick bolted to the forward nose block. A 2-56 bolt and nut is used to attach this stick to the nose block.

The wing is attached to the fuselage by pushing the 1/16 inch dowel all the way forward, then back through the rear struts, then forward through the forward struts and is retained by two small rubber bands. The wing struts are made from 1/16 inch plywood. I used aircraft grade mahogany plywood, as it is lighter and stays straighter than birch plywood. Slot the ends with an X-acto saw to receive the Robart "Mini" Hinge Points. Use epoxy to fasten the hinges in place. The strut assembly is completed with the addition of the jury struts and pin attachment. A 1/16 inch dowel joins the front and rear struts, at the jury strut attachment.

Cover the model, using your Japanese tissue, and thinned-out Wilhold White Glue for attaching the tissue. After water-shrinking the paper, apply three coats of thinned-out nitrate dope. I used Floquill Model Railroad Colors mixed with nitrate dope for the colors noted on the three view. Use ink to represent the cowl split lines, door outline and control surfaces. Use split bamboo for control horns and thread for the control cables.

Balance the model at the point shown on the drawing by moving the battery fore or aft as required. Initial flights should be made over deep grass or weeds until necessary adjustments are made. Thrust line changes are easily made by the simple addition of small washers under the motor attach screws. My model required a single 1/32 inch washer under the upper left hand motor attach screw, which provided a small amount of down and right thrust.

Follow the instructions in the VL-101 Electric Flight System instruction book when charging the battery. I used about thirty seconds of charge at two amps for initial flights. After initial adjustments are complete, give the battery a full charge and set her on a smooth surface for a most realistic takeoff and flight. You can almost hear the old Szekley purring away, and you don't have to worry about cylinders flying off like they used to do on the real engines, over 40 years ago!

Good luck if you build the Eaglet, and write to me in care of the MODEL BUILDER, if you have any questions.