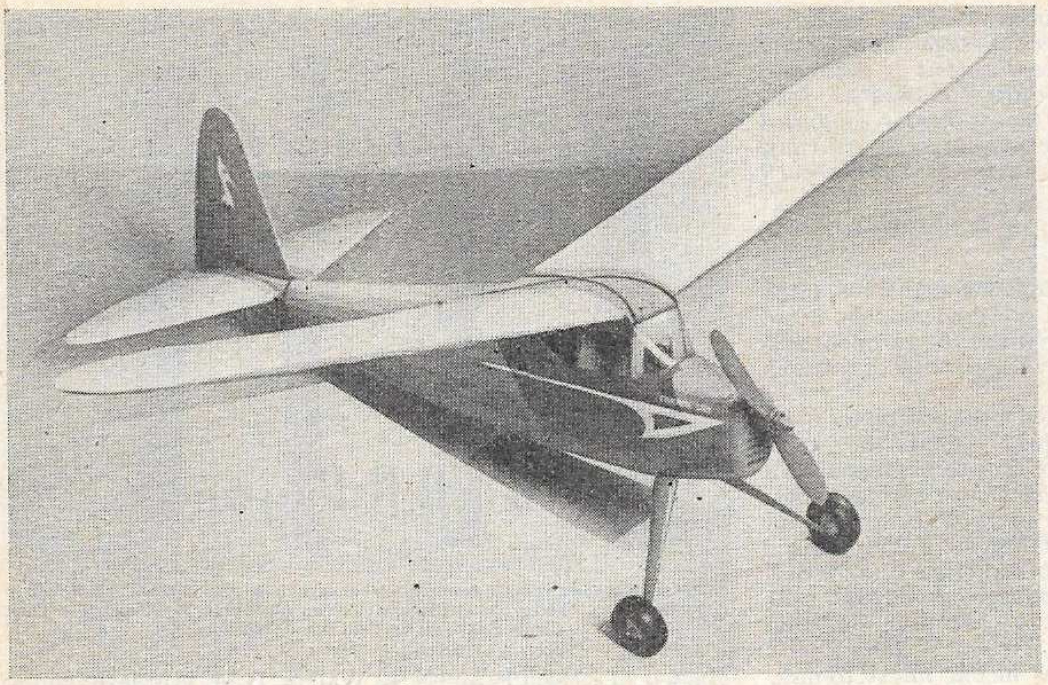

ETHEREAL LADY

A 48 inch SPAN POWER MODEL

BY V. E. SMEED

The original "Ethereal Lady" still looks spick and span after six years' service. Below, the designer's brother, Bill Smeed, with his E.D. powered version.

ETHEREAL LADY is one of those amiable little aeroplanes that will put up with minor modifications, over-loading, glider-towing, and all the maltreatment inflicted on models by ingenious aeromodellers, and will still retain its viceless characteristics and delightful flying qualities. As a first power model, with the smaller engines, it is ideal, although not of the slab-sided construction normally recommended for first attempts. With larger engines it is a challenge to the pylons and freak models in its performance, and yet retains complete simplicity in trimming.

The maiden flight of the prototype was straight off the drawing board—5 mins. 40 secs. on a 40 sec. motor run, in non-thermal conditions. This model was powered with an Ohlsson 23, and a careful compilation of performances over a period of weeks gave an average rate of climb of 1,700 ft. per minute for this machine. A Mills-powered version climbed consistently at 800–900 f.p.m. So far five models have been built to this design—one with a Mills, two with E.D.'s, and two with Ohlsson 23's, one of which (the designer's) was converted to take a 2 c.c. Movo. Each of these models was built by a different builder, and none so far has cost more than 9/–, excluding motor and wheels, although built so far apart as South Africa, Germany, Yorkshire and Kent.

One trouble with the diesel motor applied to semi-scale and scale models is the difficulty of positioning the C.G. correctly with so much motor weight forward. Ballast seems a wasteful means of correctly relating the forces, and to provide a pleasing cabin and ready access to the motor without cranking the wings is a bit of a problem. Since, however, a semi-scale job is built for looks as well as performance, this weight set-up does offer scope for a careful colour-dope finish. This is the case with the diesel-powered version of the "Lady"—the nose has been shortened as far as is practicable, and the fuselage is finished with two coats of clear dope, two of colour, and one of banana oil.

To anyone wishing to modify the design, it should be pointed out that, while an ample margin of longitudinal stability is inherent in the model, any increase in weight in the nose will mean ballasting and an increased pitching moment, with the consequent recovery-lag in a stall, etc.

Construction.

The construction throughout is perfectly straightforward, but the following points may help. Some eyebrows may be raised at some of the materials used—for instance, $\frac{1}{8}$" sheet wing ribs—but if the wood used is graded correctly, a sturdy and reasonably warp-proof yet surprisingly light structure will result. The prototype weighed 23 ozs. with the Ohlsson 23, ignition equipment, and heavy-duty batteries.

Fuselage.

This is commenced by laying down the $\frac{1}{4}$"×$\frac{3}{8}$" crutch. Scrap pieces of balsa are used to form a frame into which the formers can be slipped with a minimum of trouble. Before removing the crutch from the plan, mark in the positions of all formers. These are cut from $\frac{1}{8}$" medium sheet, and the centres may be cut out, leaving $\frac{1}{2}$" all round, if desired. Cement them in lightly, add the bottom centre stringer, and check that the formers are square before cementing them permanently. Observe that F1 is complete with bearers and undercarriage before being attached.

The wing runners come next, followed by the stringers. The tailwheel attachment should be bound in place before completing the lower stringers. When fitting the stringers, place each end and mark the positions of the required notches —the best way of avoiding those unsightly wavers. Notice that the top centre stringer locates in a notch cut in the centre of the top of F5, and that the next each side describe inward curves from the rear ends of the wing runners until resuming a normal course from F7 onwards. F6 is squared out at the top to assist in the transition from the flat top of F5 to the elliptical form of the after-fuselage. This construction provides a smooth and easy-to-cover fairing.

Odd corner-plates, cabin details, etc., may now be added. The cowling construction will vary with the type of motor used, the installation, and the individual builder's tastes. That shown on the plan has proved very satisfactory, since the noseblock is rigidly held to the bearers and is not likely to be dislodged in the event of one of those down-wind nose-overs. The sheet covering of the forward fuselage is optional, especially if rag-pulp tissue is used; it is, however, recommended

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for ham-fisted fliers ! A small area of sheet is essential round the finger choke-hole and round the timer site.

Wing.

The construction of the wing requires little comment. The 1/16" × 1/16" stiffeners were found to greatly reduce tissue sag between ribs. The leading edge may be covered with 1/32" sheet if desired. The tips may be constructed from sheet, or, for the builders who look askance at one 1/8" × 1/16" spruce tip, a second length of spruce may be glued round the first.

Tail Surfaces.

These are straightforward and call for no special comment.

Motor Mounts.

The engine bearers and undercarriage are attached to F1 before gluing the former in. It should be borne in mind that this former is the keystone of the model—it is, in effect, an engine and undercart securely fastened to a ply bulkhead which is sort of followed around by a model. Remember that the strength of cement relies largely on its soaking into the material being cemented—ply will not absorb it and therefore Croid, Pafra, or a similar glue should always be used.

The near-cantilever bearers used on this model have proved satisfactory on many models built by the designer, but modifications may be made by anyone viewing the idea with suspicion. Metal mounts may be employed, in which case some means of rigidly affixing the noseblock must be devised. A piece of soft iron wire soldered between each (side) pair of bolt-heads, and a retaining strap under the heads (to prevent them from dropping out) makes a simple and foolproof means of bolting the engine in—the nuts may be dropped into place and tightened without the need to hold the heads.

The installation shown on the plan necessitates moving the motor forward and tilting to remove. This system is not possible with all types of motors; in the event of any difficulty a small piece of the noseblock at the top may be cut out and cemented to the front of the top hatch. With motors weighing 5 ozs. or under, the nose may be lengthened slightly, and in the event of a petrol motor being used, the positioning of the batteries allows the use of a considerably longer nose. The location of the timer is left to the individual builder, since this is a controversial point, though a box sited between F3 and F4 is recommended.

Undercarriage.

This is formed to plan from 12 s.w.g. piano wire and is bound and sewn to F1 before the insertion of the former into the crutch. The fairings are carved from 1" × 1/2" block—notice the clearance at the upper ends to avoid penetrating the covering in the event of excessive backward travel. The wire leg fits in a groove cut into the fairing, and the whole is secured by four wrappings of rag-pulp, liberally cemented.

Finish and Flying.

Rag-pulp is recommended ; this again is a matter of personal taste. If a lightweight tissue is used, double-covering is well worth while. This type of model can be made to look very attractive, and, as mentioned elsewhere, there is room for the builder to spread himself on his colour-scheme. A hole drilled in the bottom of the cowling at the extreme rear of the engine compartment, and a small V-piece cemented outside will protect the finish by collecting superfluous oil and allowing the slipstream to blow it clear of the model.

When glide tests seem satisfactory, trimming should be carried out for right-hand circles under power. The diameter of the circles will vary with the power available—with small motors a wide circle produces the most pleasing results. The higher-powered " Ladies " have all exhibited the ability to hold a tight spiral. A slight amount of sidethrust allows the model to be trimmed for a wider circle while gliding. The designer's present model (Movo-powered) requires two degrees right-thrust and slight right rudder.

Full size plans of Ethereal Lady (see ¼ scale reproduction) are available price 3/–, post free, from the Aeromodeller Plans Service Ltd., Allen House, Newarke Street, Leicester.