AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 18

THE DE HAVILLAND "MOTH"

From "Flight," March 5, 1925

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THE DE HAVILLAND "MOTH."*

From whichever point of view one regards it, the de Havilland "Moth" must be considered a very fine little airplane. It may be argued that it is not a light airplane, in the sense of the term that has come to be commonly accepted, but it is a low-power airplane with a good performance. The engine, the Aircraft Disposal Co.'s "Cirrus," is of fairly large capacity (4500 cm^3) (274.6 cu.in.), and is capable of flying the airplane quite strongly without being run at its maximum permissible revolutions. This, naturally, means that there is a good power reserve to enable the airplane to take off from a reasonably small field, so that the "Moth," both on this account and also because of the fairly high top speed which enables headway to be made against a head wind, is well suited for cross-country flying or touring. It is particularly suitable for school work and "joy-riding," but one can foresee a number of other uses to which it can be put. As a fairly low-priced airplane for the owner-pilot the type should have much to recommend it, especially as its construction is of the simplest and most straightforward, while the "Cirrus" engine is so much of the motor-car type that anyone with motor-car experience should easily be able to look after it. Moreover, the

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engine has been designed to give very long service without overhaul, so that the maintenance should be well within the capabilities of the average motorist.

Simplicity and robustness are the main features of the de Havilland "Moth," or D.H.60, its official type designation. The number of fittings used, for example, has been reduced to an absolute minimum, and such few as are employed are of very simple form, cheap to manufacture and not likely to require much attention during use. The fuselage, for instance, is a box composed of four longerons, straight plain vertical and horizontal struts, and the whole covered with sheet ply-wood. This type of construction has now been employed for many years by Captain de Havilland, and has stood the test of time. In actual use it stands up well to fairly rough handling, and at the same time it is a form of construction comparatively cheap both in small numbers and in large quantities. The sides and bottom are flat, but the top is deeply cambered. The struts in sides and bottom are not directly attached to the longerons, but are held in place by the three-ply covering, whereas the top (which is, of course, open under the fairing) has its struts secured by angle brackets and bolts to the top longerons, as shown in Fig. 2.

The two cockpits are arranged in the usual fashion, that at the rear being normally intended for the pilot, although when dual controls are fitted the airplane is, of course, flown from either cockpit provided the airplane is trimmed by carrying a

passenger, or equivalent load, in the rear cockpit. From Figs. 1, 2, 3 and 4, it will be seen that the view from the rear cockpit is very good, while that from the front cockpit is excellent. The seat is comfortable and the cockpit exceptionally roomy for such a small airplane. A speaking tube is fitted in the cockpit, so as to facilitate communication between pilot and passenger or pupil. Access to the front cockpit is facilitated by a small door in the coaming, which allows of stepping from the lower wing into the cockpit without any great difficulty. When closed the door is kept in place by a simple spring-loaded bolt, which can easily be withdrawn by the passenger himself.

The landing gear is of the plain V-type, with the rear "legs" in the form of telescopic tubes sprung by rubber blocks working in compression. The rubber is enclosed in a cylindrical metal casing, so that the light is kept away from it, and it should thus last almost indefinitely. The travel on the legs is not long, some 4 inches or so, but appears to be ample, and the airplane displayed not the slightest tendency to bounce.

The "Cirrus" engine has its four "feet" resting on the top longerons, which are specially strengthened for the purpose, and a very neat cowling surrounds all but the top of the cylinders. In the first airplane the exhaust pipe is crossed over the top of the fuselage, to run along the starboard side, but in subsequent airplanes it will run straight down along the port side, and the door to the front cockpit will be to starboard. The two

long breather pipes of the crankcase are hidden inside the engine cowling, and help materially to keep the airplane clean. The oil-filler cap, incorporated with the breather pipes, projects through the cowling, and thus allows of replenishing the sump without disturbing anything. The carburetor is placed on the side, above the cowling, where, in case of a backfire setting any small quantity of gasoline on fire, it is removed from any inflammable part of the airplane, and is, moreover, exposed to the rush of air. A small metal shield serves to prevent the carburetor from getting too cold. The gasoline supply (15 gallons, normally) is carried in the gravity tank on the top center section, and there are thus no gasoline pumps to get out of order. The oil is carried in the sump of the engine. The gasoline carried in the standard tank is sufficient for about 5 hours at cruising speed, or something like 325-350 miles. It is, however, of interest to note that if the airplane does not carry a passenger, and a gasoline tank is built into the fuselage, the gasoline capacity can be increased to suffice for about 12 hours' flying. A hand-starter, operated by a lever in the pilot's cockpit, enables the engine to be started without outside assistance, as was repeatedly demonstrated by Mr. Broad.

The wing construction is extremely simple, with I-section spars, routed out from the solid, and with very simple ribs (Fig. 5). The wing bracing is in the form of streamline wires, and there is but one pair of interplane struts on each side.

The wings have been designed to fold, an operation occupying but a few minutes, and in the folded state the airplane only occupies a width corresponding to the span of the stabilizer, or approximately 9 feet. Ailerons are fitted to the bottom wing only, in order to make them more accessible, but the lateral control appears to be sufficient. The ailerons are hinged at the top of the spar, instead of on the center line, and thus it has been possible to cover the gap between wing and aileron with a fabric strip.

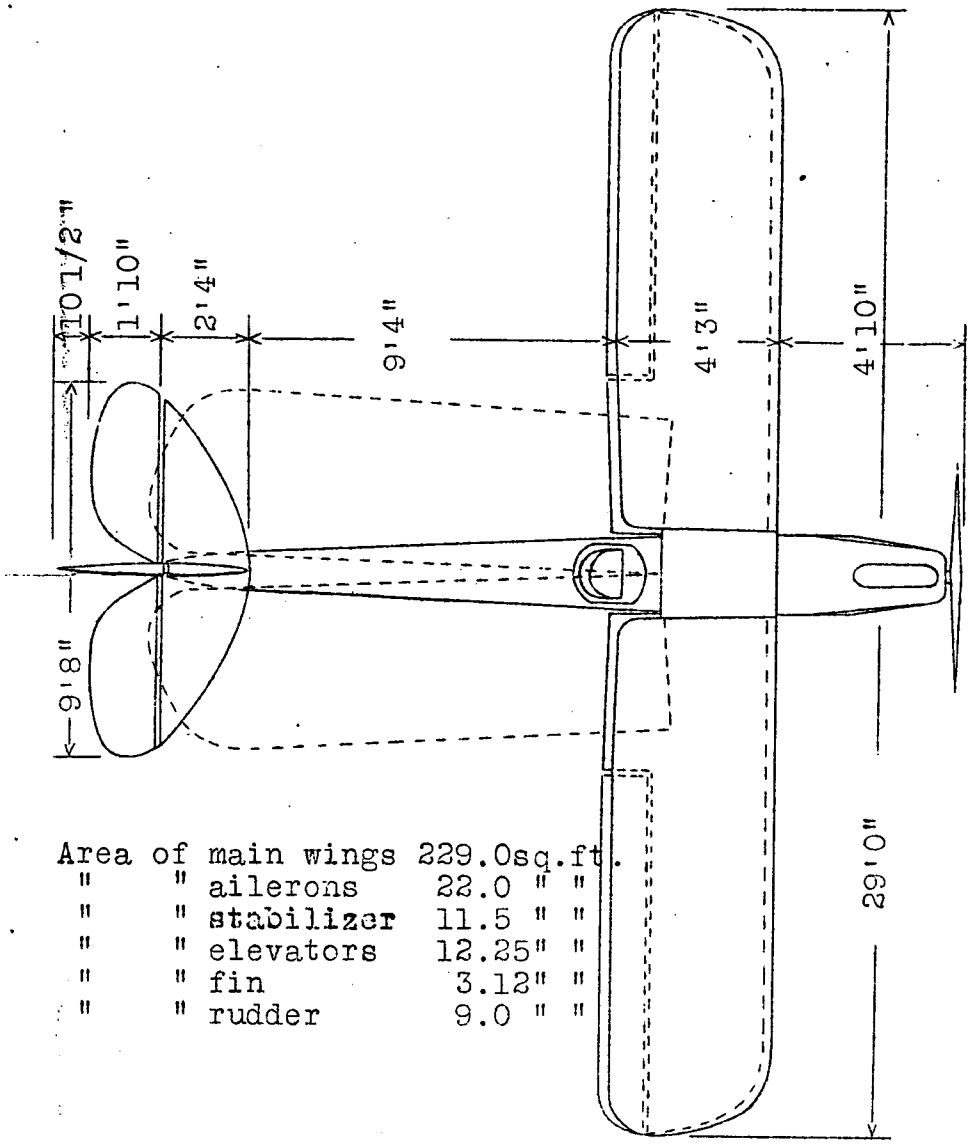
Performance

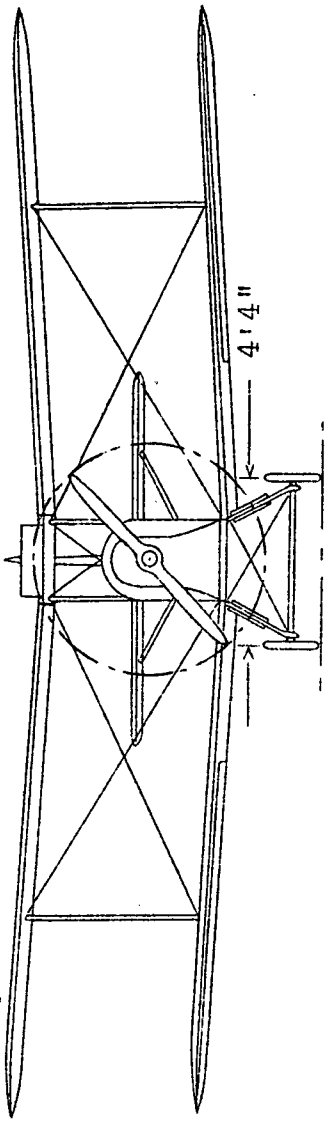
Speed at ground level	91 M.P.H.
Stalling speed	40 "
Rate of climb at ground level per minute,	430 ft.
Ceiling (absolute)	13,000 "
Range at cruising speed,	4 hr.
Gasoline consumption per gal.,	20 mi.
Oil consumption per hour,	1 pt.

Weights

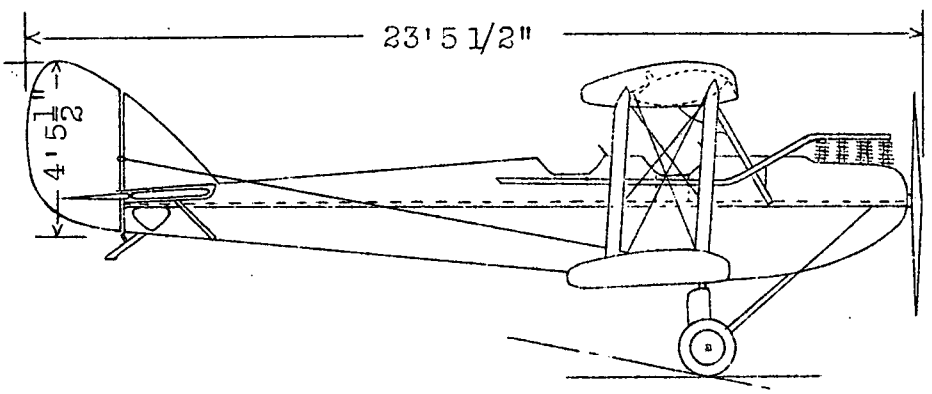
Weight empty	770 lb.
" of gasoline (15 gal.)	110 "
" " oil (1 1/8 gal.)	10 "
" " pilot	160 "
Normal useful load	190 "
Weight with normal full load	1240 "

Fig.1





Area of	main wings	229.0	sq.ft.
"	" ailerons	22.0	" "
"	" stabilizer	11.5	" "
"	" elevators	12.25	" "
"	" fin	3.12	" "
"	" rudder	9.0	" "



60 HP.
"Cirrus"
engine.

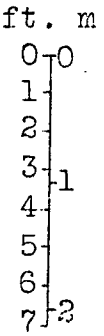


Fig.1 DH-60 "Moth" airplane.

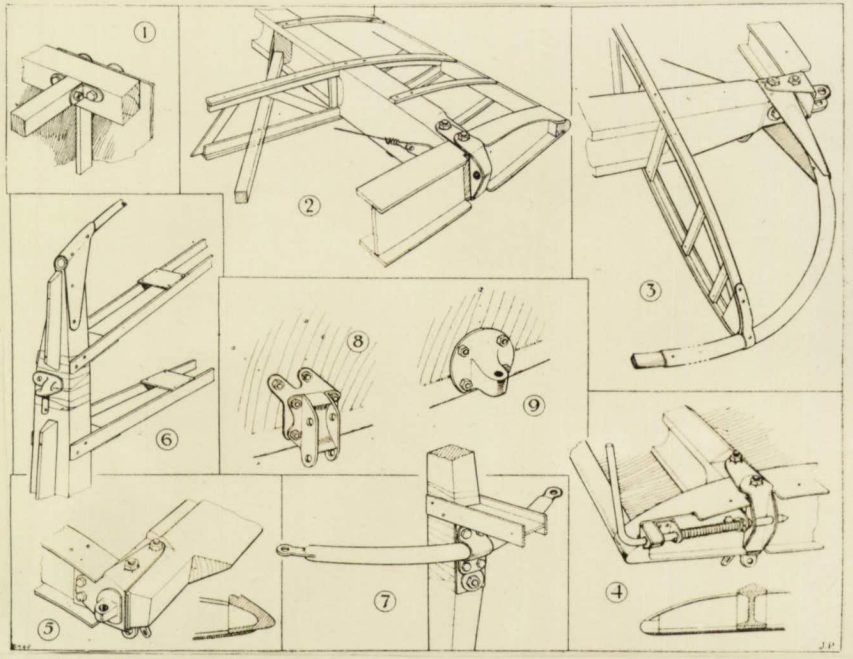


Fig. 5 Constructional details;- 1, the only metal fittings, attachment of top cross-struts to top longerons. 2,wing construction and spar fitting of top wing. 3, rear top spar with fitting, etc.;the rounded corner is in the form of an aluminium tube, flattened to meet the wooden trailing edge. 4, front spar fitting of top center section, with quick release for folding of wings. The gravity gasoline tank rests on the center-section spars. 5,rear spar of top center section, with hinge fitting for folding. 6,top of rudder post, showing hinges, ribs, and metal trailing edge. 7,rear view of rudder, with plain tubular rudder crank. 8 & 9, the very simple wing fittings on the lower longeron of the fuselage.The wings, of course, pivot on the rear spar fitting, and the locking device on the front spar is similar to that shown in 4

Fig. 3 View showing landing gear and mounting of "Cirrus" engine

Fig. 4 View showing arrangement of cockpits. Note also the gravity gasoline tank in top wing.

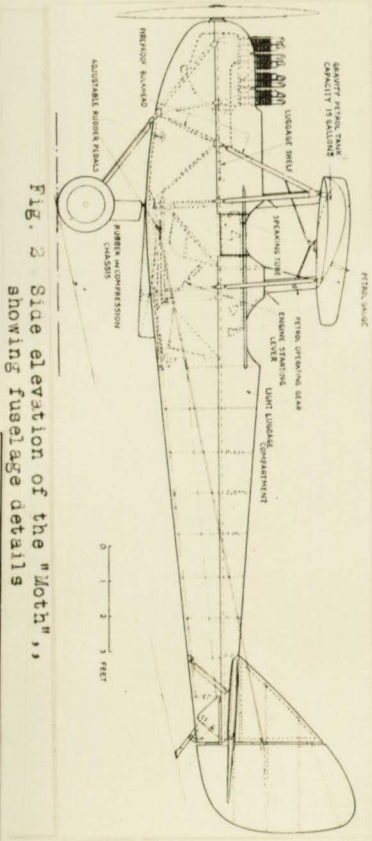


Fig. 2 Side elevation of the "Moth", showing fuselage details

Figs. 2, 3, 4 & 5