

AIRCRAFT CIRCULARS  
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

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No. 131

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THE HANDLEY PAGE TYPE 42 COMMERCIAL AIRPLANE (BRITISH)  
A Metal Sesquiplane

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Washington  
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THE HANDLEY PAGE TYPE 42 COMMERCIAL AIRPLANE (BRITISH)\*

A Metal Sesquiplane

The Handley Page 42 is practically an all-metal sesquiplane of very original conception. The design is remarkable not only in the matter of size, but also in its originality (Figs. 1, 2, and 3). Fundamentally, the design of the 42 is based upon an engine arrangement which is not new, having been used by M. Blériot in several airplanes, bombers and passenger aircraft, but in the 42, this engine arrangement has been combined with other features in a manner not previously tried, as far as we can recollect. For example, the placing of one-half the passengers in a cabin projecting forward from the wings has resulted in a fuselage projecting a very long way in front. It is this which gives the 42 its unusual appearance. The second cabin is aft of the line of the engines, and consequently no passengers are seated in a position which might be excessively noisy, nor where a broken propeller blade, should such a mishap occur, would be likely to hit anyone.

The extreme nose of the fuselage contains the pilots' cockpit, and being right out in front, the view is exceptionally good. Aft of the cab follows the forward cabin, and then comes a space for luggage and mails on the starboard side, a

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\*From Flight, November 28, 1930.

steel fittings, are slotted into the spar flanges, which are reinforced by internal and external laminations to stiffen the flange to take the concentrated load.

Automatic slots are fitted to the top wing (Fig. 6). The auxiliary airfoils of the slot mechanism are of a new form of construction, with single spars of Z-section duralumin and a planking or skin of sheet duralumin. The top planking is in the form of narrow sheets with their lateral edges bent up for riveting to the plain, unflanged ribs. The ailerons are of the slot type, and have single spars of circular section duralumin tube, with tubular ribs. Each aileron is carried on four hinges, supported on box section brackets projecting back from the rear spars. The ailerons are balanced statically and aerodynamically, and are reported to be very light on controls.

The fuselage of the Handley Page 42 is built in two sections, of which the main forward one is a metal monocoque, while the rear is of welded steel tube construction (Figs. 7, 8, 9, and 10). In Figure 9: 1, shows the bulkhead which carries the front wing spar; note the section of the longeron. In 2 is shown the bulkhead attachment of interplane struts, while 3 is a corner of the bulkhead carrying rear spar fittings; this was sketched while lying on its side. The details of the diagonal skin bracing are illustrated in 4. The duralumin longerons of the forward portion are in the form of two corrugated strips with flat flanges, placed face to face so as to form nearly a

circular section tube with flat projecting flanges. The fuselage formers or frames, of large size channel section duralumin, are attached to the longerons by angle-section brackets, and the "alclad" plating or covering is riveted to longeron flanges and frames. The planking, although having deep fore-and-aft corrugations, is not relied upon exclusively for the bracing of the fuselage structure. Between vertical frames are diagonal members of X formation, riveted to the planking and joined together, where they cross each other, by gussets of sheet duralumin. The construction is probably very strong, indeed, but impresses one as being expensive.

The structure and balancing of the tail surfaces is shown in Figures 11, 12 and 13.

The power plant installation is, as already mentioned, unusual (Figs. 14 and 15). The two lower engines are placed on the lower wings. The engine plates or bulkheads are of duralumin, built up to form boxes. These engine plates are supported by welded steel tube structures which extend right aft to the rear wing spars so as to give a very rigid engine mounting. From the lower engines to the fuselage the lower wings slope up to the top of the fuselage so as to avoid piercing the cabin with spars and various obstructions. The result of this "negative dihedral" is that the view from the cabin in a downward direction is not obstructed by the lower wing. The top engines, placed as close together as the propeller diameters permit, are

mounted in a similar manner to the lower, but are slung under the top center section. The gasoline tanks are housed in the upper wing, and give direct gravity feed to all four engines. In the first airplane built, the engines are Bristol "Jupiters," series XI, of 490 hp each, but there is a possibility that in the "Eastern" model medium supercharged "Jupiters" may be fitted.

The landing gear of the Handley Page 42 is of the oleo-pneumatic type, with bent axles. The tubes are something like 7 inches in diameter, and of T.2 axle material. The landing gear is of very simple form and low frontal area, as will be seen from Figure 1. Dunlop wheels with Palmer brakes are fitted. On Figure 16 is shown one-half of the oleo-pneumatic landing gear. The ball-and-socket joint of the radius rod has an internal plug of phosphor bronze, screwed into the outer casing and locked in position by the bolts passing through the castellations in the top of the bush. The controls are in duplicate, the elevator and aileron controls taking the form of a large-diameter Y-tube, the upper limbs of which each carry a wheel.

Adjustable foot-bars are provided, and the seats are also adjustable. The engine controls are arranged in a somewhat unusual manner. A "lost motion" mechanism is incorporated, so that the first few degrees of movement of the throttle levers do not open the throttles on the engines but merely turn on the gasoline. Thus it is impossible for the pilot to forget to turn the gasoline on to one of the engines. Also a certain

amount of extra control leads are saved, which is not unimportant in an airplane of the large dimensions of the 42.

The control lever of the Palmer wheel brake system is centrally placed, within reach of both pilots, and is very neatly arranged so that a straight-back movement of the lever applies both brakes, while a diagonal movement to one side or other applies one or other of the brakes.

Altogether, the Handley Page 42 is an unusually interesting airplane, and it will be instructive to watch its behavior when it is put into service.

#### Details of the Handley Page 42 Type\*

Although the external appearances of the aircraft appear the same, there are actually two types, known as the H.P. 42 E type and the H.P. 42 W type, the former denoting the eastern type, and the latter the western type.

From the accompanying particulars, it will be noted that the eastern type, by virtue of reduced pay load has an increased performance, with the ability to fly on any three engines at an altitude of 6000 feet.

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\*Received from Paris Office, N.A.C.A.

## D i m e n s i o n s - Both types

Wing area,	2838 sq.ft.
Span of upper wing,	130 ft.
"    " lower "	94 "
Chord of upper wing,	15. ft. 6 in.
"    " lower "	11 " 6 "
Length, over-all	86 " 6 "
Height, tail down,	25 "
Wheel track,	28 " 3 in.
Size of wheels,	60 in. diam. x 21 in. wide

## E n g i n e s

- 4 "Jupiter" XI.F's of 490 hp each, or  
 4 " " X.F.BM's of 555 hp each.

## L o a d

Pay load of 42 E type with "Jupiter" XF.MB's - 6301 lb.  
 " " " 42 W " " " XL.F's - 8160 "

## W e i g h t

Total all-up weight, 42 E type "Jupiter" XF.MB's - 27,244 lb.  
 " " " 42 W " (Design weight) - 28,500 "

## Estimated Performance

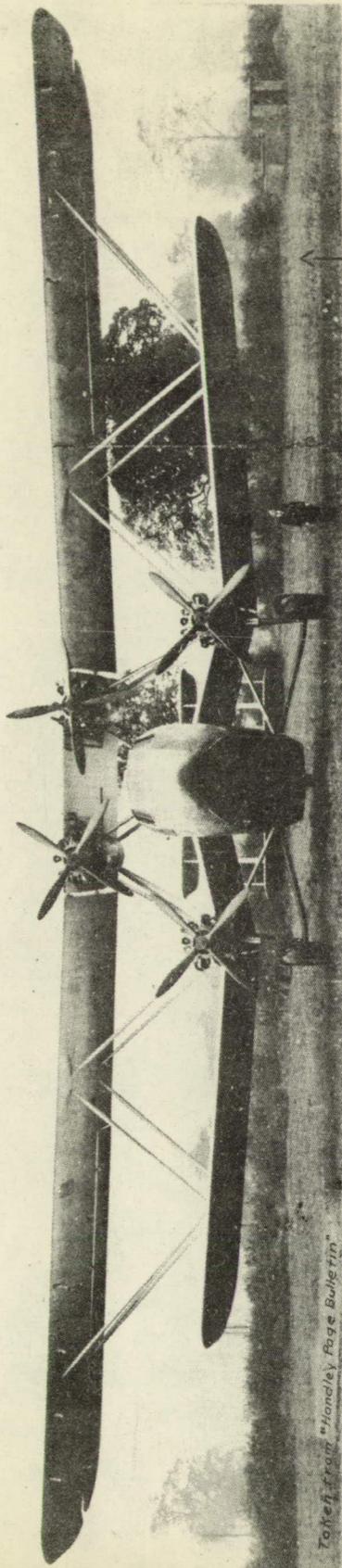
42 E type, with "Jupiter" XF.MB's

Maximum speed at sea level,	119.5 m.p.h.
Cruising speed,	105.0 "
Rate of climb at sea level,	828.0 ft. per min.
Service ceiling,	-
Landing speed,	50.0 m.p.h.

42 W type, with "Jupiter" XI's

Estimated speed at 1000 feet,	115.5 m.p.h.
Cruising speed,	85.0 "
Rate of climb at 1000 feet,	600.00 ft. per min.
Service ceiling,	11,350 ft.
Landing speed,	50 m.p.h.

Tank capacity is provided in both types for 500 miles, although with the normal tankage, 300 miles would be the range.



*Taken from "Handley Page Bulletin"*

Fig. 1 View of the Handley Page 42 airplane showing how the fuselage is slung beneath the lower wings in order to give the passengers a good view and to enable them to enter and leave the saloon without using steps or ladders.



Fig. 2 Three-quarter rear view of the Handley Page 42 airplane.

Fig. 3 Three-quarter front view of the Handley Page type 42 commercial airplane.

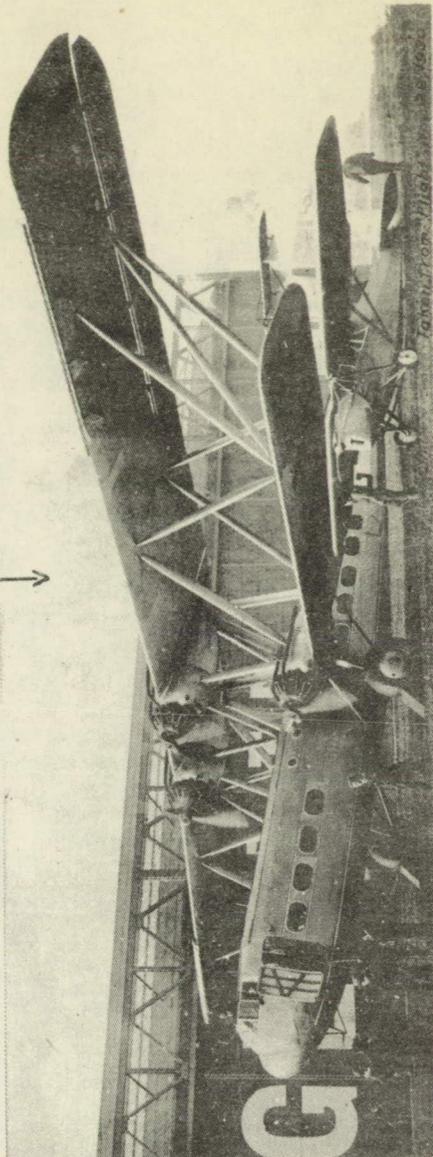
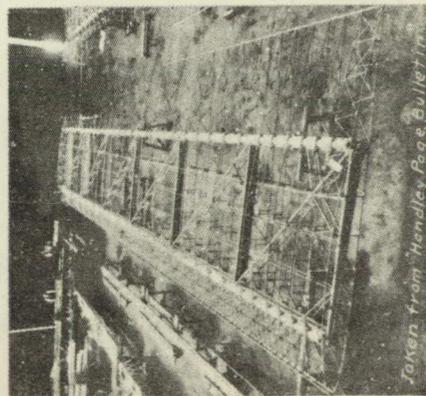


Fig. 4 Top star-board wing.



*Taken from "Handley Page Bulletin"*

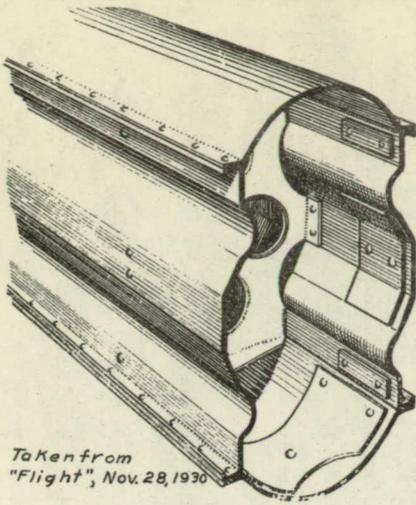


Fig.5 The main wing spars are of built-up box section.

Taken from "Flight", Nov. 28, 1930

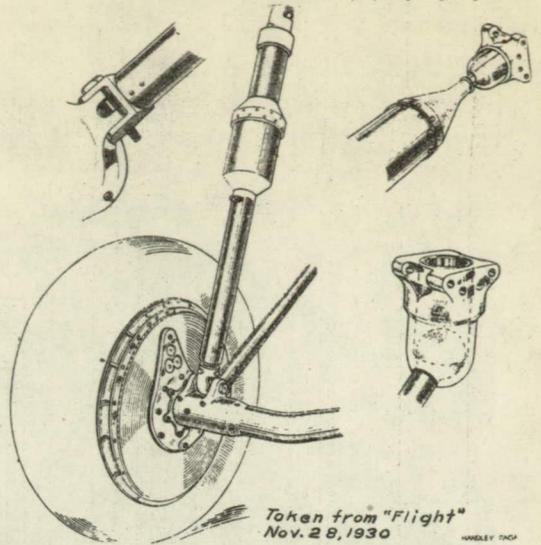


Fig.16 Details of landing gear.

Taken from "Flight" Nov. 28, 1930

HANDLEY 1700

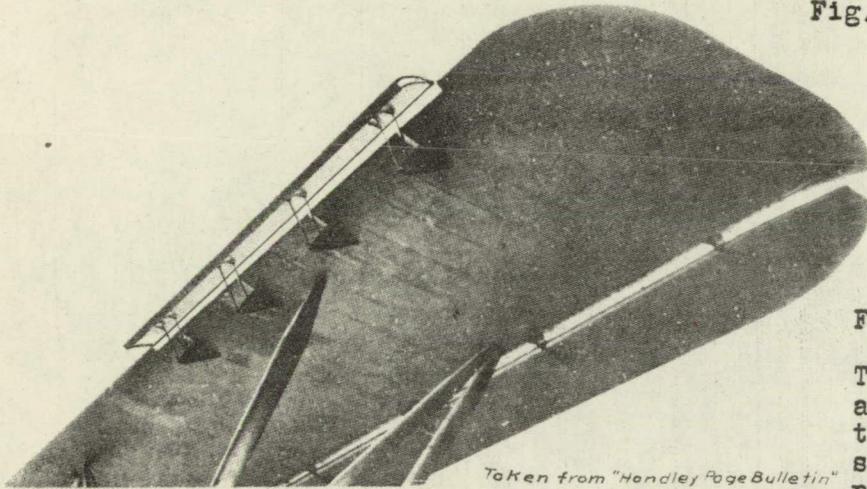
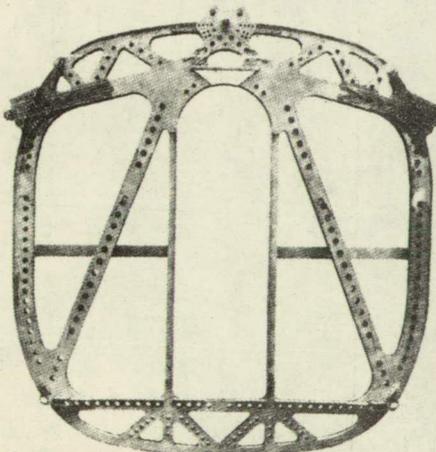


Fig.6 View of the automatic slot in the top wing.

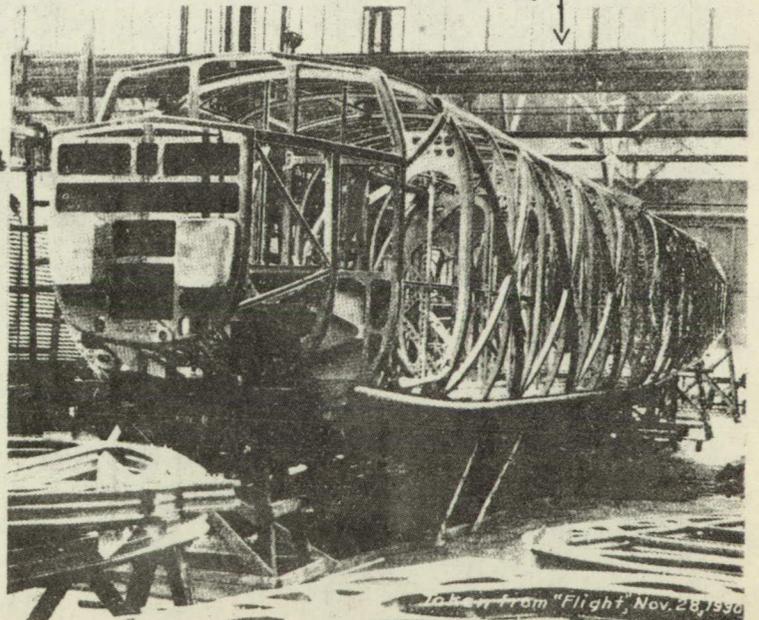
Taken from "Handley Page Bulletin"

Fig.7 Fuselage construction: The vertical frames are of channel section, riveted to the skin, and bracing is provided by diagonal members.



Taken from "Handley Page Bulletin"

Fig.8 The massive bulk-head aft of the front cabin.



Taken from "Flight", Nov. 28, 1930

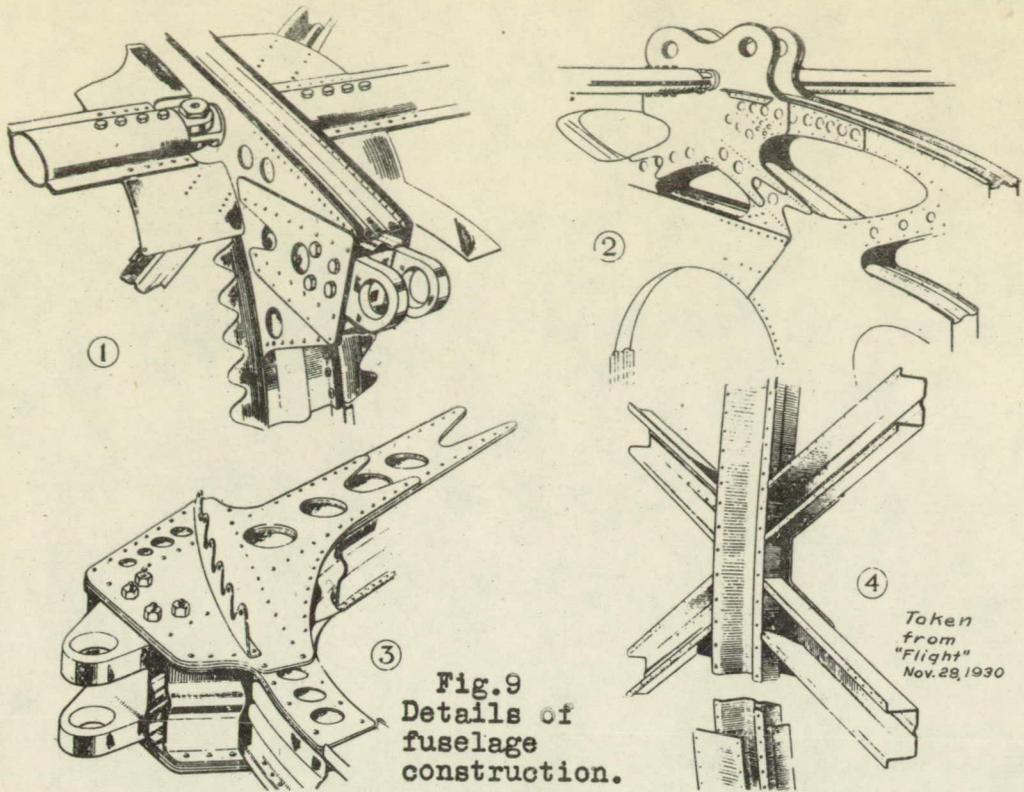


Fig. 9  
Details of  
fuselage  
construction.

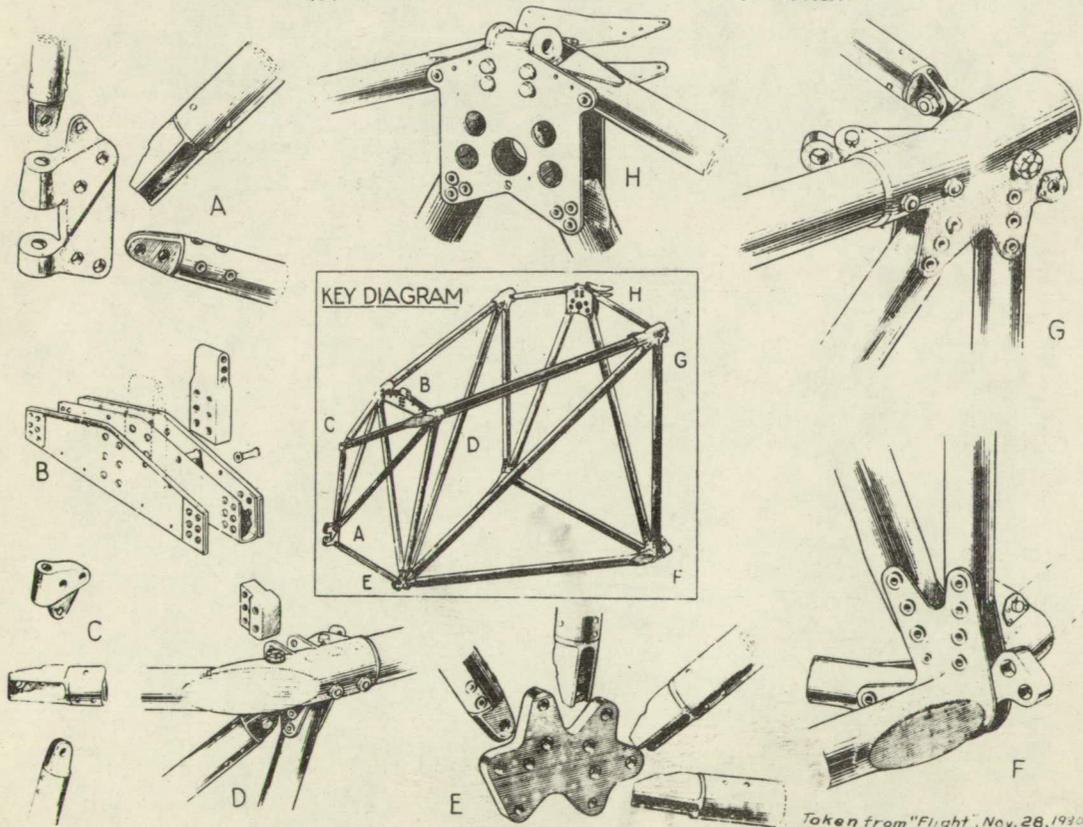


Fig.10 Details of rear portion of fuselage, which is of welded steel tube construction. The key diagram shows extreme stern portion.

Fig.11 The elevator is of duralumin construction, with rigid drag bracing.

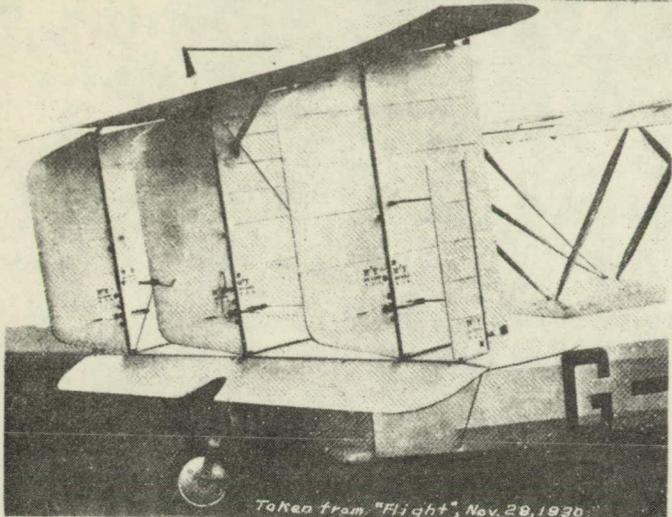
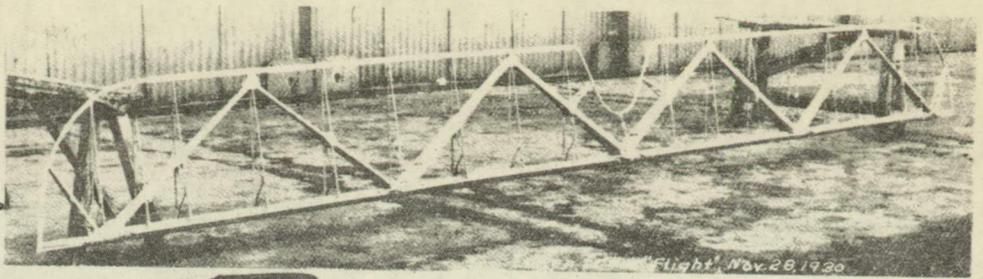


Fig.12 Rudder balances of an unusual type are used. These take the form of separate surfaces, placed some distance from, but linked to, the outer rudders. The balances are provided with fixed slots.

Fig.13 The stabilizer is like the main wings and control surfaces, of duralumin construction.

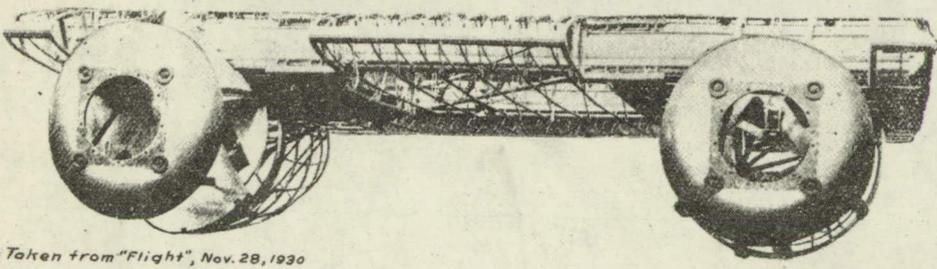
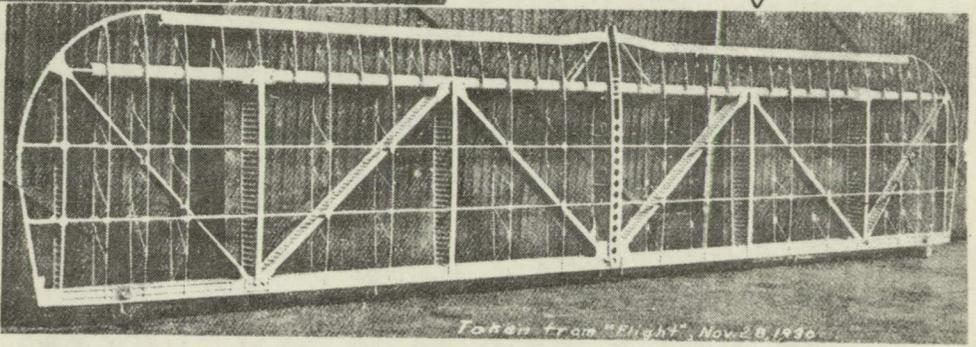
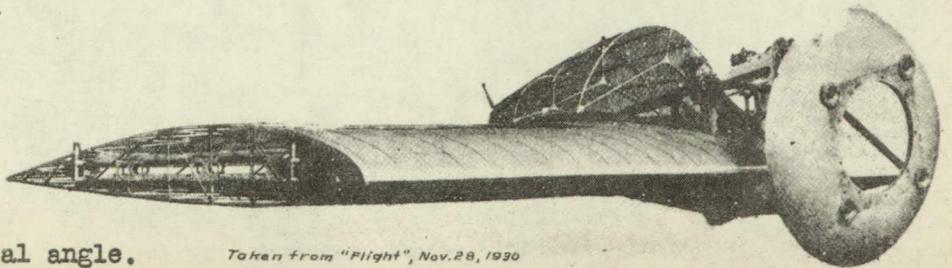


Fig.14 The top center-section, with engine nacelles in place.

Fig.15 A lower wing portion with its engine nacelle. This wing portion is set, in the finished airplane, at a negative dihedral angle.



Taken from "Flight", Nov.28, 1930