AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 20

THE HANDLEY PAGE "HAMLET"

From "The Aeroplane," October 13, 1926
and "Flight," October 14, 1926

Washington
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THE HANDLEY PAGE "HAMLET." *

The "Hamlet" is a three-engined monoplane of comparatively small size, fitted with three Bristol Lucifer, Series IV, engines of 130 HP. each, designed to carry a pilot and four passengers in comfortable quarters. Actually there is room in the cabin for six passengers, and the airplane should have no difficulty whatever, in carrying this number and a reasonable quantity of luggage. Seven persons with 390 HP. works out at over 55 HP. per passenger, which is quite a handsome allowance.

General Description

The lay-out of the airplane is clearly shown in the general arrangement (Fig. 1) which is here produced. It is of the high-wing monoplane type with rigid bracing to the wing. One engine is fitted to the nose of the fuselage and the two others are carried between the wing and the wing bracing struts by a triangulated structure of steel tubes.

Fuel tanks are recessed into the wings on each side of the body, giving gravity feed to all engines.

To each wing-engine mounting is attached one telescopic landing gear leg, with compression rubber springing and oleo damping gear, which supports an axle hinged to the fuselage at the root of the front spar bracing strut. The joint between

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axle and leg is stayed by a third tube running forward to the bottom edge of the fuselage.

Mud guards are fitted to each wheel to prevent dirt and pebbles from being thrown into the propeller above.

The tail unit includes a single central fin and a rudder balanced by the "inset hinge" method; and a monoplane stabilizer and elevator carried well above the fuselage.

The Wings

The wings are built in two sections on box spars, and their profile, when the slots are closed and the flaps are in normal position, is that known as R.A.F. 31. This is a thick section of remarkably low resistance which also gives a fairly high lift, and seems to suffer from no objectionable qualities.

The auxiliary nose-airfoil which forms the leading edge slot is built up of aluminum sheet on solid mahogany ribs and is carried from a stout steel tube mounted in front of the front spar by a series of parallel link motions so arranged that rotating the tube causes the nose-airfoil either to close down tight on the fixed wing, or to advance ahead of it and open the slot (Fig. 2).

The trailing edge flaps are in two lengths on each side. The inner lengths operate only in conjunction with the leading edge slot. That is to say, they are pulled down when the slot is opened.

The outer length also works in conjunction with the leading edge slot, but in addition to this they serve as ailerons.

The Slot and Flap Gear

The mechanism controlling the slot and flap gear is very ingenious and is indicated on Fig. 2. Each flap is provided with one downwardly-projecting horn, coupled by a pull-and-push rod to a lever pivoted on one of the brackets carrying the control tube to the front slot.

The upper end of this lever has in it a curved cam slot, in which a pin, carried by an extension of the link operating the front slot, engages. At first sight it looks as though opening the slot would move the flaps upwards but actually owing to the slope of the cam-slot the reverse effect is produced.

Precisely the same type of cam gear is used for the aileron section of the flaps. But instead of a direct connection from the flap to the cam-operated lever, this lever has mounted upon it a chain-wheel which is rotated by lateral movement of the control stick. On the lower face of the chain-wheel is a crank-pin and to this is coupled the aileron push-and-pull rod.

It will be realized that if the control stick is held steady and the flap gear operated, the ailerons will move precisely as though the crank-pin were rigidly fixed to the lever which carries it and will share the movement of the inner flaps. At the same time any movement of the control stick will rotate the

sprocket and produce a normal aileron movement irrespective of the position of the slot and flap gear.

As a matter of fact this last statement is not strictly accurate, for in detail the movement of the ailerons is modified by the position of the slot gear. With the slot closed the angular position of the aileron crank-pin produces a normal differential effect, such as is produced by the De Havilland differential aileron gear, and the up-going aileron moves through a bigger angle than the down-going one. When the slot opens and the flaps are down the angular relations between horns, push-and-pull rod and crank-pin are altered to such an extent that the differential action is reversed and the down-going aileron has the greater movement. And thus the full effect of the slots is attained.

The Fuselage

The body is of the normal rectangular section, built on four spruce longerons, with strut-and-wire bracing.

Over the pilot's cockpit and cabin three-ply sides and floors are used, but aft this it is fabric-covered (Fig. 3).

The pilot's cockpit is provided with a fixed Vee-pointed wind-screen of glass, fitted with an electric wind-screen wiper, and is covered overhead with Cellon panels. The pilot sits on the port side, and the panel over his head can be opened by sliding it backwards.

The flying controls consist of a stick and rudder-bar, a

slot-control handle (which rotates the torque-tube in the wing through two worm drives), and a hand-wheel controlling the incidence of the tail.

On the starboard side of the cockpit is installed a complete W.T. outfit. This can either be controlled by the pilot, or, if so desired, by one of the occupants of the cabin - who can obtain access to the cockpit by a sliding door on the same side.

The cabin is some 7 ft. 6 in. long, has nearly 5 ft. headroom, and is about 3 ft. wide. It has Cellon windows over its whole length on both sides, and obtains additional illumination through the pilot's cockpit and the above-mentioned sliding door which is also glazed with Cellon.

Entrance to the cabin and thence to the cockpit is given by a large door in the port side, and the floor of the cabin is low enough to permit of stepping straight into it.

A settee, which is adjustable for angle and position, is fitted right across the cabin at the back. A fixed seat back to back with that of the pilot is fitted at the other end, on the port side, with a folding seat (to allow use of the sliding door) alongside. A folding table fixed to the starboard wall of the cabin may be let down between the two sets of seats.

The cabin is electrically lighted, is fitted with an air-speed indicator, altimiter and clock, and also with a drinking-water tap and tank. A locker for small articles is fitted below the front fixed seat.

There is no separate luggage compartment, but there is ample room for ordinary personal luggage in the cabin.

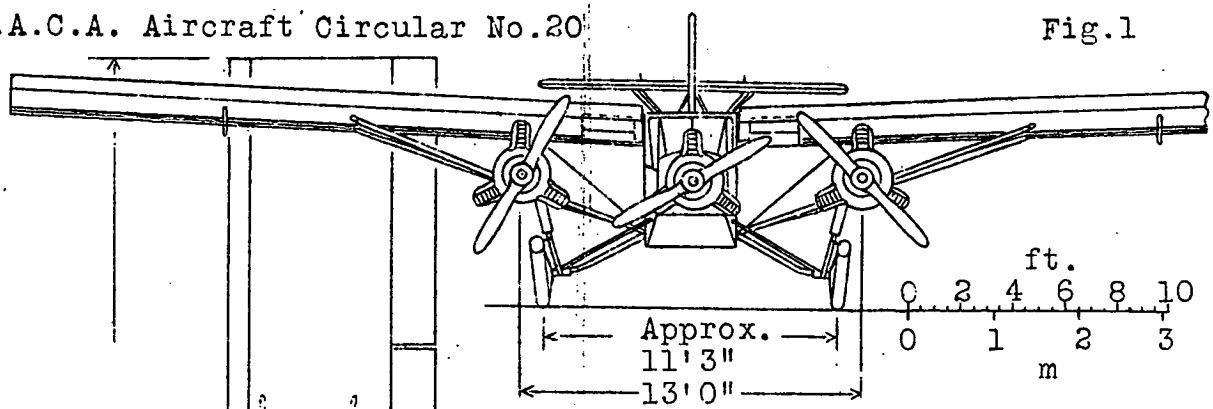
Information as to the expected performance is not available, but from the low power loading it may safely be assumed that the "Hamlet" will be distinctly speedy.

Characteristics

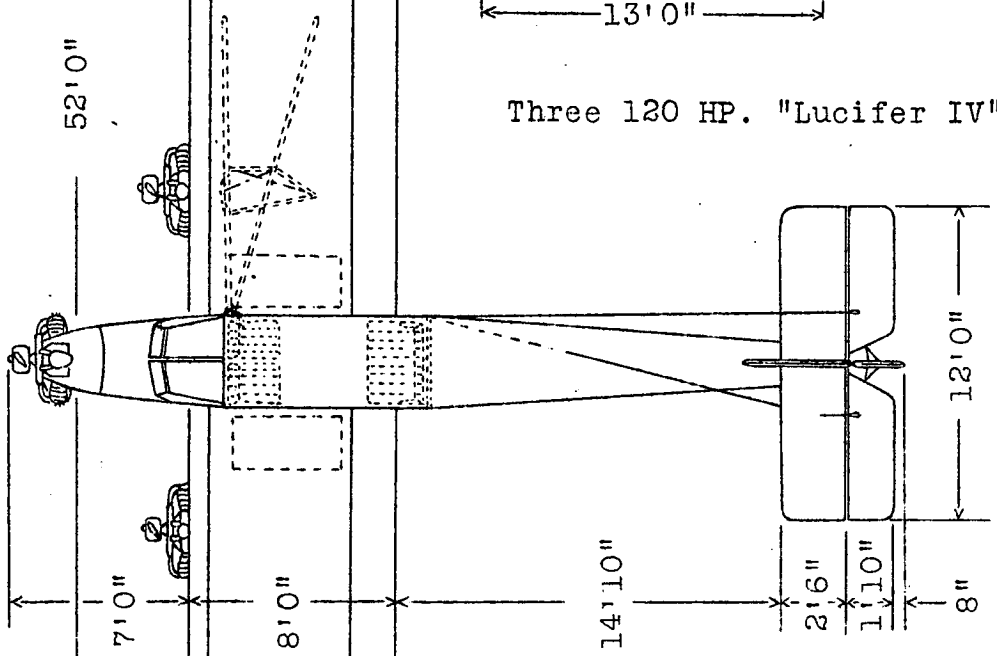
Length over-all,	34 ft. 10 in.	(10.6 m);
Wing span,	52 " -	(15.85 m);
Wing chord,	8 " -	(2.435 m);
Wing area,	388 sq.ft.	(36 m^2);
Weight of airplane, empty,	3105 lb.	(1410 kg);
Weight of instruments, cabin equipment, etc.,	270 "	(122.7 kg);
Gasoline,	74 gal.	(337 liters);
Oil,	7 "	(31.9 ");
Weight of pilot,	180 lb.	(82.0 kg);
Useful load (4 passengers and luggage),	800 "	(363.0 ");
Total loaded weight,	5000 "	(2270.0 ");
Wing loading,	12.9 lb./sq.ft.	(63.2 kg/m^2);
Power loading (3 engines at 120 HP.)	13.9 lb./HP.	(6.32 kg/HP.);
"Wing power" (i.e., ratio of HP. to wing area),	0.928 HP./sq.ft.	(10 HP./m^2);
Power loading with 2 engines running,	20.8 lb./HP.	

Characteristics (Cont.)

"Loading figure" (i.e., power loading multiplied by square root of wing loading),	50		
Estimated top speed,	118	M.P.H.	(190 km/h);
Cruising speed,	100	"	(161 ");
Landing " ,	47	"	(75.7 ");
Speed with 2 engines running,	90	"	(145.0 ").

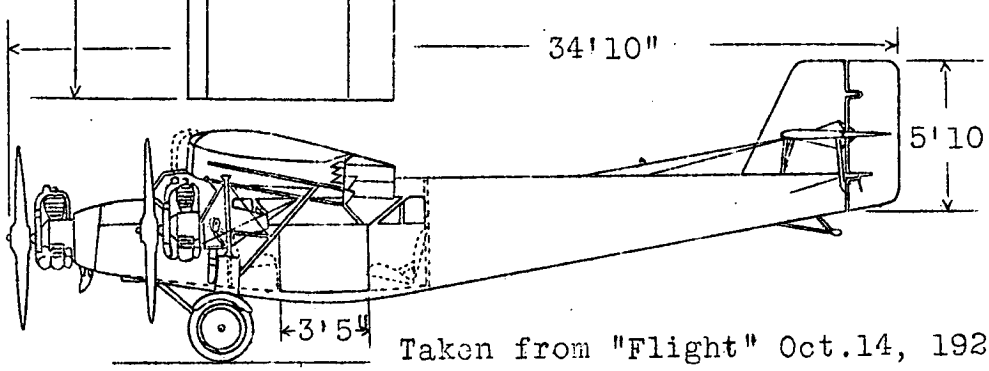


Three 120 HP. "Lucifer IV" engines.



Areas

Wing including flaps	388.0	sq.ft.
Ailerons	43.5	" "
Stabilizer	30.0	" "
Elevators	18.25	" "
Fin	12.0	" "
Rudder	11.0	" "



Taken from "Flight" Oct.14, 1926

Fig.1 Handley Page "Hamlet" airplane.

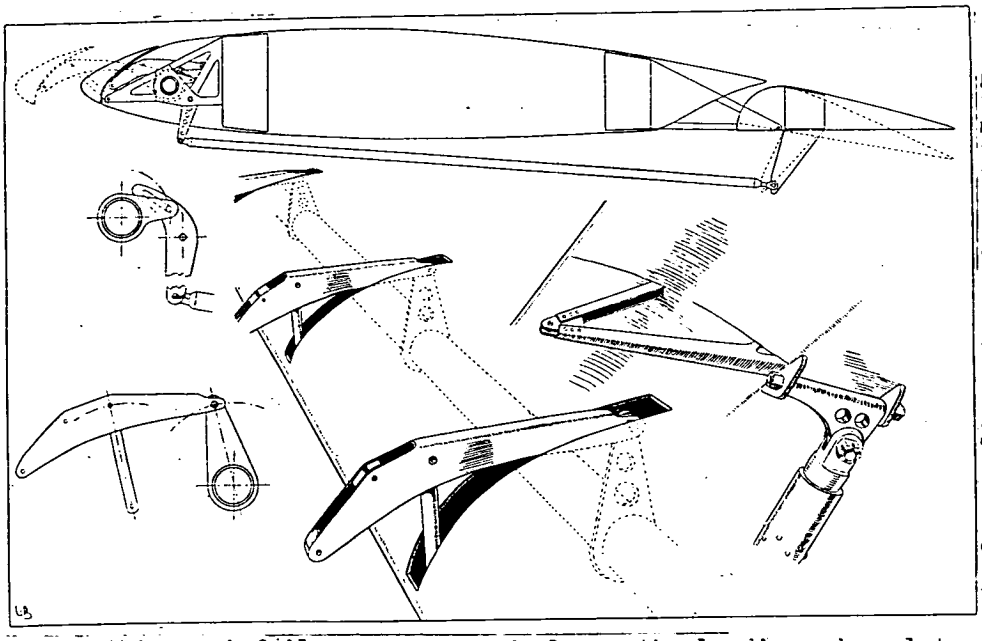


Fig. 2.
Slot and flap gear details. At top is a diagrammatic section of the wing showing the relation of the various parts. Immediately below and on the extreme left is a diagram of the cam slot gear which controls the trailing-edge flap pull-and-push rod. This gear is controlled by the torque tube, running along back of the leading edge of the wing, which also directly controls the auxiliary airfoil and opens and closes the leading-edge slot. The auxiliary airfoil is carried on a series of duralumin members which form part of a parallel link gear. This link gear is shown diagrammatically in the lower left-hand corner, and in perspective in the center of the illustration. In this case the torque tube is dotted. Only three out of the four members of the link gear are shown in these sketches, the fourth being a part of a bracket attached to the front spar, which carries the bearings for the torque tube and the pivot for the front link. On the right is shown the attachment of the rear spar-bracing tube to the spar, and the duralumin brackets which carry the trailing-edge flaps.

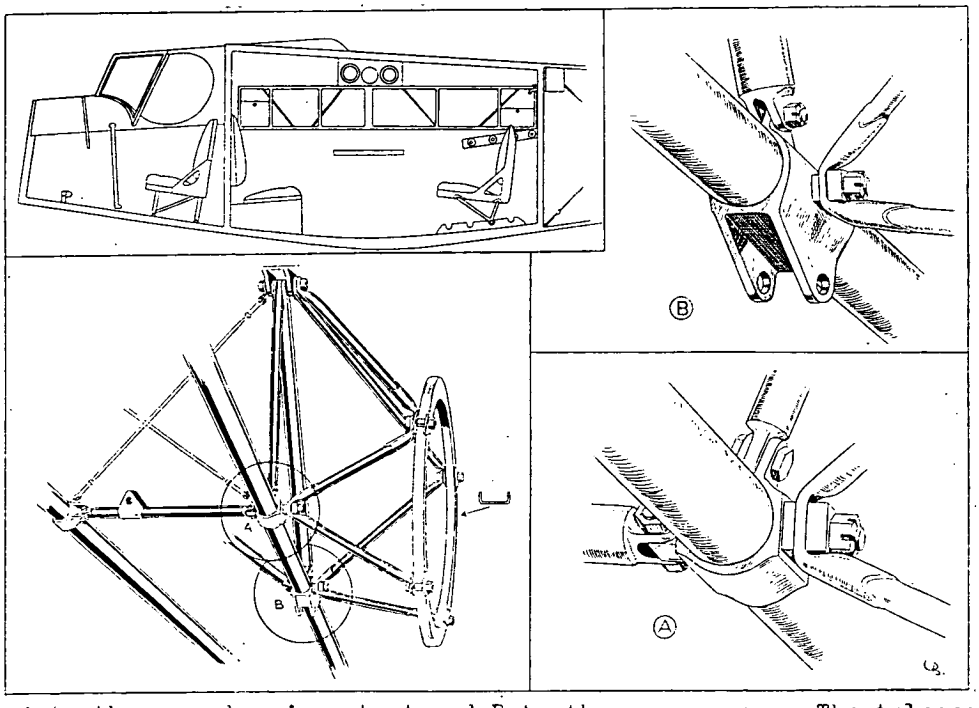


Fig. 3.
Top left, sectional elevation of pilot's cockpit and cabin. The very complete enclosure of the pilot's cockpit and ample room given in the cabin are noticeable. Bottom left, the structure supporting one wing engine. This is attached at the top to a fitting on the front wing spar, and at the bottom to two fittings A and B on the front bracing strut. A and B, shown separately on the right, are tied, A to the rear bracing strut and B to the rear spar. The telescopic leg of the landing gear is also attached to fitting B by the lug which is shown unoccupied in the sketch.