AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 64

THE HEINKEL COMMERCIAL AIRPLANE H.D. 40

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THE HEINKEL COMMERCIAL AIRPLANE H.D. 40.*

The Heinkel commercial airplane H.D. 40, is manufactured in compliance with stipulations formulated by the German Technical Department for Aeronautics at Adlershof. It is used for the transporting of passengers and newspapers. In structure it may be classified as compound in that metal is used for parts which receive secondary stresses. The wings are greatly staggered and have wire bracing, the whole being featured by great stability. In the A** test the factor of safety was found to be 6.

Fuselage

Structure of great stability, built of steel tubes and mounted on four longitudinal members with rectangular frames assembled through welding. Wire bracing is carried out by a system of cables and steel tubes.

Fuselage covering.- The pilot's cockpit is lined with light metal, otherwise the covering is of fabric and readily detachable for inspecting the inner fuselage.

Arrangement of fuselage.- See attached drawings (Figure 1 and photographs (Figs. 2, 3, and 4). The engine mounting is of tubular steel; it can be taken down by the undoing of four bolts

*Circular issued by the Ernst Heinkel Airplane Company.
**In "Analysis of Stresses in German Airplanes," by Wilhelm Hoff N.A.C.A. Report No. 143, test A is described as "pulling up out of a dive."

fixed to the front frame. This latter constitutes a fireproof bulkhead, the covering of which is of sheet and asbestos. The fittings required for carrying fuel and lubricant have been provided in front of the fireproof bulkhead. At the rear there follows the pilot's cockpit with side-by-side seats for pilot and passenger; dual control is installed. The pilot's cockpit is equipped with instrument board, steering and gas regulator, as well as with the control operating the load-releasing gear, this latter being suitably installed for operation by either the pilot or his companion. Close to the latter's seat and to the right a door gives access to the airplane. Under the pilot's cockpit there is loading space with load-dropping gear controlled at will from the pilot's cockpit for both opening and shutting, in the bottom of the fuselage. The dimensions of the freight hold are 1.2 x 1.4 x 1.0 meters; capacity about 2.00 m^3 (70.6 cu.ft.); load-dropping gear is detachable whenever the airplane is used for passenger traffic, the space thus made available is devoted to the transport of luggage. Towards the rear, a second freight hold measuring 1.8 x 1.2 x 3.0 m; capacity 6.5 m^3 (229.5 cu.ft.) for the stowage of further load, or else for the arrangement of from 6 to 8 passenger seats. At the rear and at both board sides is a door of large dimensions for speedy loading or giving passengers access to the cabin, as the case may be. The freight hold receives ample light through large windows. The attachment fittings for wings, landing gear,

and flying control connections are organically welded to the fuselage network.

Wing Structure

Both the upper and lower wings are in two parts attached to the central section and the fuselage by means of bolts. The main wing presents no Vee section, while that existent in the lower wing is very slight; none of the wings presents any arrow form. The wing structure is protected against torsion stresses by an N-stay system on both sides. The stagger is so designed that the rear spar of the main wing is right over the front spar of the lower wing; the cross bracing is insured by means of streamlined wires.

Method of construction.- Two box spars each with spruce ribbands and plywood web plankings. Ribs of spruce with plywood webs. The inner reinforcement is insured by torque plates of plywood in the lower side; the leading edges are covered with plywood to preserve their form, the upper side and rear section of the lower side being fabric-covered.

Profile.- The profile is of special Heinkel's design, evolved after many years' aerodynamical research and experimental work with the wind tunnel.

Tail Planes and Flying Controls

Materials.- Steel tubes with fabric covering. The elevator control and rudder are compensated by balancing surfaces; ailer-

ons are fitted only to the top wing and they are compensated through their own adequate design. Steering control pressure is maintained uniform in all altitudes of flight. The horizontal fin is adjustable in flight from the pilot's seat with the rear spar and the vertical fin only in position. The steering control is operated by foot lever and cable and the operation of the elevator control and that of the ailerons is by steering wheel and cables. The control cables work on brass rollers and ball bearings. The aileron cables are situated inside the wings and are readily accessible for inspection. The control system for the elevator and steering rudder is by double cables.

Landing Gear and Tail Skid

The landing gear is in two parts: suspension clamps of Vee section are provided at either side of the fuselage and organically welded to their respective axle; both are fixed to the lower fuselage spar by a swiveling attachment and fitted with shock absorbers and rubber in compression.

Wheels.- The wheels are of the wire-spoke type with tires; the wheel track is particularly wide to facilitate landings at night. The tail skid is adjustable and fitted with rubber suspension and shock absorbers.

Power Unit

The engine is a 465-600 HP. B.M.W. VI. Below the engine an N.K.F. radiator with additional water tank above the engine in the engine cowling. The oil tanks are of sheet brass and situated in the engine mounting. Fuel is conveyed to the engine from a gravity tank of sheet brass placed on the top wing.

Starter.- This is supplied in accordance with the user's requirements.

Painting and Preservation

Steel tube parts are treated with red lead, after which they are given a protecting coat of grey paint. Welded points are finished with a transparent varnish so as to facilitate their inspection. The fabric covering of the fuselage, flying controls and wings is doped with cellon in the usual way.

Flying Qualities and Visibility

The aircraft is perfectly compensated in flight. It offers a very good visibility, particularly also for landing; the different control levers and board instruments have been given special attention and their arrangement renders them easily maneuverable and prominent. The figure instruments are fitted with automatic lighting.

Instruments

The following instruments are used:

1 revolution indicator
1 speedometer
1 altimeter
1 gasoline level indicator per tank
1 board watch
1 compass
1 oil pressure indicator
1 cooling water thermometer

Specifications

Dimensions:

Span of main wing	17.60 m	(57.74 ft.)
Span of lower wing	15.15 "	(49.70 ")
Over-all length	11.90 "	(39.04 ")
Height	4.27 "	(14.01 ")
Aerodynamical surface	75.4 m^2	(811.6 sq.ft.)

Power Unit:

1 B.M.W. VI 465-600 HP. engine

Specifications (Cont.)

Statistics:

Weight empty	1822 kg	(4016.82 lb.)
Load	1600 "	(3527.39 ")
Total weight	3422 "	(7544.21 ")
Load:		
2 men	170 "	(374.79 ")
Fuel for 4 hours at full gas	430 "	(947.99 ")
Freight (newspapers)	1000 "	(2204.62 ")
Total	1600 "	(3527.40 ")

Performances: with a total weight of 3422 kg (7544.21 ")

Speed at ground level	180 km/h	(111.85 mi./hr.)
Landing speed	75 "	(46.60 ")
Climb to 1000 m (3281 ft.)	8 minutes	

Wing loading: 45.5 kg/m² (9.32 lb./sq.ft.)

Load per horsepower: 7.36 kg (16.00 lb./HP.)

These performances are guaranteed within 3% as regards speed, and within 5% in respect to climb.

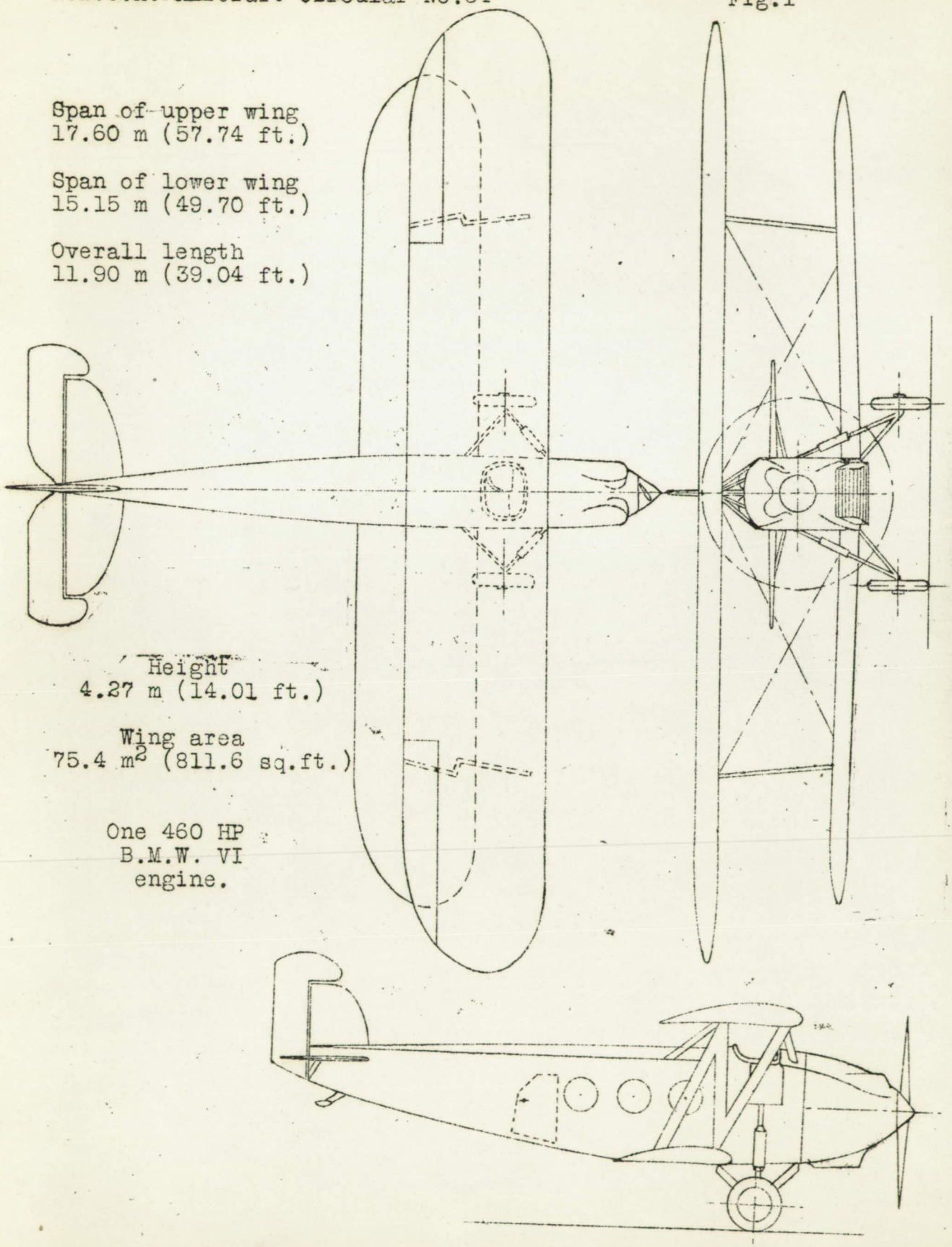

Fig.1 The Heinkel H.D.40 commercial airplane.

Fig. 2

Fig. 3

Figs. 2, 3, & 4 The Heinkel H.D.40 commercial airplane