ABSTRACTS.

Use of Carbide for Aerial Motors.

Experiments are being conducted at Messrs. Nielson and Winther's aeroplane factory, Copenhagen, with a motor fuel made from carbide. A Danish engineer, Herr Carsen, of the Danish State Railways, originated the idea and the experiments will probably be concluded in about fourteen days. If the results correspond to expectations, a factory will be erected at Amager for the production of aeroplane carbide. The costs of production are at present high. ("Göteborgs Handels-Tidning," Sept. 11, 1918.)

Fokker D.VII. Single-Seater Biplane Scout.

This machine has appeared recently on the French front and is among the best of enemy scouts. The span of the upper wings is 29ft. 3½ins., and that of the lower 23ft., whilst the overall length of the fuselage is about 23ft. The machine has a lifting surface of 233 sq. ft. and a total weight, loaded, of 2,110 lbs. The motor is a 160 h.p. Mercedes, modified.

The chord of the upper wings is 5ft. 3ins., and of the lower 3ft. 11¼ins., and the wing section is very thick (9ins. maximum). There is a positive stagger of 26.7° between the planes. The steel tube compression ribs usual in German construction are absent in this machine, but the framework of the balanced ailerons is of steel. Each of the wing spars is composed of two strips of red deal, connected by vertical surfaces of three-ply. Each of them is also all in one length, the lower spars passing right through the fuselage and being connected to cross-members of the base of the latter by collars. The lower wing spars are of very light construction. There are no bracing wires between the two planes. The wing struts on each side consist of three stream-lined steel tubes, one of which is a diagonal welded to the base of the front and top of the rear strut. Between the fuselage and the upper wing are four very divergent steel struts on each side. Two struts connect the rear spar to the base of the fuselage near the rear legs of the chassis, two join the front spar to the top longerons, and the other four, welded in pairs, join that spar to the fore legs of the chassis and to the foremost of the motor support tubes.

All members of the tail have a steel tube framework. The tailplane is triangular, and the elevators and rudder are balanced.

The fuselage has a metal framework autogenously welded and is covered with fabric. There is a light alloy sheet cowling around the engine. At the nose is a honeycomb radiator resembling that of an automobile in form. A shutter on a vertical axis, and actuated from the cockpit, is fitted on the interior side. Two Spandau mitrailleuses fixed to the top of the fuselage may fire separately or together through the propeller.

The under-carriage consists of four stream-lined steel tubes welded at the base to a special form of sheath carrying the axle of the chassis. Elasticity is secured by springs fitted between axle and sheath. This sheath is enclosed by a plane of plywood which is large enough to contribute to the lifting surface.

The speed on the ground is about 120 m.p.h., and at 16,000ft. it is 96 m.p.h. The machine climbs 15,000ft. in half an hour. ("L'Aerophile," September, 1918.)

Alignment Chart for Obtaining Heights.

By means of a d'Ocagne alignment chart the solution of Laplace's formula for the height above datum line in terms of the pressure and temperature may be easily accomplished.

Laplace's equation is

$$z = 2.21 \times 10^2 \, T \log \frac{p_0}{_{10}p}$$

This may be written in the form

$$\log z = \log (2.21 \times 10^2) + \log T - \log \left(\frac{1}{\log R} \right)$$

where

$$R = p_0/p.$$

Use is then made of the fact that if three parallel lines be drawn along which three different variables are plotted, say, U, V and W, then by a proper adjustment of the origins of each of these, any straight line cutting the parallels does so at points satisfying the relation

$$U = U_0 + AV + BW$$

where A and B are constants depending on the distance apart of the lines. This may be made identical with the modified equation whose solution is required by adjusting the constants and setting

$$U = \log z, \quad V = \log T, \quad W = \log \left(\frac{1}{\log R} \right)$$

These three quantities are thus plotted along the parallel lines and a straight-edge, joining corresponding values of p and T, cuts the third line in the required value of z. (A. H. Stuart, "Aerial Age," Sept. 9, 1918.)

Construction of Aeroplanes.

The Norwegian Aeroplane Factory, which is the name of a newly formed company, has secured land for the construction of the necessary buildings near Tönsberg.

According to estimates about 40 machines will be built annually. Three different types will be built, of which two are completed, one of 165 h.p. to carry 4 persons, the other 500 to 600 h.p. to carry 8 persons. A smaller racing type will also be constructed with a speed of 25-30 miles an hour (Norwegian mileage). The types are exclusively hydroplanes. Trial flights will be made with sulphite spirit and carbide. ("Politiken," Oct. 12.)

Transatlantic Flight by Aeroplane.

Attention is confined to the problem of the possible delivery of American and Canadian built bombing planes by air route during the present war. Three routes are considered, viz. :—

(1) The All-British, from St. John's, Newfoundland, to Valencia Island, Ireland, involving a non-stop run over the Atlantic of 1,923 miles.

(2) The Northern route from St. John's to Christian Sound, Greenland (940 miles), then to Reykjavik, Iceland (730 miles), and on to Lewis Island in the Outer Hebrides (635 miles); making a total of approximately 2,300 miles.

(3) The Southern route from St. John's to the Azores (1,200 miles), St. Michael (312 miles), Lisbon (850), and then to Plymouth (700 miles), with a total of over 3,000 miles.

Political considerations are against the northern route, and the length of journey and the surface conditions of the Azores against the southern, but the all-

British route contains a very long non-stop run. Meteorological conditions favour the all-British route for flight from West to East, since by a suitable choice of course one half of the prevailing winds blows from a westerly quarter at 21 m.p.h. for the first 1,000 miles, while three-quarters of the winds blow from the same quarter at 28 m.p.h. for the remainder of the journey. The northern and southern routes would be only on the very fringes of this cyclonic belt. A favourable wind of 20 miles per hour would add 480 miles to a day's flight.

The directional problem, type of aeroplane required, and the method of propulsion are treated at some length, and an estimate for the distance an aeroplane can travel on its own fuel is given as approximately 1,200 miles, using present-day figures.

Mention is made of constructing aerodromic ships protected by patrol boats and scout boats. The landing platform, it is stated, should be at least 600 by 150ft. ("Aviation," Sept. 15, 1918.)

Italian War Aviation.

This article describes the present condition of military aviation in Italy:—

As to *fighting* aeroplanes, we now turn out two splendid types, the A1 (so-called "Balilla"), a machine developed from the S.V.A. of the Ansaldo Factory, and the "Pe-Gamma," from the original plans of the Pomilio Works (recently taken over by the Ansaldo Factory).

We thave two types of *scouting* machines of high value—the SIA 8-B (developed from the former 7-B type), made by the SIA Factory, which is a branch of the FIAT, and the P.F. of the Pomilio Factory.

For *day bombing* two Italian machines are ready to-day which have already undergone severe tests. One is the S.V.A., built by the Ansaldo Factory, which can be used for fighting and scouting; the other is the SIA 9-B, equipped with a FIAT engine of 700 h.p., which, owing to its speed and great power, can be flown over long distances and used in broad daylight bombing.

For *night bombing* there are the biplane and triplane Caproni. The larger model of Caproni biplane (CA-5), equipped in Italy with three FIAT motors of 300 h.p. each, is without doubt superior to all similar types, so much so that our Allies have largely adopted it. It is also known to-day that the first Caproni built in the United States, and equipped with American Liberty motors, has gone through its tests with the greatest success; and the Federal authorities have since placed with American firms large orders of Caproni-Liberty aeroplanes.

The FIAT Factory stands first as one of our largest manufacturers of aviation motors, with her two well-known engines, the A-12 and the A-14. The A-12 develops 300 h.p., and the A-14 700 h.p., this being the most powerful motor used at the front for aviation by any of the Allies. The FIAT has a remarkably large output of these engines. Our Aeronautical Department, which buys all this production, after meeting all our own requirements, supplies the Allies with an important number of these motors daily. Besides this, the FIAT has now ready a new model which will soon be produced in large series—the A-15 of 450 h.p., greatly reduced in size from previous models, light and accessible.

We have also the SPA of the well-known automobile factory by that name, which, with some important changes and only a slight increase in weight, has developed her old 220 h.p. motor into a new 300 h.p. motor without being obliged to change her former equipment and machinery. These motors are already being turned out in large series.

Another important factory, the Isotta-Fraschini, produces high-grade machines. Here, again, a new motor is ready, the I.F.V.-6, developing 300 h.p.

The following figures will give an idea of Italy's effort in the production of aviation motors, 1,500 motors a month being the present output. Before the end of the year we shall certainly produce over 2,000 motors monthly, which means 24,000 aviation engines per year, and all of them of Italian design and construction, and all of high repute. (Capt. G. Bevione, "Aerial Age Weekly," Sept. 2, 1918.)

The D.H.5 Pursuit Biplane.

This machine, made by the Darracq Motor Engineering Co., London, is a tractor biplane with a single pair of interplane struts on each side and with the wings set at a negative stagger of 0.695 m. The principal dimensions, etc., are given as under:—

Wings.

Span, 7.84 m.

Chord, 1.375 m.

Dihedral, 172°.

Angle of incidence, upper wing, 2°, amidwings, 2-1/2° at tip; lower wing 2-1/2° throughout.

No sweepback.

Wing spars of spruce and of I-section.

Ribs spaced 280 to 350 mm. apart.

Body.

Ordinary four-longitudinal type, braced by cross wiring and strengthened in front, up to pilot's seat, and at rear near tail by 3 mm. plywood. Body faired to approximately circular section near front.

The undercarriage is of V-type with solid streamlined wooden struts and a continuous axle. The tail plane is of one piece mounted at 1° incidence, without the customary incidence-change gear.

The power plant consists of a 110 h.p. rotary Le Rhone, with main fuel tank for 100 lit. of gasoline and oil tank capacity of 21 lit. There is an emergency gravity fuel tank of 26 lit. capacity on upper starboard wing. The engine is fed from main tank by compressed air generated by small air pump. Total fuel supply for two hours' flight.

The following instruments are mounted in the pilot cockpit: To right, two fuel supply pipes with stop cocks, and a change of gear for elevator control; on instrument board, tachometer, speedometer, altimeter, spark switch, watch and compass; to left, fuel and oil throttles and a hand pump for the air.

The weight of the machine is: Empty, 461 kg., and fully loaded, 694 kg. Wing area is 20.14 sq. m., wing loading 344 kg./sq. m. and power loading 5.33 kg./h.p.

A photograph and several dimensional sketches are given of the machine and also a dimensional sketch of the wing section. ("Aviation," Sept. 15, 1918.)

Aeroplane Engine Test Apparatus.

This is an advertisement of an arrangement devised by Dipl. Ing. Ed. Seppeler. A photo-reproduction of the apparatus is shown. The engine is carried on a frame, the angle of which to the horizontal can be varied. No description is given. ("Automobil u. Flugtechnische Zeitschrift der Motorwagen," Sept., 1918.)

New Aeroplane Spark-Plug.

The Research Department of the Coors-Chemical Porcelain Company in the United States is now concentrating on a new porcelain spark-plug for aeroplanes. The object sought is a spark-plug that will stand fifty hours' continuous working, besides being capable of resisting hard knocks, and possessing some other qualities desirable in spark-plugs. Present indications point to its immediate appearance on the market. The best porcelain aeroplane spark-plugs now in use are good for about thirty hours.—(" Chemical and Metallurgical Engineering," Sept. 27, 1918.)

The Structure of the Atmosphere.

In the course of his paper Dr. K. Schütt refers to an investigation by A. Wigand, who took samples of air at various heights from 1,500 to 9,000 metres, and established an increase in the proportion of hydrogen with increase of height and a decrease in the proportion of carbon dioxide. On the basis of this investigation, the following figures are given for the percentage of hydrogen in the atmosphere at 0.20, 50, and 100 km., 0.01, 0.05, 3.72 and 97.84. The subject discussed in greatest detail is the nature of the layer which acts as an electrical conductor and guides " wireless " waves round the globe. A proposal to determine the height of this layer by projecting electric waves obliquely upwards and finding where they return to earth is mentioned with the comment that it will not be possible to carry it out during the war. (" Bulletin Aero-Club Suisse," Aug., 1918.)

Meteorological Kites.

The principal modes of exploration of the upper air are those involving the use of free balloons, of captive balloons and of kites. The latter system is said to be still in operation in Germany, but it has apparently been dropped in France. M. Frantzen urges the desirability of developing it vigorously.

As compared with the free balloon, the kite has the advantage that the instruments it carries give a continuous record of the conditions in a single locality and by the use of electrical connections the record can be made available at once. Kites of suitable construction will fly at heights from two to three kilometres which cannot be reached by kite balloons or " sausages." The creation of a kite centre (Centre Cervoliste) has been demanded in the name of the societies which are said to have obtained in peace time better results, meteorologically speaking, than all the military organisations have secured during the war. Only specialisation will give to scientific and military kites their place in the dominion of the air. (L. P. Frantzen, " L'Aerophile," Sept. 1-15, 1918.)