FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

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1927

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Mar. 31 .... **I.Ae.E. Dinner at Savoy Hotel.**
April — .... **International Aero Exhibition, Copenhagen.**
April 2 .... **28 Sqdn. (R.A.F.) Old Boys' Association Social.**
April 6 .... **"The Application of Instruction by Aeroplane," Mr. Dudley Wright, before Inst.Ae.E.**
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April 15-18 **Bournemouth Easter Races.**
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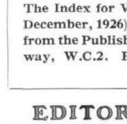
April 19 .... **Aero Golfing Soc. Match, Moor Park.**
April 25 .... **Annual Dinner, 29th Division Association, Cafe Royal, London.**

EDITORIAL COMMENT.



IN many ways one of the most remarkable lectures ever delivered before the Royal Aeronautical Society was that of Major Wronsky, Political Director of the German Luft Hansa, on March 24. A summary of the paper is published elsewhere in this issue of FLIGHT.

Those who had expected a highly technical paper were disappointed, as relatively little technical information was contained in the paper, technical that is, from the point of view of the flying material used by the Luft Hansa. Readers of FLIGHT will, however, be familiar with practically all the types of aeroplanes in general use by the German company, since they have been described and illustrated from time to time in our columns. In other respects, however, Major Wronsky's paper gave very detailed information concerning German commercial aviation, its organisation, its operation, and its aims and objects.

"Peaceful Penetration"

Of particular interest was the statement—made, we believe, for the first time in this country, at any rate clearly—that generally speaking the German Reich subsidises those lines of the Luft Hansa which link up with the lines of foreign countries, while German states, cities and corporations subscribe to the cost of running the internal German "air net." During the discussion following the reading of the paper the question was raised as to how the German Luft Hansa had managed to get subsidies from individual states and cities, as well as the subsidy from the government of the Reich. The lecturer replied that there was no secret in this, it was a result of the structure of the Reich. The various states and cities

were somewhat jealous of each other, and the only secret lay in how to make them jealous enough. This reply was received with applause, and with good reason. In this country it was suggested, quite a number of years ago, that the race for the King's Cup should be flown by machines representing various towns, cities and counties in Great Britain, as in this way a sporting competitive spirit might be fostered which would be all to the good of air racing in this country. The suggestion was a very excellent one, but so far as we know nothing came of it. Whether that was because those responsible for the organisation of the race did not grasp how to make the various English towns, "jealous enough," or whether due to other causes, we do not know. Possibly the explanation is that Great Britain was not at the time sufficiently "air minded" for such a scheme to be practicable. Although things have changed somewhat for the better since then, mainly as a result of the excellent propaganda work done by the light 'plane clubs, it is to be feared that in the matter of "air mindedness" Great Britain is still a long way behind Germany.

What impressed one most in Major Wronsky's lecture was the evidence it furnished of Germany's determination to push on with a very vigorous air policy, a determination of which the very post filled by Major Wronsky is proof. The duties of the "political director" of the Luft Hansa are connected with paving the way for international air lines, to negotiate with foreign companies and governments in the organisation of lines to all parts of the world joining up with Germany's existing and projected lines. In spite of Major Wronsky's admission that these lines do not pay—in fact, cannot be expected to pay within a measurable period, as evidenced by the fact that the receipts cover but 30 per cent. of the cost, Germany is determined to carry on, firmly convinced of the necessity for doing so at whatever cost may be entailed.

In these days of criticism of aviation from a variety of sources, this fact should be kept in mind. So long as other nations see the necessity of keeping civil aviation alive by subsidies, so long must Britain do the same. In fact, the British Empire is probably in greater actual need of rapid communications than is any other country in the world. The difficulties in our way are greater than those of many other nations. While Germany is favourably situated geographically, we are placed in a rather out-of-the-way corner of Europe, aerially speaking, at any rate until trans-oceanic services become a practical proposition, and Empire aviation is our only solution to the problems. But we should take heed of the signs around us. France is doing magnificent pioneer work by extending her lines to and through Africa. What Germany is doing was clearly illustrated by Major Wronsky. Italy, under the beneficent dictatorship of Mussolini, is setting the world an example of what courage and determination can do. It is not the slightest use thinking that Great Britain can abandon her air policy, even if she wished to do so. In the early days, it should be recollected, subsidies became necessary because France commenced to subsidise her companies on the London–Paris route, so that competition by the unsubsidised British company became impossible. So in modern times, so long as other nations subsidise their air lines, we have no option but to do the same, even if there were no hope of ever making civil aviation pay, a view which we do not share.

Major Wronsky very rightly claimed that Germany is the centre of European civil aviation. No one can look at a map without realising the truth of this. Major Wronsky also disclaimed any desire on Germany's part for air supremacy in Europe. Whether one accepts his statement that "Germany solely fulfils an economical and cultural duty, imposed upon it by its geographical position," or whether one ascribes to Germany ulterior motives, even putting it on the lowest basis and assuming that Germany does desire air supremacy in Europe, who could seriously blame her for doing so? As the centre of European air lines, Germany might have decided to have no air lines at all, and to prohibit the machines of other nations from flying over her territory. In that case, would not the cry have gone up that Germany was following an obstructionist policy, and was stopping everyone else from running really useful air lines? Instead, she has resolved to make her air lines, internal and external, as efficient as Teutonic thoroughness can achieve. That in doing so she will reap her reward is scarcely a thing for which she could be blamed. The object lesson presented should have the effect of making us realise that just as Germany has taken advantage of her geographical position, so should we take advantage of our status of an Island Empire scattered over the surface of the globe and make every effort to place British Empire aviation in the lead.

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The King Dines with the Air Minister

THE KING honoured Sir Samuel Hoare with his presence at dinner on March 29 at 18, Cadogan Gardens. His Majesty was attended by Lord Claud Hamilton. The following had the honour of being invited to meet His Majesty:—

Sir Philip Sassoon, the Duke of Sutherland, Marshal of the R.A.F. Sir Hugh Trenchard, Air Marshal Sir John Salmond, Air Vice-Marshal Sir John Higgins, Air Vice-Marshal Sir Philip Game, Air Vice-Marshal Sir Oliver Swann, Air Vice-Marshal Sir Ivo Vesey, Air Vice-Marshal Scarlett, Air Vice-Marshal Brooke-Popham, Air Vice-Marshal Lambe, Air Vice-Marshal Sir John Steel, Air Vice-Marshal Longcroft, Air Vice-Marshal Munro, Sir Walter Nicholson, Sir Sigmund Dannreuther, Sir Geoffrey Butler, Mr. Oliver Hoare, Mr. C. Ll. Bullock, and Mr. Paul Paget.

The Duke of York at Sydney

FIFTEEN aeroplanes of the Royal Australian Air Force and the Aero Club, formed an aerial escort, strengthened by a number of newspaper aircraft carrying reporters, and photographers, when the Duke and Duchess of York arrived in Sydney on March 26.

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Sir Sefton Brancker on Flying in Central Africa

AIR VICE-MARSHAL SIR SEFTON BRANCKER, Director of Civil Aviation, recently returned to Nairobi from Dar es Salaam, and said that he was satisfied with the reception to his suggestion that Tanganyika should share in the extension and the financing of the Khartum-Kisumu air line. Sir Donald Cameron, Governor of Tanganyika, was certain that the country would contribute towards a permanent service as far as it was able. Sir Sefton Brancker also said that he had communicated with representatives of the Aircraft Operating Co., Ltd., who were carrying out an aerial survey in Northern Rhodesia, and had asked them to send one of their party to visit Dar es Salaam to consult with the Government as to the possibility of and the cost of carrying out an aerial survey of the forests in the tsetse area south of Tabora.

He also hoped to arrange a large-scale experimental attack on cotton pests in the Sudan by means of aircraft. He expects that both proposals will be considered at the Governor's Conference in London in May, at which Sir Donald Cameron will be present.

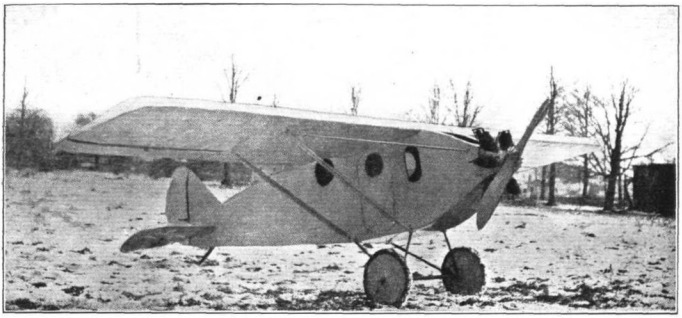
FLIGHT

THE McCARTHY AIR SCOUT

An American Two-Seater Enclosed Light 'Plane

WE give a brief description, together with illustrations, this week of a somewhat novel American commercial aeroplane, which may be classed as a light 'plane—the McCarthy Air Scout. This machine, the first product of the McCarthy Aeronautical Engineering Co. of Detroit, is a "semi-cantilever" monoplane with a very deep fuselage, forming a totally enclosed cabin for pilot and passenger. It is powered with a engine at all flying angles. Both wings may be completely removed by two men in half an hour.

The fuselage is 16 ft. long, 4 ft. deep and 2 ft. wide, and is constructed of four laminated ash and spruce longerons, and eight spruce bulkheads, securely tied with three-ply birch gusset plates, glued and secured in position with screws. At first the covering of the fuselage consisted of vulcanised fibre,

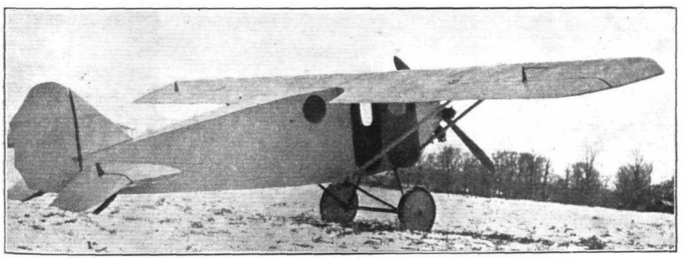


THE McCARTHY AIR SCOUT: An American light commercial monoplane, fitted with a 45 h.p. Anzani engine.

45 h.p. Anzani engine which, it is claimed, provides ample reserve of power for all conditions of flying.

The Air Scout was designed for light commercial work or sporting purposes. It is strongly constructed, safe and easy to fly, and can be cheaply operated. The wings, which are of fairly thick section (revised Martin) are in two units, each composed of two large main spars constructed of spruce strips planked with three-ply birch. The ribs—13 to each wing—are constructed of channeled spruce members with three-ply birch capstrips, all joints being glued and screwed shrunk on and fastened with brads and glue. Now, however, the covering is three-ply birch, similarly attached, resulting in a much more rigid construction.

The forward portion of the fuselage forms an unobstructed cabin, 7 ft. long, accommodating the pilot and passenger, the seats being arranged in tandem with the passenger's seat forward. There is only one set of controls, in front of the pilot's seat and allowing a clear entrance to the cabin through the door in the starboard wall of the latter. There are seven windows in the cabin, one forward in the roof and three in



THE McCARTHY AIR SCOUT: Three-quarter rear view showing the door leading to the totally-enclosed cabin.

(no rails being used). The trailing edge is formed by cable.

Each wing is securely attached to the top of the fuselage by two large steel bolts from the inside, and braced by three steel tubes, streamlined with Balsa wood, two from the lower longerons of the fuselage taking the lift, and the third from the nose of the fuselage, being bolted direct to the engine plate.

At the root of each wing is a 5-gal. petrol tank, with a filler opening through the upper surface and two outlets, one in each end of the tank, which supply a constant feed to the each side wall, the two rear windows at the side of the pilot being open and all the others being "glazed" with celluloid. In the upper part of the cabin, forward of the passenger, is the instrument board, which is in full view of both pilot and passenger.

The landing gear is of the conventional type, consisting of two steel tube Vees and a straight-through steel tube axle, cable braced. The struts are streamlined with balsa wood, and the wheels are of the wire type, with fabric covering.

The axle is secured by ¼-in. rubber cord, and the Vee connections to the fuselage are pin type. The tail skid is of laminated ash leaves, secured at the top end, with a steel shoe on the lower leaf.

Both the horizontal and the vertical stabilising surfaces are of extremely thick section, and are built integral with the fuselage, whilst the elevators and rudder, to which respectively they are hinged, are also of thick section, but are unbalanced. The control surfaces are built up of spruce and plywood spars, with ribs of channeled spruce and three-ply birch capstrips; the trailing edges are cable.

The controls are of the cable and pulley type, with streamlined steel horns. The usual rudder bar has been replaced by an equaliser under the pilot's seat and two pedals. The aileron control wires operate within the wings.

The power plant is an A.B.C. 9-cyl. engine, rated at 45 h.p. at 1,450 r.p.m. It is mounted on a steel plate securely fastened to a 1 in. laminated birch bulkhead by twenty ¼-in. steel bolts. The engine is covered on the two sides by small aluminium cowlings. The carburettor, which is mounted directly on the bottom of the engine, is outside the fuselage, and is fed by gravity from the tanks in the wings. Magneto and oil pump are located inside the fuselage, where they are protected from moisture, etc. A three-ply birch-panelled bulkhead separates the oil tank, oil pump, and magneto from the cabin.

The main characteristics of the McCarthy Air Scout are :—

Span	26 ft. 0 ins.
Overall length	19 ft. 10 in.
Height	6 ft. 9 in.
Chord	5 ft. 3 in.
Wing area	136·5 sq. ft.
Angle of incidence	3°
Area of ailerons	18 sq. ft.
Area of elevators	9 sq. ft.
Area of horizontal stabiliser	13 sq. ft.
Area of fin	2·25 sq. ft.
Area of rudder	6·15 sq. ft.
Weight empty	560 lbs.
Weight laden	1,020 lbs.
Wing loading	7·5 lbs./sq. ft.
Power loading	22 lbs./h.p.
Fuel capacity	10 galls.
Speed range (full load)	40-120 m.p.h.
Radius	300 miles.

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LIGHT 'PLANE CLUBS

London Aeroplane Club

Is future the report for the week will be taken up to each Friday instead of Sundays, as in the past. The weather conditions during the past week only allowed one day's flying, *i.e.*, Monday, 21st, and the total flying time was 6 hrs. 30 mins.

Pilot Instructor.—Capt. F. G. M. Sparks.

Dual Instruction.—D. Hewett, L. W. Gibbens, J. A. Simson, G. M. Randall, A. S. Richardson, H. Wickett, L. G. Sykes.

Solo Flying.—Miss O'Brien, H. Spooner, T. W. G. Eady, N. J. Hulbert.

Passenger Flight.—C. H. Tutt.

Annual Dance.—The Annual Dance was held at the Spring Garden Galleries on Tuesday last, and was attended by nearly 200 members and friends. Mrs. Woods Humphery and her Dance Committee are to be congratulated on providing a most pleasant evening.

Bournemouth Easter Rally, etc.—The Club will, it is hoped, be represented in most of the Races, and the selection of Members to pilot the machines is getting a little more difficult on account of the larger number now available and wishing to take part. Members will be admitted free to the Members' Enclosure and Paddock on production of their Membership Badges. There will be a charge of 2s. 6d. for motor-cars.

The Hampshire Aeroplane Club

REPORT for week ending March 25.—Very high winds again curtailed flying, and the total time for the week was only 4 hrs. 10 mins.:—Instruction flying, 3 hrs. 25 mins.; joy riding, 30 mins.; solo flying, 15 mins.

The following members had instruction:—Lieut. *Heinemann*, R.N., 45 mins.; Messrs. Dobson, 25 mins.; Clifton, 45 mins.; Dunning, 25 mins.; Stokes, 20 mins.; Mellor, 20 mins.; Dickson, 15 mins.; and Courtney, 10 mins. The soloists were Keeping, 10 mins.; and Cooper, 5 mins.

The joy riders were Mrs. Williams, Mrs. Hallum and Mr. Burley.

On Thursday, the Club held its first dance, and a very happy evening was spent at the Barova Café. In fact, the organiser, Mr. A. N. Clifton was asked to arrange another, and it was decided to hold a Pageant Dance, on May 17 (two days after our field day). The number of tickets will be strictly limited, so members and friends who would like to be there are advised to make early application.

The alterations to the clubhouse are progressing rapidly, and now that the storage tank and petrol pump are installed and the large doors are fitted to the garage entrance, the premises are beginning to look like business.

The lounge promises to be particularly attractive with its black rafters and huge Tudor fireplace, and it will most probably be much appreciated by members of the other flying clubs when they drop in for refreshment and re-fuelling during the course of their aerial tours. Incidentally, the scenery round about Hamble could scarcely be bettered in the summer time from an aerial viewpoint, and is well worth a visit.

The Hampshire Aeroplane Club is much indebted to the following donors to the prize fund of the Hampshire Air Pageant for their early and generous support:—Rt. Hon. Lord Louis Mountbatten, K.C.V.O., R.N.; Sir Charles Wakefield, Bart., C.B.E., M.P.; R. Morris, Esq.; W. Sweetland, Esq.; Accles & Pollock, Ltd.; The Aeronautical & Panel Plywood Co., Ltd.; *The Aeroplane*; The Air Survey Co., Ltd.; The British Aviation Insurance Group; The British Hoosier Co., Ltd.; Brown Bros., Ltd.; The De Havilland Aircraft Co., Ltd.; Fleming; Thos. Firth & Sons, Ltd.; Industrial Rubber Products, Ltd.; Lactocol Sales Co.; John Lenanton & Son, Ltd.; Munt's Metal Co., Ltd.; Palmer Tyre, Ltd.; Thos. Parsons & Son; Rubery Owen & Co.; Llewellyn Ryland, Ltd.; S. E. Saunders, Ltd.; Serck Radiators, Ltd.; Short & Mason, Ltd.; Stevenson & Son, Ltd.; The Supermarine Aviation Works, Ltd.; Titanine-Ranailite, Ltd.; Luke Turner, Ltd.; The Westland Aircraft Works; Woods, Sons & Co.

Lancashire Aero Club

REPORT for week ending March 26:—Total flying time for the week, 18 hrs. 12 mins., made up as follows:—

Dual with Mr. Brown: Messrs. Serck, 2 hrs. 35 mins.; Birley, 1 hr. 15 mins.; Miss Brown, 55 mins.: Messrs. Ward, 55 mins.; Forshaw, 35 mins.; McNair, Hartley and Caldecott, 30 mins. each.; Shiers, 25 mins.; Anderson, Nelson, Evans and Miss Emery, 20 mins. each; Nicholson, Dickinson, Crosthwaite and Fray, 15 mins. each; Gattrell, 10 mins.; Mulder, 20 mins.

Dual with Mr. Cantrill: Mr. Chadwick, 25 mins. Dual with Mr. Scholes: Mr. Serke, 15 mins.

Solo: Messrs. Twemlow, 1 hr.; Michelson, 45 mins.; Birley, 30 mins.; Wade, 15 mins.; Williams, 10 mins.

Joy-rides: With Mr. Scholes: Mr. Fallon, 50 mins.; Miss Anderson, 10 mins. With Mr. Lacayo: Mr. Caldecott, 55 mins. With Mr. Cantrill: Mr. Preston, 20 mins.; Mrs. McNair, 10 mins. With Mr. Leeming: Mr. F. Scholes, 25 mins. With Mr. Goodfellow: Miss Bodenham, 15 mins. Test flights: 47 mins.

The weather continued fair till Monday last, upon which day, being the vernal equinox, it most appropriately commenced to change for the worse, until, by the end of the week, the snow was trying to lie and the members had given up trying to fly. *Integer vitae scelerisque purus non egel auris . . . .*" and all that sort of thing, of course, but—well, I'm glad we've got a comfortable club-house nowadays.

Midland Aero Club

REPORT for week ending March 26.—The total flying time was 8 hrs. 20 mins.

The following members were given dual instruction by Capt. McDonough:—C. Fellowes, E. P. Lane, S. H. Smith, J. C. Rowlands, A. Ellison, H. Beamish, Advanced dual:—H. J. Wills.

Mr. Brighton flew solo and also with passengers. High winds restricted flying.

Mr. F. C. Brinton, a Member of the Club, has recently been gazetted a Pilot Officer in No. 605 (Bombing) Squadron A.A.F.

The second Dance of the Season was held at the Palace Ballroom, Erdington, on March 25, and was very successful. The profits are being devoted to the social amenities of the Club.

The Newcastle-upon-Tyne Aero Club

REPORT for week ending March 27.—Flying was impossible, owing to either fog or high winds from Sunday, the 20th, to Friday, the 25th, inclusive. Mr. R. N. Thompson flew for 30 mins. on Saturday, when the fog cleared a little. Later in the day, Mr. Brown decided to change a cylinder head with which he was not satisfied, so the Club's only machine was taken off service. The weather on Sunday morning was excellent, but it was late afternoon before the machine was tested and passed, after which 2 hours 35 mins. flying was carried out.

Total for the week—3 hrs. 5 mins. Dual, 1 hr., "A" pilots—Mr. R. N. Thompson, half-an-hour; Mr. H. Ellis, with Mr. Thirlwell, 39 mins; Dr. Dixon with Mr. C. Thompson, 30 mins. Test, 15 mins.

A member of the Club, who is a large proprietor, received a message, while at the aerodrome, that a car belonging to one of his clients had developed a fault (the starter stuck, it is believed), and in answer to this S.O.S., Mr. Dickson flew over with the member to the place where the breakdown occurred, landed within a few yards of the car and returned to the aerodrome alone, having been away only 20 mins. Very shortly afterwards the member arrived at the aerodrome with the car concerned.

The Club wishes to very heartily congratulate the London Club on their excellent achievement, reported last week, in completing in one week, 82 hrs. flying with 28 hrs. in one day. With the present and possible future recruitment of the Club, it will not be easy, but every effort will be made to beat this record, in the right spirit, of course, and, in competition with other Clubs.

The Yorkshire Aeroplane Club

REPORT for the week ending March 27.—Total flying time for the week, 4 hrs. 40 mins., made up of:—Dual instruction, 2 hrs. 10 mins; solo, 1 hr. 30 mins.; pleasure flights, 45 mins.; tests, 15 mins. There were 20 flights made in all.

Messrs. Dawson, Mann, M. B. Lax, and Wood flew solo. Mr. Wood took up an Avro, with Mr. Mann as passenger, for a flight of 5 mins. Messrs. Oglesby, K. K. Lax, Swift, Wilson and Batcock received dual instruction. Two prospective members, Mr. and Miss Wilkinson, were given flights of 10 and 15 mins. each, respectively.

On Sunday afternoon, Lord Oxmanston arrived with a passenger in his "Moth," at 4.10 *p.m.*, having flown from Cramlington in 1 hr. 20 mins. The aerodrome presented a scene of considerable activity when he arrived, as both our "Moth" (H.N.) and the Avro "A" were also in the air at the same time, and a number of cars were lined up on the talamac.

With the exception of 10 mins. flown during the week, the rest of the flying was done on Saturday and Sunday only.

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The "Underground" Aerial View of London

AN aerial photograph of central London is being exhibited, as a poster, on the Underground Railway stations, depicting with remarkable clearness the principal buildings, bridges and parks. No fewer than 477 separate photographs were taken for this mosaic by Aerofilms from a height of 10,000 ft. It covers an area of 8 sq. miles to a scale of 11·25 ins. to the mile, and 41 stations are indicated. There is also exhibited a futuristic poster depicting a skyscraper London of 1,000 years' time, with the sky specked with all types of futuristic aircraft departing and arriving from all corners of the earth. The fundamental idea is to convey that whatever may be the future possibilities of flying, underground travelling is essential to-day.

FLIGHT

THE FOKKER C.V.-D.

In order to meet the demand for a military machine which would suit the requirements of various countries, and to avoid designing a machine specially to suit some individual requirement, the Dutch Fokker Company of Amsterdam produced a "general purpose," or standard, type of machine, known as the C.V. In this type it was possible, by means of a few quickly effected alterations, to have a machine which could be rendered suitable for every military purpose, yet possessing at the same time a performance equal to that obtained from a machine specially built for any particular purpose.

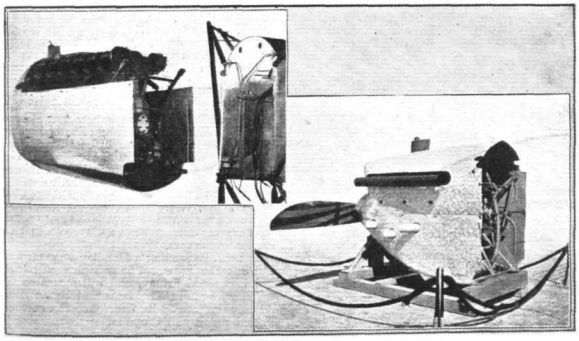
The Fokker C.V.-D.: Three-quarter front view of the Dutch "general purpose" Military biplane, fitted with a 425 h.p. Siddeley "Jaguar" engine.

That the Fokker C.V. has fulfilled this object has been demonstrated on frequent occasions and a number have been put into service in various parts of the world. The C.V. is a tractor fuselage biplane, which can be employed either as a two-seater fighter, artillery-spotter, etc., or else as a long-distance reconnaissance or day bombing machine. This dual "personality" is brought about by the simple expedient of inter-changeable wings. In the former case—when the type is known as C.V-D.—medium-sized wings, as shown in the accompanying illustration, are fitted, which, as will be seen, comprise a fairly thick, straight, tapering top plane and a much smaller lower plane, with single V interplane struts. In the second case—known as type C.V-E—much larger wings are fitted, having a total area of 39·3 sq. m. (422·8 sq. ft.) as compared with 28·8 sq. m. (309·8 sq. ft.) in type C.V-D. Type C.V-D has a maximum load of 800 kg. (1,764 lbs.), whilst the C.V-E. has a maximum load of 1,000 kg. (2,205 lbs.).

Apart from changing the wings, a further provision is made for adapting this machine to meet various requirements, in that the power plant is in the form of a standard detachable unit, so that, if required, different makes of engines may be installed, ranging from 250 h.p. to 260 h.p. In the model illustrated herewith, the Armstrong-Siddeley 425 h.p. "Jaguar" is fitted, but the engine unit—which is attached to the fuselage by four bolts only—may be adapted for the mounting of other types of engines, air-cooled radial or water-cooled in line "V" and "broad-arrow." We give an illustration showing two examples of this power-plant unit.

The fuel tanks of the C.V. are carried in the top plane, and have a capacity of 485 litres (107 gals.) and 800 litres (176 gals.) in the types "D" and "E," respectively.

As regards performance, etc., there is, of course, a certain variation according to the type of engine installed, or wings fitted, but to give our readers a general idea as to the characteristics of this machine, we give below some figures concerning the model illustrated—the C.V-D with "Jaguar" engine—and its alternative type, "E." It will be seen that this 'bus gives good all-round performance, and we understand that it is very easy to fly, is controllable, can be stunted, and lands well.



The Fokker C.V.-D.: Two of the detachable power-plant units, by means of which various types of engines may be installed, easily and quickly.

	D.	E.
Span	41 ft.	50 ft. 2 ins.
Length	31 ft.	31 ft.
Height	10 ft. 9 ins.	11 ft.
Area	309·8 sq. ft.	422·8 sq. ft.
Weight empty	1,502·6 lbs.	2,745·2 lbs.
Useful load	1,323 lbs.	2,205 lbs.
Weight laden	3,825·6 lbs.	4,950·2 lbs.
Weight per h.p.	8·6 lbs.	11·2 lbs.
Weight per sq. ft.	12·3 lbs.	11·6 lbs.
Speed range	56–138 m.p.h.	56–130 m.p.h.
Climb to 3,280 ft.	3·5 mins.	3·7 mins.
,, 6,560 ft.	7 mins.	10·3 mins.
,, 13,120 ft.	19 mins.	31 mins.
Ceiling	20,864 ft.	18,040 ft.

Pinedo's Progress

HAVING, apparently, overhauled the two Isotta Fraschini-Asso engines of his Savoia S 55 seaplane, the Marchese de Pinedo continued his big round-Atlantic flight, on March 25. He left Para for Georgetown (British Guiana), but strong head winds caused him to descend at Paramaribo (Dutch Guiana) to refuel, and this done, he completed the 200 miles to Georgetown in two hours. Early next morning he proceeded to Pointe a Pitre, Guadeloupe, and on March 27 he completed another stage to Port-au-Prince, Hayti, where he was welcomed by Mr. Davis, U.S. Secretary for War. Continuing on March 28, he flew to Havana, where he arrived early in the afternoon. The final leg of the second stage of this remarkable flight was concluded on March 29, when the Marchese successfully accomplished the 700-mile sea flight from Havana to New Orleans. Here he received an extraordinarily enthusiastic reception as he alighted on the Mississippi.

Bert Hinkler's Hop Round Britain

MR. BERT HINKLER, the well-known Australian pilot, who has been so long associated with the Avro Company, intended to start on a circuit of Great Britain in the Avro "Avian" (Cirrus II. engine), on March 29, but the weather conditions compelled him to delay his start. His proposed route will range over 1,046 miles, and it will touch Bristol, across the Irish sea to Wexford, then Dublin, Belfast, across the sea to Glasgow, Edinburgh, Newcastle, Norwich, Lympne, and return to Croydon. If successful, he will create a light-aeroplane non-stop record, being in the air for more than 12 hours. He intended to start at dawn and arrive back about 5 p.m. *Incidentally, this will be a preliminary flip to* his future light-aeroplane flight to Australia, which he hopes to reach in 15 days. At the time of writing, we have been unable to learn whether or not he has actually started on this Croydon-Croydon trip.

An Argentine for the Atlantic, Now!

AN ambitious flight is now being planned by an Argentine airman, Edouard Olivero. He intends to fly from Genoa to Buenos Aires, a distance of 7,900 miles, making only two stops to refuel, on a Savoia-Napier flying-boat, fitted with two British Napier engines, which is being constructed for him in Italy. His first "hop" will be from Genoa to Dakar (Senegal) a distance of 2,900 miles, thence from Dakar across the South Atlantic Ocean to Pernambuco, 2,200 miles, and then 2,800 miles to Buenos Aires. His only companion on the flight will be Bernardo Duggan. The expenses for this flight over three Continents are being defrayed by subscriptions from the Argentine public.

Nungesser to Fly the Atlantic

THE French ace, Captain Nungesser, has been reported as preparing to attempt the Atlantic flight to New York, in company with Coli, on a "Goliath" machine.

Ditto Bernardi

MAJOR DI BERNARDI, who won the Schneider Cup for Italy last year, has announced his intention of attempting a non-stop flight between Rome and New York. This makes the twelfth entrant for this event.

Capt. Fonck on his Accident

AFTER his recent return from America, Captain Fonck has been explaining to the French Press the cause of his accident in the Sikorsky machine, and detailing all the trials preceding his tragic Atlantic attempt. In all, he did 27 hours' flying tests with various loads, and carrying, all told, 280 passengers. Five of his principal flights were made before two controllers of the American Technical Service who were aboard the machine.

Cairo-Karachi Air Service Hitch

THE Persian Government have unexpectedly refused to ratify a provisional agreement permitting the British machines on the Cairo-Karachi air line to fly over Persian territory. At present the line terminates at Basra, and the extension was all arranged for April 6. This attitude on the part of the Persian Government was a complete surprise, and it is suggested that some influences opposed to Great Britain are responsible. The agreement was signed in 1925, and it is considered significant that these objections coincide with the arrival of the Persian Foreign Minister in Moscow to negotiate the delayed Russo-Persian Treaty. Moscow holds that it should be consulted before any airway agreement is arrived at. This was done in the recent Persian agreement with the Junker Aviation Company.

London-Constantinople Air Service

THE longest air line in Europe, extending nearly 2,000 miles from London across the Continent to Constantinople, will be opened on April 18, running each week-day throughout the summer. Leaving London in the afternoon by Imperial Airways, passengers for Constantinople will fly via Paris, Prague, Vienna and Bucharest, arriving at the Turkish capital in 70 hours after leaving London. They will fly by day only, spending the nights in hotels; and the fare has been fixed at £34 13*s.* single, and £62 return. The service will run in conjunction with the French air lines.

Western Australian Airways

THE following statistics, for the month of December last relating to traffic on Western Australian Airways (Perth-Wyndham route) may be of interest:—Number of passengers carried, 129; number of flights, 94; mileage flown, 15,702; total mileage flown since inauguration of service, 724,594; number of letters carried (December), 20,000, approx.; total weight of freight, 3,288 lbs. The second locally constructed D.H. 50 biplane was successfully tested and put into service in January, making a total of five D.H. 50's in operation; a sixth machine of this type will shortly be added to the fleet.

Fatal Air Accident in Australia

AUSTRALIAN civil aviation suffered its first fatal accident on March 23, when a machine operating on the "Qantas" line, between Charleville and Camooweal, crashed at Tambo, Queensland, killing the pilot, Mr. Davidson, and the two passengers, Mr. Bell, a pastorialist, of Winton, and Mr. Donaldson, of Rocklands, Camooweal. Australia's fine record must be unparalleled. This Queensland service alone has been running weekly since 1922, and has been well supported from the beginning.

Bournemouth Easter Flying Meeting

WE would remind our readers that the Easter Air Race Meeting will be held at Ensbury Park Racecourse, Bournemouth, on Good Friday, Easter Saturday and Easter Monday, the 15th, 16th and 18th inst. There will be 12 races over the three days, and the prizes amount to nearly £500. A list of the events was given in FLIGHT for March 17. The closing date of entries is Thursday, April 7. Full particulars and entry forms can be obtained from the Royal Aero Club, 3, Clifford Street, London, W.1. *Members of the Royal Aero Club will be admitted free to the Members' Enclosure and Paddock on production of their membership badges.* There will be a charge of 2*s.* 6*d.* for motor cars.

Imperial Airways will be sending a Handley Page air liner to Bournemouth for the races. The machine will leave Croydon at 9 a.m. on Good Friday, and will return on the following Tuesday at 9 a.m. The fares will be £2 single and £3 12*s.* return. Luggage 30 lb. free. The fares include transport between London and Croydon.

New Air Records

REPORTS of three new world's records are to hand, established in France, Germany and Italy. On March 28, Lieut. Demougeot, of the French Navy, beat the altitude record for seaplanes at Sartrouville, when he attained a height of 9,000 m. (29,520 ft.).

In Germany, Dr. Werner von Langsdorff, flying a Daimler light plane fitted with a 20-h.p. engine, reached an altitude of 5,638·5 m. (18,500 ft.).

The Italian pilot Passaleva established, last week, the seaplane altitude record with 1,000 kg. load, attaining an altitude of 5,100 m. (16,730 ft.) on a Savoia-Marchetti S 32 seaplane, fitted with an Isotta Fraschini-Asso engine. (This engine, by the way, already has 18 world's records to its credit.)

Jugoslav Pilots Plan Big Flight

Two Yugoslav pilots, Captain Sondermayer and Lieut. Baydak, will attempt to fly from Belgrade to Bombay and back in April next, on French aircraft.

Paris-Timbuctoo?

THE French pilots, Cornillon and Girardeau, are attempting a flight from Paris to Timbuctoo.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

March 31, 1927

CONTENTS

EDITORIAL VIEWS

When the publishers of FLIGHT decided to issue with the last number in each month a special section devoted to the more technical aspects of flying, it was hoped and intended that this section should be mainly devoted to an interchange of ideas among our designers and constructors, an interchange which, looked upon from a broad viewpoint, could only be for the common good of the industry and consequently for the improvement of British aircraft in general. It is with regret that we have come to the conclusion that British aircraft designers do not individually realise that for THE AIRCRAFT ENGINEER to fulfil its intended functions, a certain amount of co-operative effort is required on their part. We do not, of course, for one moment believe that they have failed to assimilate the view put forward by Mr. North some time ago, that if there are 10 designers and each contributes his share of knowledge to the common stock, he stands, on an average, to receive nine times as much as he gives.

A few aircraft designers have supported us admirably, none more so than Mr. North, who has been an almost uninterruptedly regular contributor since publication of the second issue of THE AIRCRAFT ENGINEER, and to them our thanks are due. But out of the 20 or so chief aircraft designers of the British industry, but a very small percentage has come forward in the manner which we had hoped for and—not unreasonably, we think—expected. Private appeals by the Editor have met with promises, but unfortunately the paper cannot go to press on promises. Let us see what publication of a "Black List" will do. The firms from whose chief designers we have as yet had *nothing* include: The Blackburn Aeroplane & Motor Co.; The Fairey Aviation Co.; The Gloster Aircraft Co.; H. G. Hawker Engineering Co.; George Parnall & Co.; A. V. Roe & Co.; S. E. Saunders, Ltd.; and Short Bros., Ltd.

We know that THE AIRCRAFT ENGINEER is greatly appreciated in the drawing offices of the industry and by many of our technically-minded readers outside the industry, but if all the designers do not "do their bit," the paper will fail to achieve its maximum of usefulness. Moreover, it is not quite fair to leave it to a few energetic ones of our designers to do all the work of keeping "The Industry's Paper" going.

AIRCRAFT PERFORMANCE.

The Airscrew.

By J. D. NORTH, F.R.Ae.S.

(*Continued from p.* 6.)

The most elementary conception of an air propeller is an instrument for imparting a sudden rise of pressure to the column of air passing through it as the aircraft advances.

In the figure the fluid motion is streamline except for the pressure suddenly added at the "actuator disc." The reaction at the actuator disc (the integral of this pressure) is equal to the momentum imparted to the wake, while the lost energy in the race is, of course, equal to the kinetic energy of the race. Since the momentum is proportional to the added velocity, and the kinetic energy to the square of the added velocity, it is obvious that losses from this source will be reduced by the lowest possible added velocity, *i.e.*, by

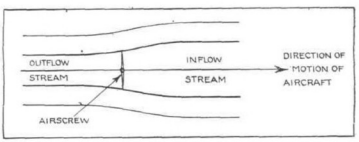


Fig. 15 (reprinted from June 24, 1926, issue).

making the actuator disc as large as possible. The fundamental inefficiency of any direct form of "combustion-jet" propulsion is obvious. The air *screw*, a mechanical device for producing the pressure at the artificial "actuator disc" from the rotating shaft of the engine, demands a certain mean "helix angle," and hence a certain pitch-diameter ratio $\left(\frac{V}{nD}\right)$ for efficient working. With aeroplanes and engines as we know them, these two requirements are incompatible. A compromise diameter has to be chosen to give a minimum sum of "jet" and "screw" losses. For a given forward velocity, however, it will be obvious that the added velocity in the race will be a constant if the diameter of the propeller increases as the square root of the horse-power, and that it will operate at the same value of $\left(\frac{V}{nD} = J\right)$ if the angular

velocity varies inversely as the diameter, *i.e.*, as $\frac{1}{\sqrt{H.P.}}$. In this respect it is interesting to examine Fig. 20, in which curves of equal potential propeller efficiency are given for different values of $K = n\sqrt{H.P.}$ As K is a large number $K \times 10^{-3}$ is more convenient. n is given as revolutions per minute, as the common form of expressing angular velocity of airscrew shafts.*

Some objection may be raised to the assumption of constant forward velocity for engines of increasing power, on the ground that with higher powered engines the aeroplane must necessarily travel faster. Such argument is most justified in the case of racing aeroplanes designed for top speed, but does not hold good for that class of machine in which the size is increased to keep constant power loading. Nor does it stand where climb is concerned. Optimum climbing speed is largely a matter of propeller efficiency and $\frac{span^2}{W}$, and there is, naturally, an advantage in having the speed as low as the efficiency losses in the propeller and the induction losses in the planes will allow. High indicated air speed on climb is an indication of inefficiency in one or both of these, and is, of course, not experimental justification for high K.

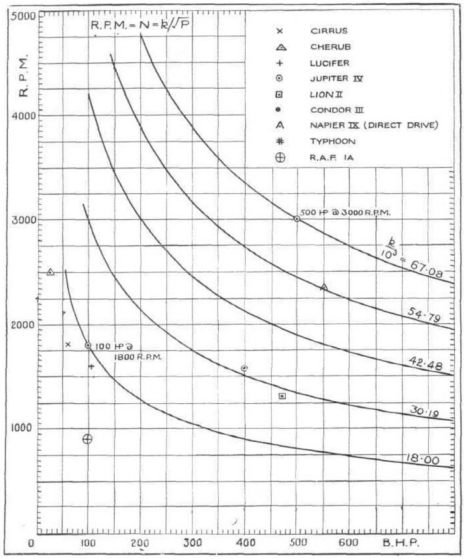
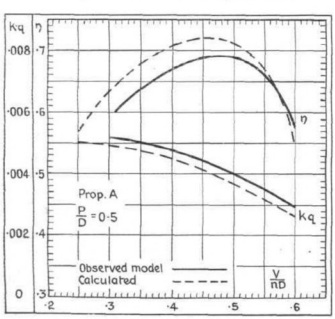


Fig. 20.

Froude's "jet" or momentum theory indicates that the added velocity in the race is received, half in front and half behind the actuator disc. If we examine the forces on an elementary section of the blade, this inflow velocity acts similarly to the induced downwash on a wing. Experimental aerofoil characteristics must therefore be corrected to zero induction (infinite aspect ratio) before they can be applied to airscrew analysis. The well-known failure of aspect ratio characteristics to adapt themselves to an inflow value of $\frac{}{}$ is easily understood. More accurately, rotation interference must also be taken into account, but it is not so important over the usual significant flight range. The use of infinite aspect ratio characteristics, of course, shows advantage to high angle of attack, and usually suggests a "face" pitch as large as the influence of the corresponding blade width reduction on strength will allow.

It will be realised from the above, that the potential propeller efficiency is really decided by the engine designer in his choice of airscrew shaft speed. The curves of Fig. 20 show how little meaning the terms "fast running" propeller and "slow running" propeller have in themselves. For example, the "Typhoon" has a higher value of K than the "Jupiter IV," and a very much higher value than the "Cirrus." A value of $K \times 10^{-3} = 30$ is fairly representative of modern practice, and for general purpose aeroplanes

* Except for this case read n = revs. per sec. hereafter.



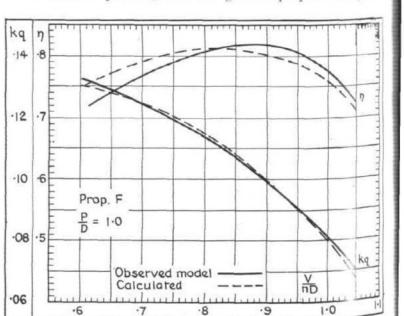


Fig. 21.

corresponds to a tip speed of about 825 ft. per sec. Tip speed is of course proportional to the product of diameter and angular velocity, and hence has a uniform value for airscrews of constant K, varying power, but similar flight speeds. It is noticeable how far the R.A.F. 1a lies below all modern engines, explaining the high propeller efficiencies obtained with that engine at moderate translational speeds. The abnormally low value of K used by the Wright brothers was, *in my opinion*, one of two essential features in their design, principally responsible for their success. The two important secondary propeller effects, tip speed losses and slip

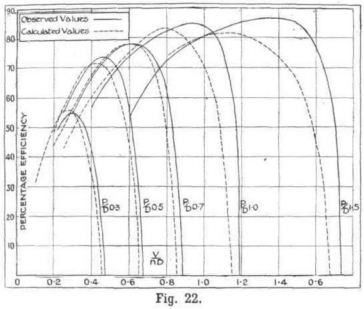


Fig. 22.

stream resistance, have the same percentage effect on overall efficiency at different values of B.H.P. if K is constant.

To investigate the influence of airscrew design on performance, it is desirable to know how far calculations are substantiated by observations. The propeller designer has two problems, *one* to make an efficient propeller, *two* to make the propeller torque resistance so balance the engine torque effort that the greatest possible advantage of the engine's inherent power is taken advantage of at all flight conditions. Firstly, the performance of model airscrews in a wind channel can be compared with calculation. In R. & M. 892 a family of airscrews is compared, calculations against observation. The airscrews. Propeller A $\left(\frac{P}{D} = 0{\cdot}5\right)$ shows considerably lower efficiency at low Js than calculated. This general tendency seems to be due to a discrepancy mostly in the calculation of thrust, the value of the thrust coefficient $\left(K_T = \frac{T}{\rho n^2 D^4}\right)$ being estimated too high at low J and falling off more steeply. The coincidence of calculation and observation is much nearer for $\frac{P}{D} = 0{\cdot}5$ in R. & M. 892 (*see* Fig. 22).

These model airscrews are running at Vl values generally within wind channel range, so that scale effect is practically eliminated.

Some of the airscrews of N.A.C.A. 237 have been tested out full scale (N.A.C.A. 1925, Report No. 219). Fig. 23 shows comparison of the model and full scale figures for certain airscrews.

Propeller B′	$\frac{P}{D} = 0{\cdot}6$	Tip speed ≒ 830 f/s.
,, I	$\frac{P}{D} = 0{\cdot}7$	,, ≒ 770 f/s.
,, D′	$\frac{P}{D} = 0{\cdot}8$	,, ≒ 750 f/s.

In this figure $Cp \propto Kq$ = Torque coefficient.
$C_T = K_T$ = Thrust coefficient.

It must be realised that the full-scale figures are deduced from flight tests without direct measurement of thrust and torque. So far as efficiency is concerned, one can only consider the agreement remarkable, although both Kq and Kt are higher full scale than model.

There is of course a marked increase in Vl and also in $\frac{V}{Vc}$ [Vc = speed of sound in air]. No figures for full-scale efficiency corresponding to the R. & M. 892 family are available. The increased full scale values of Kq are, however, in accord with the general experience of propeller designers. There does not appear to be any evidence that the discrepancies between full-scale and calculated efficiences are greater than those between model and calculated for tip speeds less than 825 f/s. The differences may be due to the influence of periodicity, the difference between the shape of the experi-

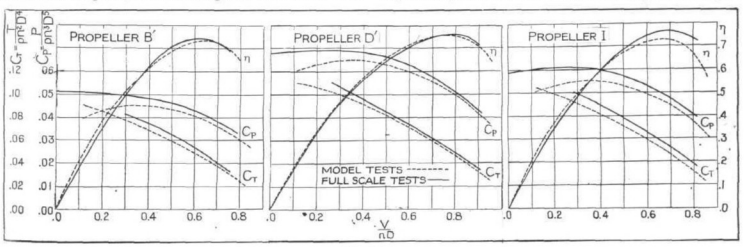


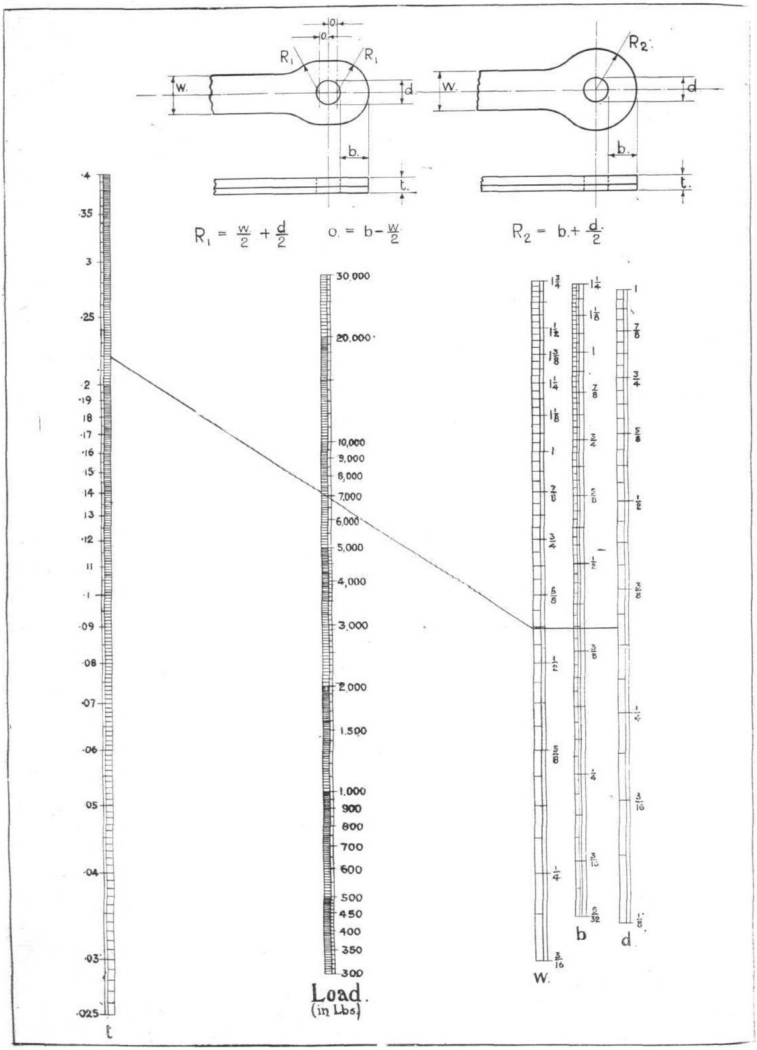
Fig. 23.

efficiencies generally occuring at a higher value of J $\left(= \frac{V}{nD}\right)$ than calculated, rising to a higher value, but being below calculation at low values of J. This is more noticeable on airscrews of high pitch/diameter ratio.

Mr. T. Whitlock, of the experimental staff of Boulton & Paul, Ltd., has brought to my notice some comparisons which he has made of a similar nature, based on the experimental results of the U.S.A. Advisory Committee, report N.A.C.A. 237. In Fig. 21, the observations of this report are compared with Mr. Whitlock's calculations for the same mental and calculated thrust grading curve ("tip loss"), by the mutual effect of body and boss since all experimental mechanism require the use of a body behind the propeller. The last source of difference would more easily be lost between experimental full-scale and model conditions, since similar assumptions are made in both cases in reducing observations.

Increase of $\frac{V}{Vc}$ up to ·75 f/s has been already associated with increase in Kq and Kt. Beyond this figure the efficiency also begins to be affected.

(To be continued.)



Wiring lug design chart, mild steel plate, specification S.3. Stresses used : tension 26 tons per square in., shear 18, bearing 44. *See page 25.*

IN THE DRAWING OFFICE.

WIRING LUG DESIGN.

By C. CHAPLEO.

The design of a wiring lug is a problem presented to the aeronautical draughtsman probably more frequently than any other. Therefore, from the point of view of the drawing office, much may be said in favour of a quick and simple method of obtaining the dimensions of a lug to comply with any given conditions. The following is suggested as such a method. (*See page* 24.)

Referring to the chart, it will be seen that there are five scales. Taken in order, the first (the left), is a "thickness" scale, the second a "load" scale, the third a scale of "widths," the fourth gives the dimension from the edge of the hole to the end of the lug, and the fifth gives the pin diameter for bearing in the plate. For simplicity, these will be referred to as the "t," "load," "w" "b," and "d" scales respectively. A straight line connecting points on the "t" "load," and "w" scales gives the width required for a given thickness and load. From the point of intersection of this line with the "w" scale, a line drawn at right angles to the scales, through the "b" and "d" scales, gives the values of "b" and "d" for this particular lug. As an example, the design of a lug for an $\frac{1}{2}$ in. B.S.F. fork end is shown. The load in this case is 7,150 lb., the thickness adopted being 0·22-in. (*i.e.*, one 10 G plate, and one 12 G, minimum thicknesses. 0·122 in. and 0·098 in.) From the chart, $w = \frac{9}{16}$ in., $b = \frac{5}{32}$ in., and $d = \frac{1}{2}$ in. For an offset lug the radius is $\frac{5}{32}$ in. $+ \frac{1}{4}$ in. $= \frac{13}{32}$ in., and the offset is $\frac{1}{32}$ in. $= \frac{1}{32}$ in. $= \frac{1}{8}$ in. For a concentric lug the radius is $\frac{5}{32}$ in. $+ \frac{1}{4}$ in. $= \frac{13}{32}$ in. When the pin diameter has been checked for shear, the lug is completely designed. In this example, the pin diameter as given by the chart, happens to coincide with the diameter of the pin in the fork end. When this is not the case, *i.e.*, when the pin in the fork end is larger than is necessary for bearing, the value of "d" used in arriving at the offset or radius for the lug is the diameter of the pin in the fork end, the "d" scale just being used as a check. Alternative lugs for a given load may be quickly seen by pivoting a straightedge about the required point of the load scale.

With regard to the construction of the diagram, the theory of alignment charts may be found in almost any practical mathematical text book, so it will be sufficient to deal with this application only. The five scales are traced from a 10 in. slide rule, the "D" scale of the rule being used for the "t," "w," "b," and "d" scales of the chart, and the "A" for the "load" scale. The "t" and "w" scales are drawn first, then the "load" scale, placed midway between them, its relative position vertically being obtained by calculating one value of the load for a given thickness and width, and plotting from that point. The dimension "b" is obtained from the expression, load $= 2 \times b \times t \times$ shear stress. Also, load $= w \times t \times f_t = d \times t \times f_b$, where f_t and f_b represent tensile and bearing stresses respectively.

If f_s = shear stress, $\frac{b}{w} = \frac{f_t}{2.f_s} = \frac{26}{2 \times 18} = \cdot 722$ and $\frac{d}{w} = \frac{f_t}{f_b} = \frac{26}{44} = 0{\cdot}591$. The "$b$" and "$d$" scales are placed, relative to the "w" scale, to give these ratios, *i.e.*, 0·722 on the "b" scale, and 0·591 on the "d" scale, are placed level with 1 on the "w" scale.

The short article printed above, and the full-page chart on the previous page, is an excellent example of the type of article suitable for inclusion in THE AIRCRAFT ENGINEER *under the section headed "In the Drawing Office." There must be, in our various drawing offices in the British aircraft industry, many draughtsmen and junior designers who are making daily use of such labour-saving devices as Mr. Chapleo's wiring lug chart. The Editor will always be pleased to consider for publication articles of this nature.*

In the case of contributors not personally known to the Editor it will be necessary to give an undertaking that the material submitted is wholly, or at any rate mainly, the contributor's own work, and that if he is employed by any aircraft firm, his firm raises no objection to the material being published.

TECHNICAL LITERATURE.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

THE EFFECTS OF BODY INTERFERENCE ON AIRSCREW PERFORMANCE.

By W. G. JENNINGS, B.Sc., of the Aeroplane and Armament Experimental Establishment (Home). Presented by the Director of Scientific Research.

R. & M. No. 1046 (Ae. 232) (10 pages and 3 diagrams). July, 1926. Price 6*d*. net.

Reasons for Enquiry.—A considerable amount of experimental work, covering a number of years, has been carried out in wind tunnels on the mutual interference of airscrews and bodies. It was thought desirable to investigate to what extent the more recent tests supported the results of the earlier work, and how far the present state of knowledge of the interference effect on models could be usefully applied to full-scale experiments.

The results of the wind tunnel tests* have been examined and their application to full-scale performance work discussed in the present report.

It appears that the increase of body resistance due to slip stream can be expressed in the form

$$\frac{R}{R_o} = a + \frac{bT}{\rho V^2 D^2}$$

This equation is well supported by all model tests, but in view of the fact that recent results have shown a considerably increased value of the constant b, due possibly to a pressure gradient effect, it seems desirable that an investigation should be made into the pressure distribution over a fuselage in the slip stream. It is shown that for bodies of good shape, b is in the form

$$b = a_2 + \frac{a_3}{k_{D^2}}$$

where a_2 and a_3 are constants.

The method of determining the net efficiency of a combination of airscrew and body by reference to airscrew and aircraft characteristics in free air, may lead to appreciable errors in the prediction of performance.

Further work requires to be done before it is established that the overall efficiency obtained from the analysis of full-scale tests is sufficiently independent of aircraft characteristics to enable airscrew performances to be compared.

It is considered that a reliable thrust meter fitted to the airscrew shaft would greatly assist the examination of interference effects in full-scale work, since it would provide a means of establishing the parasitic drag of the aircraft.

* R. & M. No. 985. The reduction of aircraft performance tests.
* R. & M. No. 830. Experiments with a family of airscrews, including effect of tractor and pusher bodies. Part II.
* R. & M. No. 1030. Experiments with a family of airscrews, including effect of tractor and pusher bodies. Part IV. On the effect of placing an airscrew in various positions within the nose of a streamline body.
* R. & M. No. 344. An investigation of the mutual interference of an airscrew and body of the "tractor" type of aeroplane.

MODEL TESTS OF A COMBINED SLOT AND AILERON CONTROL ON A WING OF R.A.F. 15 SECTION. PUSH FORWARD TYPE OF AUXILIARY.

By F. B. BRADFIELD, Maths. and Nat. Sci., Trip., and A. S. HARTSHORN. Presented by the Director of Scientific Research.

R. & M. No. 1047 (Ae. 233) (10 pages, 9 diagrams.) May, 1926. Price 9*d*. net.

The slot-and-aileron control, as described in a number of previous publications, has been fitted to the R.A.F. 15 section, and the tests are described in R. & M. 1008*. Since the publication of this paper, it has been decided to fit a slot control to a wing of R.A.F. 15 section, such that the section should be identically R.A.F. 15 when the auxiliary was in its closed position, and the Handley Page thin-plate type of auxiliary was chosen for this purpose.

Rolling and yawing moments, and the force on the

* R. & M. 1008. Wind channel tests of slot-and-aileron control on a wing of R.A.F. 15 section.—F. B. Bradfield, A. S. Hartshorn and L. Caygill.

auxiliary aerofoil have been measured up to 40° incidence, for various aileron angles and slot openings, both with R.A.F. 15 centre portion, and with a flap pulled down and a slot open along the centre portion.

As regards rolling and yawing moments, the control is effective, but the force required to operate the control is very large. No satisfactory operating mechanism has been found to cover all conditions.

In view of the difficulties involved in this method of opening the slot, a rotating type of auxiliary aerofoil was tested and has now been fitted to two Bristol Fighter aeroplanes.

Later experiments have shown that the slot-and-aileron control fitted to the top wing only of a Bristol Fighter is quite satisfactory.

THE VARIATION IN THE FATIGUE STRENGTH OF METALS WHEN TESTED IN THE PRESENCE OF DIFFERENT LIQUIDS.

By G. D. LEHMANN, B.Sc. (Eng.). Communicated by Professor C. F. JENKIN.

Work performed for the Engineering Research Board of the Department of Scientific and Industrial Research.

R. & M. No. 1054. (M. 48). (13 pages and 13 diagrams.) October, 1926. Price 1*s.* net.

A few workers have already carried out experiments on the fatigue of metals in the presence of chemicals, including Haigh, J. A. Jones, G. Slater and S. C. Langdon. Other papers on the subject have been published in the Stahl and Eisen and the Journal of the Institute of Metals, and references to all these papers are here given.

The present experiments relate to researches carried out in the Engineering Laboratories at Oxford, following a suggestion by the Elasticity and Fatigue Sub-Committee of the Aeronautical Research Committee. The most unusual result is the increase of the fatigue limit by 6 per cent. when the steel was tested in the presence of sodium chloride.

Wöhler fatigue tests have been made on specimens of both the Aeronautical Research Committee standard steels in the presence of hot aqueous solutions of sodium nitrate, sodium chloride and ammonium chloride; also in water after the steel had been pickled in sulphuric acid; also in oil. Control tests were made in hot water, and in air at atmospheric temperature.

The results show that oil has no effect; pickling reduced the fatigue strength about 8 per cent. Ammonium chloride reduced the fatigue strength 16 per cent. Sodium chloride *raised* the fatigue limit 6 per cent. Sodium nitrate produced no effect on the 0·33 C. steel, but lowered the fatigue limit of the 0·13 C. steel by 4 per cent.

ALGEBRAIC FORMULÆ FOR THE PERFORMANCE OF AN AIRCRAFT AT FULL THROTTLE.

By R. S. CAPON, B.A., of the Aeroplane and Armament Experimental Establishment (Home), Martlesham. Presented by the Director of Scientific Research.

R. & M. No. 1056 (Ae. 239). (13 pages and 4 diagrams). July, 1926. Price 9*d.* net.

The question of the performance of aircraft has been dealt with in a number of papers from the Experimental Establishment at Martlesham, and the present paper deals with formulæ that have been used for this work. They apply to full throttle conditions.

It is shown that simple algebraic formulæ may be obtained for the performance of an aircraft at full throttle, applicable over the range from maximum level speeds to 5 or 6 m.p.h. above stalling speed, on the assumption that the variation of horse-power with airscrew rate of rotation (n) may be represented by a function of the form n^x, a condition satisfied with sufficient accuracy for many purposes by present-day service engines.

The formulæ may be used to analyse performance tests which include maximum rates of climb and level speeds at full throttle only. They may also be used for the prediction of performance from the airscrew and aircraft characteristics. Approximations introduced in deriving the formulæ cause appreciable errors to arise in the results either of analysis or prediction by their use, and their chief value lies in their applicability to the rapid estimation of the change in performance due to changes of wing area, aspect ratio, etc.; for such comparisons are little affected by the approximations.

The formulæ are being used:—

(1) To predict the change of performance with wing loading (through variation of wing area) of a typical single-seater fighter.

(2) To show the effect of interference of aircraft and airscrew on performance, using the wind channel data provided in R. & M. 830.

(3) To predict the effect of a 50 per cent. increase of horse-power on the performance of a single-seater fighter.

AMERICAN NATIONAL ADVISORY COMMITTEE REPORTS.

The National Advisory Committee for Aeronautics in the United States of America corresponds to our own Aeronautical Research Committee. Two distinct classes of reports are issued, the first being known as *Technical Reports*. These Technical Reports are printed, and are illustrated by photographs and/or drawings. The second class are known as *Technical Notes*, and are issued in mimeographed form so as to enable them to be rapidly distributed to a somewhat smaller, but directly interested, circle of readers. Copies of the Reports and Notes may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., U.S.A.

Summaries of Technical Reports Published in 1926.

(*Continued from page* 12.)

Report No. 246, entitled "Tables for Calibrating Altimeters and Computing Altitudes Based on the Standard Atmosphere," by W. G. Brombacher, Bureau of Standards.—During 1925 the assumption of an isothermal atmosphere which was in general use as the standard for the calibration of altimeters in the United States was replaced by a standard atmosphere which assumes an altitude-temperature relation closely corresponding to the average of upper air observations at latitude 40° in this country. The same standard atmosphere had already been adopted somewhat earlier in the United States as the aircraft performance standard.

National Advisory Committee for Aeronautics Technical Reports Nos. 147 and 218 give necessary constants, tables, and information. However, neither of these reports includes all of the tables required for the computation of actual altitudes nor those readily suitable for use in calibrating altimeters, since the altitude intervals for which data are given are not sufficiently small. The present report has been prepared specifically for these purposes.

The formulas which define the standard atmosphere are given in this report, together with other formulas giving the corrections to be applied to the standard altitude in order to obtain the actual altitude when the necessary observations of pressure and temperature are available.

The tables necessary for the use of this standard atmosphere in calibrating altimeters and in computing altitudes form the principal part of this report. In Table I are given the standard altitudes at pressure intervals of 0·1 mm. of mercury in the range 87 to 200 mm. of mercury and at intervals of 0·2 mm. of mercury in the range 200 to 790 mm. of mercury. In Table II standard altitudes are given at intervals of 0·01-in. of mercury in the range 3·4 to 31·09 ins. of mercury. In Table III are given the pressure in inches and millimetres of mercury, the temperature, the mean temperature, and the corresponding isothermal altitude at every 500-ft. interval of standard altitude in the range −1,000 to +50,000 ft. Temperature corrections for use in computing altitudes from observed pressures and temperatures are given in Table IV.

An example of the computation of actual altitude from the necessary observations of pressure and temperature is also included.

Report No. 247, entitled "Pressure of Air on Coming to Rest from Various Speeds," by A. F. Zahm, Construction Department, Washington Navy Yard.—The text gives theoretical formulas from which is computed a table for the pressure of air on coming to rest from various speeds, such as those of aircraft and propeller blades. Pressure graphs are given for speeds from 1 *cm.-second up to those of swift projectiles.*

The present treatment slightly modified was prepared for the Bureau of Aeronautics, Navy Department, February 17, 1926, and by it was submitted for publication to the National Advisory Committee for Aeronautics.

Report No. 248, entitled "The Corrosion of Magnesium and the Magnesium Aluminium Alloys Containing Manganese," by J. A. Boyer, American Magnesium Corporation.—The tentative conclusions drawn from the experimental facts of this investigation are as follows:—

The overvoltage of pure magnesium is quite high. On immersion in salt water the metal corrodes with the liberation of hydrogen until the film of corrosion product lowers the potential to a critical value. When the potential reaches this value it no longer exceeds the theoretical hydrogen potential plus the overvoltage of the metal. Rapid corrosion consequently ceases. When aluminium is added, especially when in large amounts, the overvoltage is decreased and hydrogen plates out at a much lower potential than with pure magnesium. The addition of a small amount of manganese raises the overvoltage back to practically that of pure metal, and the film is again protective.

Report No. 249, entitled "A Comparison of the Take-Off and Landing Characteristics of a Number of Service Airplanes," by Thomas Carroll, National Advisory Committee for Aeronautics.—This investigation, which is a continuation of Technical Report No. 154, "A Study of Taking Off and Landing an Airplane," follows very closely the earlier methods and covers

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a number of service airplanes, whereas the previous report covered but one, the JN-4h.

In addition to the air speed, acceleration, and control positions as given in Report No. 154, information is here given regarding the distance run and the ground speed for the various airplanes during the two manœuvres.

Report No. 250, entitled "Description of the N.A.C.A. Universal Test Engine and Some Test Results," by Marsden Ware, National Advisory Committee for Aeronautics.—This report describes the 5-in. bore by 7-in. stroke single-cylinder test engine used at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics, in laboratory research on internal-combustion engine problems and presents some results of tests made therewith.

The engine is arranged for variation over wide ranges of the compression ratio and lift and timing of both inlet and exhaust valves while the engine is in operation. Provision is also made for the connection of a number of auxiliaries. These features tend to make the engine universal in character and especially suited for the study of certain problems involving change in compression ratio, valve timing and lift.

Incidental to investigations of carburettor and fuel-injection engine problems, considerable data have been obtained which indicate the effect of changes of compression ratio on friction horsepower and volumetric efficiency. From this and some other work, it appears that with a change in compression ratio from 5 to 13, the friction horsepower obtained by motoring the engine increases by about 15 per cent., while the volumetric efficiency taken during power runs is practically unchanged.

The results of some tests are presented also that show the power obtained when operating as a carburettor engine on aviation gasoline at compression ratios in excess of that which will permit full throttle as a normal engine and controlling detonation by throttling the intake charge and by varying the inlet valve timing. For fixed compression ratios in these tests throttling gave the least power when the opening of the inlet valve coincided with the opening time kept fixed gave the greatest power for the conditions tried.

Report No. 251, entitled "Approximations for Column Effect in Airplane Wing Spars," by Edward P. Warner and MacShort, Massachusetts Institute of Technology.—The significance attaching to "column effect" in airplane wing spars has been increasingly realised with the passage of time, but exact computations of the corrections to bending moment grooves resulting from the existence of end lobes are frequently omitted because of the additional labour involved in an analysis by rigorously correct methods. The present report, *submitted for publication by the National Advisory Committee* for Aeronautics, represents an attempt to provide for approximate column effect corrections that can be graphically or otherwise expressed so as to be applied with a minimum of labour. Curves are plotted giving approximate values of the correction factors for single and two-bay trusses of varying proportions and with various relationships between axial and lateral loads. It is further shown from an analysis of those curves that rough but useful approximations can be obtained from Perry's formula for corrected bending moment, with the assumption that points of inflection arbitrarily *modified in accordance* with rules given in the report.

The discussion of general rules of variation of bending stress with axial load is accompanied by a study of the best distribution of the points of support along a spar for various conditions of loading.

Report No. 252, entitled "The Direct Measurement of Engine Power on an Airplane in Flight with a Hub Type Dynamometer," by W. D. Gobe and M. W. Green, National Advisory Committee for Aeronautics.—This report describes tests made at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics, to obtain direct measurements of engine power in flight. The tests were made with a Bristol hub dynamometer installed on a modified D.H.4 airplane, Liberty 12 engine, to determine the *suitability* of this apparatus.

This dynamometer unit, which was designed specially for use with a Liberty 12 engine, is a special propeller hub in which is incorporated a system of pistons and cylinders interposed between the propeller and the engine crankshaft. The torque and thrust forces are balanced by fluid pressures, which are recorded by instruments in the cockpit.

These tests have shown the suitability of this type of hub dynamometer for measurement of power in flight and for the determination of the torque and power coefficients of the propeller.

Report No. 253, entitled "Drag and Pressure-Drag of Simple Quadrics," by A. F. Zahm, construction department, Washington Navy Yard.—In this text are given the pressure distribution and resistance found by theory and experiment for simple quadrics fixed in an infinite uniform stream of practically incompressible fluid. The experimental values pertain to air and some fluids, especially water; the theory and tests agree very perfect, again to viscid fluids. For the cases treated the concordance of theory and measurement is so close as to make a summary of results desirable. Incidentally, formulas for the velocity at all points of the flow field are given, some being new forms for ready use derived in a previous part and given in Table I.

Report No. 254, entitled "Distribution of Pressure Over a Model of the Upper Wing and Aileron of a Fokker D-VII Airplane," by A. J. Fairbanks, National Advisory Committee for Aeronautics.—This report describes tests made in the atmospheric wind tunnel of the National Advisory Committee for Aeronautics, for the purpose of determining the distribution of pressure over a model of the tapered portion of the upper wing and the ailerons of a Fokker D-VII airplane. Normal pressures were measured simultaneously at 74 points distributed over the wing and ailerons. Tests were made throughout the useful range of angles of attack and with aileron settings ranging from $-20°$ to $+20°$. The results are presented graphically.

It was found that the pressure distribution along the chord is in general similar to that of thick tapered airfoils previously tested. The maximum resultant pressure recorded was *five times the dynamic pressure*. The distribution of the air load along the span may be assumed to be uniform for design purposes.

Aileron displacements affect the pressure forward to the leading edge of the wing and may increase the air load on the outer portion of the wing by a considerable amount. With the wing at large angles of attack the overhanging portion of the aileron creates usually a burbled flow and therefore a large drag. The balance reduces the control stick forces at small angles of attack for all aileron displacements. At large angles of attack it does this for small displacements only. With the airplane at its maximum speed, an angle of attack of 18°, and a down aileron displacement of 20°, the bending moment tending to break off the overhanging portion of the aileron will be greater than that caused by a uniform static load of 35 lbs. per square foot.

Report No. 255, entitled "Pressure Distribution Over Airfoils at High Speeds," by L. J. Briggs and H. L. Dryden, Bureau of Standards.—This report deals with the pressure distribution over airfoils at high speeds, and describes an extension of an investigation of the aerodynamic characteristics of certain airfoils which was presented in N.A.C.A. Technical Report No. 207.

The results presented in report No. 207 have been confirmed and extended to higher speeds through a more extensive and systematic series of tests. Observations were also made of the air flow near the surface of the airfoils and the large changes in lift coefficients were shown to be associated with a sudden breaking away of the flow from the upper surface.

The tests were made on models of 1-in. chord, and comparison with the earlier measurements on models of 3-in. chord shows that the sudden change in the lift coefficient is due to compressibility and not to a change in the Reynolds number. The Reynolds number still has a large effect, however, on the drag coefficient.

The pressure distribution observations furnish the propeller designer with data on the load distribution at high speeds, and also give a better picture of the airflow changes.

Report No. 256, entitled "The Air Forces on a Systematic Series of Biplane and Triplane Cellule Models," by Max M. Munk, National Advisory Committee for Aeronautics.—*The air forces on the largest systematic series of biplane and* triplane cellule models ever published, measured in the atmospheric density tunnel of the Langley Memorial Aeronautical Laboratory, are the subject of this report. The tests consist in the determination of the lift, drag, and moment of each individual airfoil in each cellule, mostly with the same wing section.

The magnitude of the gap and of the stagger is systematically varied; not, however, the decalage, which is zero throughout the tests. Certain check tests with a second wing section make the tests more complete and the conclusions more convincing.

The results give evidence that the present Army and Navy specifications for the relative lifts of biplanes are good. They furnish material for improving such specifications for the relative lifts of triplanes. A larger number of factors can now be prescribed to take care of different cases.

SUMMARIES OF TECHNICAL NOTES PUBLISHED IN 1926

(*Continued from page* 19)

T.N. No. 242:—"IMPROVING THE PERFORMANCE OF A COMPRESSION IGNITION ENGINE BY DIRECTING FLOW OF THE INLET AIR." By Carlton Kemper, Langley Memorial Aeronautic Laboratory.

The object of this report is to present the results of tests performed by the National Advisory Committee for Aeronautics to determine the effect on the performance of directing the flow of the inlet air to a 5in. by 7-in. single cylinder, solid injection, compression ignition engine. After a few preliminary tests, comparative runs were made at a speed of 1,500 r.p.m. with and without directed air flow. It was found that directing the flow of the inlet air toward the fuel injection valve gave steadier engine operation, and an appreciable increase in power, and decreased fuel consumption. The *results indicate the possibility of improving the performance of a given type* of combustion chamber without changing its shape and with no change in valve timing. They would also seem to prove that directional turbulence, set up before the inlet valve of a four-stroke cycle engine, continues in the engine cylinder throughout the compression stroke.

T.N. No. 243:—"THE CHARACTERISTICS OF THE N.A.C.A. M12 AIRFOIL SECTION. By George J. Higgins, Langley Memorial Aeronautical Laboratory.

The data obtained on the N.A.C.A. M-12 airfoil, tested at twenty atmospheres density in the National Advisory Committee for Aeronautics variable density wind tunnel, have been extended by additional tests at one and at twenty atmospheres under improved conditions. The results of these tests are given. Considerable scale effect was found.

T.N. No. 244:—"NAVY PROPELLER SECTION CHARACTERISTICS AS USED IN PROPELLER DESIGN." By Fred E. Weick, Langley Memorial Aeronautical Laboratory.

This report contains artificial aerodynamic characteristics of a set of propeller sections to be used in designing propellers by means of the blade element theory. These characteristics computed from model propeller tests for a single section are extended to cover sections of all thicknesses by means of model wing tests on a series of Navy propeller sections at high Reynold's Number in the variable density tunnel of the National Advisory Committee for Aeronautics.

T.N. No. 245:—"REPORT ON TESTS OF METAL MODEL PROPELLERS IN COMBINATION WITH A MODEL VE-7 AIRPLANE." By E. P. Lesley, Stanford University.

This report, prepared at the request of the National Advisory Committee for Aeronautics, describes tests of three metal model propellers, in a free air *stream and in front of a model of a VE-7 airplane.*

The effect of introducing the model airplane is shown to be an increase in thrust and power coefficients and efficiency at small slip, and a decrease in the same at large slip.

In one of the models, a pressed steel design, the sections near the hub are shown to be relatively unimportant. The thrust and power coefficients of this model are shown to vary widely with constant V/nD, but with V and n varying in the same proportion. A model of convenient form is shown to have practically constant coefficients under these conditions.

T.N. No. 246:—"TEST OF A MODEL PROPELLER WITH SYMMETRICAL BLADE SECTIONS." By E. P. Lesley, Stanford University.

This report, prepared at the request of the National Advisory Committee for Aeronautics, gives the results of tests on a model propeller having blade sections with the form of Gottingen airfoil No. 409. The model is shown to have a dynamic pitch practically equal to the nominal or geometrical pitch, and a somewhat higher efficiency, but lower power coefficient than would be expected of a propeller of more conventional sections.

T.N. No. 247:—"THE DRAG OF AIRSHIPS, PART I." By Lieut. Clinton H. Havill, U.S.N.

In order to begin research on the drag of airships it was first necessary to make a logical digest of the reported past performances and data given on deceleration tests for a large number of airships. That these data may become available for airship designers in a compact form is the purpose of this report, as well as to serve as the basis on which the author is continuing his researches, which will be given later in Part II (Technical Note No. 248).

This digest as given here in Part I was begun in September, 1923, and worked on intermittently until December, 1925.

The outstanding results are as follows:—

1. In general, the maximum speed of most airships was reported about 5 per cent. higher than obtained in this report.

2. Total maximum horse-power was reported in many cases higher and in a few cases lower, than obtained in this report.

3. Propulsive coefficients at maximum speeds are in general lower than the reported values. Coefficient "C" is constant and the propeller efficiency "E" is reduced as at maximum speed that the propulsive coefficient "K" falls off.

4. It was further noted that several ships of widely different designs had nearly the same drag coefficient for the whole ship. However, this is looked upon as a coincidence in the cases where the type of hull, cars, and surfaces differed widely.

5. That in general an idling propeller was found to have about 15 sq. ft. area of drag, while a stopped propeller showed about 6 sq. ft. area of drag. This was found by working out the area of drag from the ship's performance and comparing it with the area of drag as obtained on the deceleration test with either stopped or idling propellers as the case was reported. In some cases this difference of area worked out to be 8 or 9 sq. ft. per propeller, but with certain types of engines it is possible that all engines were not stopped but that one or two were left idling during the deceleration tests.

Applied values of principal data and results are given in Table I and Fig. 3.

T.N. No. 248 :—"THE DRAG OF AIRSHIPS, PART II." By Lieut. Clinton H. Havill, U.S.N.

The extension of wind tunnel tests of models of airship hulls to full scale requires an extension from a V.L of the order of less than 500 sq. ft. sec., to the order of 80,000 sq. ft. sec., where V = air speed, feet per second, L = length in feet of the particular form of hull. The reason for this research was to furnish the airship designer with a method for finding the VL curve of any conventional type of hull, using data obtained from actual performance of airships flown prior to 1926.

The first, as given here in Part II, was begun in preliminary details in June, 1922, and completed in April, 1926, as it was necessary to complete Part I before Part II could be completed: the period between September, 1923, and December, 1925, was devoted to work on Part I.

The outstanding results are as follows :

1. An empirical method for finding the drag coefficient of any bare airship hull with its VL curve from 100,000 cub. ft. volume to 6,400,000 cub. ft. volume.

2. The derivation of an empirical shape coefficient that can be calculated from the hull contour that defines the VL curve of any conventional airship shape within the limits placed on Figs. 7 and 8.

3. (*a*) That the slope of each VL curve differs with each type of hull and that its slope is not quite constant.

(*b*) That C_H = function of $(VL)^n$ and n is a variable at different values of VL. C_H = drag coefficient of bare airship hull. $\text{Drag} = C_H \frac{\rho}{2} (\text{Volume})^{2/3} V^2$.

(*c*) That the value of n varies slowly so that extrapolations beyond that given by diagrams Figs. 7 and 8 of the VL curves are not much in error, as requirement 3 of illustrative problem shows.

4. The region from model tests to a volume of 100,000 cub. ft. size indicates that in this region the most rapid change in the slope occurs with the conclusion that "The best model in the wind tunnel will probably be the best (lowest drag) airship hull but not necessarily" as their VL curves may cross and again may re-cross at higher values of VL. In view of this as found by extrapolating the VL curves calibrated on performance back to wind tunnel values and extrapolating wind tunnel results to higher values of VL together with the fact that airship designers are not interested in airship hulls of less than 100,000 cub. ft. of volume, this part of these researches was left out. The scale on diagrams at 0·3 cub. ft. volume calibrated on existing wind tunnel data is merely for general information.

T.N. No. 249 :—"EFFECT OF PROTRUDING GASOLINE TANKS UPON THE CHARACTERISTICS OF AN AIRFOIL." By Eastman N. Jacobs, Langley Memorial Aeronautical Laboratory.

These tests were carried out in the variable-density wind tunnel, on a 5 in. by 30 in. model. The tank was made to represent roughly that used on the de Havilland "Moth." The tests were made only at the highest value of the Reynolds Number at which the tunnel is ordinarily operated. With the tank on top there was a decrease in lift at large angles, although up to 10 degrees the decrease was not large. The drag was considerably increased throughout, most at large angles. Putting the tank below the centre-section resulted in a decrease in drag, but the lift at large angles was not increased, in spite of the fact that with the tank in this position the airfoil went to higher angles before burbling commenced. The wing section used in the experiments was the "Clark Y."

T.N. No. 250 :—"INFLUENCE OF THE ORIFICE ON MEASURED PRESSURES." By Paul E. Hemke, Langley Memorial Aeronautical Laboratory.

The influence of different orifices on the result of measuring the same pressure distributions is the subject of this note. A circular cylinder is exposed to an air stream perpendicular to its axis and its pressure distribution is repeatedly determined. The pressure on the greater part of the upstream half of the cylinder apparently increases when the orifice size increases. The pressures measured on the downstream half of the cylinder do not change for the orifice sizes used in the tests. Rounding the edge of an orifice has the same effect as increasing its size.

The maximum value of the ratio of orifice diameter to radius of curvature of the surface in the plane of motion, for which no measurable error was found, is given. Values of this ratio for orifices as used in aircraft and model airfoils were found to be much less than the maximum ratio.

T.N. No. 251 :—"THE EFFECT OF TUBE LENGTH UPON THE RECORDED PRESSURES FROM A PAIR OF STATIC ORIFICES IN A WING PANEL." By T. Carroll and R. E. Mixon, Langley Memorial Aeronautical Laboratory.

The differences in head caused by variations in the length of tubing are small, the lowest recorded being zero, and the highest 2·7 per cent. This difference is well within the experimental error.

T.N. No. 252 :—"RESISTANCE OF A FIFTEEN-CENTIMETER DISK." By James M. Shoemaker, Langley Memorial Aeronautical Laboratory.

The results of this test show that the dynamic scale has very little effect on the drag coefficient of a disc over a wide range of Reynolds Number. A comparison of these results with those of tests made on a series of discs at Gottingen University furnishes a good check on the method of testing in this tunnel.

T.N. No. 253 :—"WIND TUNNEL STANDARDIZATION DISK DRAG." By Montgomery Knight, Langley Memorial Aeronautical Laboratory.

This report deals with the resistance of a series of three similar discs placed normal to the wind as determined in the atmospheric wind tunnel of the National Advisory Committee for Aeronautics. This is the first of the standardisation tests to be made in American wind tunnels using these particular discs. The curves of drag coefficient plotted against Reynolds Number for this tunnel show discrepancies between overlapping values which are to be attributed to the presence of the tunnel walls.

BERICHTE UND ABHANDLUNGEN.

No. 14 of the "Berichte und Abhandlungen der Wissenschaftlichen Gesellschaft für Luftfahrt E. V. (W.G.L.)," published as a special issue of the *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, contains a number of lectures and papers of unusual interest.

First comes a paper by Dr. L. Rumpler on "The Trans-Oceanic Aeroplane," in which he outlines his scheme for a huge multi-engined, multi-hull flying-boat. The subject of seaworthiness is dealt with at considerable length, and during the discussion several speakers raised objections to the machine on account of the stresses that would be set up by the different hulls working in a seaway. The machine is designed to have a high wing loading, and it is estimated that the take-off speed would be about 130 km. (80 miles) per hour, so that considerable stresses may be expected.

Dr. Rohrbach is represented by a paper entitled "Design and Problems of Light Metal Construction," the paper being illustrated by photographs and drawings of Rohrbach constructional details. The subject of steel or light metal is dealt with both in the paper and the discussion.

A paper on "Photogrammetric Measurements of Starting and Landing," by *Bruno Spiewock*, explains how the times for taking off and alighting may be measured by means of the cine camera and stop watch, the different being photographed on the film. The machine flies straight away from, or straight towards the camera, as the case may be, and when the wing span is known, the distance from the camera at any moment can be calculated.

A paper on the stresses and changes in form in aircrews is contributed by F. Seewald, and F. N. Schenbel, of Aachen, is represented by a paper on "Control Surface Flutter and Its Prevention," a subject much to the fore in this country at the moment.

"The mutual Influence of Wings and Propellers" is the title of a paper by K. Seiferth, of Göttingen, while Hanns Weidinger contributes a paper on "Profile Drag Measurements of a Junkers Wing," making use of Betz's Procedure in making comparisons between model and full scale flying tests.

A paper by H. Herrmann (who was chief designer to the Udet Works at Munich) is entitled "Floats and Flying Boat Hulls," and gives the lines of a large number of hulls (many of them English), and their resistance.

The book will be very considerable technical value, and those of our readers who are able to read technical German will be well advised to obtain a copy. The price is 16 marks, and the report can be obtained from Verlag R. Oldenburg, 8, Glückstrasse, Munich.

SCHÜTTE-LANZ AIRSHIP WORKS, 1909-1925.

Another work recently published by Oldenburg, and obtainable from the same address (Price 15 Marks), is entitled "Der Luftschiffbau Schütte-Lanz, 1909–1925." The preface to this is by Dr.-Ing. Johann Schütte, surviving partner of the Schütte-Lanz Airship Company (Dr. Karl Lanz died in 1921—Ed.), and contains a brief history of the firm.

The numerous sections into which the book is divided are written by specialists, most of whom have worked with the Schütte-Lanz Airship Company in various capacities. The first chapter, by Dr.-Ing. Dietrich Rühl, deals with the peculiar Schütte-Lanz plywood construction. Then follows a chapter by Dr. Ing. W. Bleistein on the influence of speed on the commercial economy in commercial airships. A chapter on the design and stress calculations of Schütte-Lanz airships by members of the staff, edited and collated by Dipl.-Ing. Weiss and Dipl.-Ing. Gentzke, is naturally of a very highly technical character, and is elaborated by an appendix dealing with some full scale experiments. Another interesting section, by Dipl.-Ing. Weiss, is entitled "Contributions to Rigid Airship Construction." Dipl.-Ing. Fritz Gentzke contributes a section on the light-weight construction of airships, treating in great detail upon *metal versus* plywood as materials for airship construction.

The development of the electric installation in Schütte-Lanz airships is ably dealt with by Ulrich Aschmann, while Chem. Endras writes of the gas cells and outer covering. Other sections of the book deal with various subjects, including the general history of German airship work.

Altogether this is a book which no one interested in airship construction can afford to be without. Although it deals to a considerable extent with the plywood construction adopted by the Schütte-Lanz firm, and which in modern times probably nobody would be likely to take up, the book contains such a wealth of technical information on general airship subjects that it is of very much more than historical interest. The illustrations are well reproduced, and there are large inserts of drawings, etc.

SOME RECENT PAPERS AND LECTURES

We have had quite a crop of papers and lectures in this country recently, most of which, unfortunately, have been of such a nature that they cannot usefully be summarised. At the Royal Aeronautical Society, Group-Capt. Flack read a paper on "Man and the Machine" on March 10. Mr. M. A. Giblett dealt with "Line-Squalls" on March 17, Maj. Wronsky with "Air Traffic in Germany" on March 24 (summary published in FLIGHT this week), and on March 31 a paper was read by F. G. Richardson entitled "Recent Model Experiments in Aerodynamics."

At the Institution of Aeronautical Engineers, Maj. Wylie read a paper on "Portable Hangars" on March 8, and Mr. Wingfield on "Aircraft Law" on March 22.

WORLD'S RECORDS FOR LIGHT 'PLANES

(Aeroplanes and Seaplanes)

THE *Fédération Aeronautique Internationale* have, as announced in FLIGHT some time ago, introduced the following new classes for world's records for light aeroplanes, to start from May 1, 1927 :

1st Category. Two-Seater Aeroplanes.—Weight empty not more than 400 kilos.

For every record attempt two-seater aeroplanes must carry a person in each seat.

2nd Category. Single-Seater Aeroplanes.—Weight empty not more than 200 kilos.

3rd Category. Single-Seater Aeroplanes.—Weight empty from above 200 kilos. to 350 kilos. inclusive.

Nature of Records

In each of these categories the following records without replenishments in flight may be established :—

1. Distance, returning to the point of departure without alighting.
2. Distance in a straight line without alighting.
3. Speed over a closed circuit of 100 kms.
4. Height.

Weight empty means the total weight of the machine in flying order. The following weights are not included :—Fuel (petrol and oil), crew, instruments for controlling the record required by the F.A.I., and parachutes and oxygen apparatus, if any.

The weight of water in the radiators shall count in the weight empty. In the two-seater category, the weight of the crew must be at least 150 kilos. or made up to this weight by ballast. The ballast and appliances must be sealed.

All records must be made under the supervision of officials appointed by the Royal Aero Club.

The fee of £5 5s. is payable in respect of each attempt. In addition to this fee the expenses incurred by the Royal Aero Club in supervising the flight are payable by the entrant.

The fee, together with all particulars of the aeroplane, must reach the Royal Aero Club at least seven days prior to attempt being made.

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Junkers Machine Beats Its Own Record

As recorded in FLIGHT last week, a Junkers J. 33 (Junkers L-5 engine) monoplane recently established a new world's record of 16 hours' duration with a useful load of 500 kg. (1,100 lb.). A few days later the same machine beat this record and established in addition a new one for distance with this load over a closed circuit. Starting from Dessau at 7.21 a.m., on March 21, piloted by Schnäbele and Loose, the machine flew over the Dessau-Leipzig circuit (50 km. = 31 miles) until 5·38 a.m., on March 22. The actual time in the air was 22 hours 11 mins. 45 secs., and the distance covered was 2,735 km. (approximately 1,700 miles). The fuel and oil consumption was remarkably low, being given as an average of 35 kg. (77 lb.) per hour. When the machine landed, it still had enough fuel and oil for another hour's flight. The record attempt will be submitted to the F.A.I. for homologation.

Four Air Ministry High Speed 'Planes for the Aerial Derby

THE announcement last week by the British Broadcasting Corporation confirmed our statement in FLIGHT for February 3 last regarding the participation in the Aerial Derby of the Air Ministry's "Four Fast Flyers." This announcement stated that the Air Ministry had given its permission for the entry of the Avro "Avenger," the Fairey "Firefly," the Gloster "Gorcock" and the Hawker "Hornbill" (not the "Horsley," as put out on the ether) in the forthcoming Aerial Derby—if, when, and where it takes place.

Lieut. Guilbaud Returns from Africa

LIEUT. GUILBAUD, who, it will be remembered, set out last year in company with Lieut. Bernard, to fly from France to Madagascar and back, and who was compelled to abandon his flight at Lokodja in Nigeria, has now returned to France in his C.A.M.S. flying-boat fitted with a 450 h.p. Lorraine engine. Accompanied by his mechanic, Rapin, he followed the route progressed by Lieut. Barnard, and, if a study is made of our map which illustrated the successful flight of Lieut. Barnard, in our issue for January 20, it will be seen that to do this he had first to fly south from Lokodja to follow the inland waterways and lakes as far as possible. He passed through Garoua, January 20 ; Font-Archambault, January 22 ; Stanleyville, in the Congo, January 23 ; Albertville, on Lake Tanganyka, January 30 ; Mongala, February 6 ; Fachoda, February 7 ; Khartoum, February 8 ; Dongala, February 9 ; Luxor, February 10. He reached Aboukir on February 13, and then temporarily left the course followed by his more successful companion earlier and went up the coast of Palestine to Beirut, arriving there on February 22, where a reception was held in his honour given by Admiral Bouis and General Vallier. He next went to Makri, February 24 ; Constantinople, February 27 ; arriving there at 1 p.m., and being cordially welcomed by the Turkish authorities. Athens on March 1 was his next stage, then Argostoli on the Greek Island of Cephalonia, March 3 ; Malta, March 4 ; Bizerte, March 6. He reached Saint-Raphaël in the South of France, on March 7, his arrival coinciding with the fête being held by the Aero Club of Marseilles. He was received by Commandant Godfroy of the local centre, the entire personnel, the Mayor of Saint-Raphaël, and numerous civil and military personages. The next day he was honoured at a banquet in the Casino. He next arrived at Marseilles in the afternoon of March 9 and was welcomed by the French Minister of the Marine, the local authorities, and members of the French Aero Club. At the Hotel de Ville, M. Flaissières, Mayor of Marseilles, M. Rastoin, President of the Chamber of Commerce, M. Ambroggi, President of the Aero Club of Provence, paid tribute to the gallant airmen at a reception, and Guilbaud responded modestly and with emotion. They arrived at La Gare de Lyon, Paris, on March 15, in the morning and in the afternoon, they were received by the Minister of the Marine.

The Kisumu-Khartoum Air Service : The accompanying illustration shows a letter carried on the first flight of the Kisumu-Khartoum air mail. As previously reported in "Flight," the machine (a Fairey seaplane), piloted by Capt. Gladstone, left Kisumu on February 14, and arrived at Khartoum on February 19.

SERVICES RUGBY FOOTBALL

Army *v.* Royal Air Force

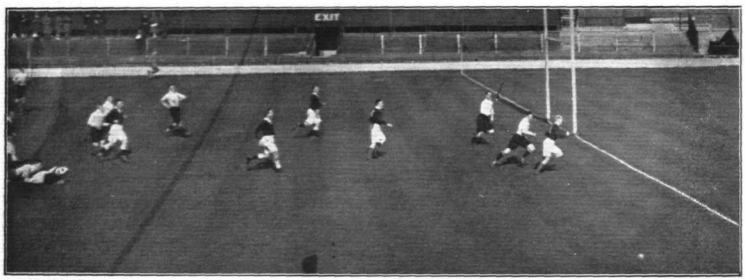
The Army beat the Royal Air Force at Twickenham on Saturday, March 26, by two goals and four tries (22 points) to love.

Whatever one may have hoped, few Rugby critics really expected that the Royal Air Force would succeed in mastering the strong team which the Army was able to put into the field this year. Previous records of course rather favoured the supporters of the Air Force, because, if one disregards the results of place kicks, the Air Force had done just as well as the Army managed to do against the Navy. The champions had scored two tries to one against each of the other services; and on that showing the R.A.F. ought to have played pretty level against the Army. But in Rugby, records are notoriously fallacious guides. The Army, in its match against the Navy, were obviously far below the form which they ought to have shown, and practically threw away the match by faulty passing among their outsides. In the final match, the Army strengthened their three-quarter line by the inclusion of Aslett, the English international, and showed much improved form; while the changes made in the R.A.F. team were not successful, and the whole team seemed on a lower grade than they were in their match against the Navy. E. S. Burns made a far less trusty back than Hale-Munro, and C. P. Vines added nothing to the strength of the three-quarter line. R. V. M. Odbert certainly did some useful work at the barren sands of Iraq? At full back E. S. Burns made one good kick into touch, and that is about all that one can say for him.

It is pleasant to turn from all this dreary fault-finding, and bestow hearty praise on the great game which J. C. Chick played as wing forward. What one man could do to put some devil into his side, Chick did. He had a great duel in the line-outs with J. A. Ross, and found the Highlander also in brilliant form.

The Army XV by no means gave a perfect exhibition of Rugby football. A service team very seldom does. Cass was sound as usual. Young doled out some of the erratic passes which this year are his besetting sin, but otherwise he played in brilliant form. The three quarters were not a perfect line, but they were in infinitely better form than when playing against the Navy. The forwards worked hard against a heavier pack, and W. F. Browne and Ross were constantly brilliant in the loose play. The main virtue of the Army XV was that they were out to score tries; they attacked boldly at every opportunity, and they went hard for the line. That spirit is a great merit in any XV, and, as the result was six tries, one may forgive various occasions when polish was a bit lacking.

Russell won the toss and decided to play with the wind, which was nearly due west overhead, but on the ground blew



SERVICES RUGBY FOOTBALL: Army *v.* Royal Air Force. Lieut. G. V. Palmer, of the Army, about to touch down after a brilliant dash.

stand-off half, but it was neutralised by feeble play in front of him and behind him, and he certainly did not mark B. H. G. Tucker close enough. Yet when all is said and done, 22 points to love is a tremendous beating, and few critics can have expected that the Air Force would go down so badly as all that.

The blame must be distributed pretty impartially. The R.A.F. forwards lacked "devil," and only for a moderate period in the second half did they use their weight to keep the play in their opponents' half of the ground. At half back Russell was not at his best. He did some good things now and again it is true, some sound tackling and some good kicking into touch. But round the scrums he was quite outclassed by Young. Of course such high class halves as Nelson and Sugden have found Young a proposition which has taxed all their powers; but Russell has in his day played the even more redoubtable Kershaw of the Navy fairly level, and it was distressing to see Young allowed to do very much what he liked. The R.A.F. three-quarters covered themselves with anything but glory. G. D. Harvey alone of them played a sound game, but he lacked pace, and could never make any progress against Palmer. The two centres O. C. Bryson and F. S. Hodder at times did some tackling, but too often R. B. Maxwell and Aslett, especialy Maxwell, were allowed to break through. In attack, the R.A.F. line were slow and uncertain in starting, and erratic in their passing. They never looked like scoring, for they did not seem to have any idea how to set about it. Why is Lowe condemned to soar above from the south. Ross kicked off for the Army, and Young soon got away and passed to Aslett, who was well held. The Army attacked, and though a free kick to the Air Force brought momentary relief, Palmer ran well down the right wing into R.A.F. ground. Immediately after, Young burst through half the Air Force team and when he could go no further slung out a long pass to where Palmer ought to have been, but was not. The game had only been going six minutes when Ross made an opening, and passed to Palmer who romped over the line, as shown in the photograph. Cass kicked the goal, and the Army were 5 points up.

On resuming, the R.A.F. forwards heeled the ball out several times, but the threequarters fumbled their passes badly. Then the Army in turn did some fumbling and the Air Force started an attack, which ended in Harvey dropping his pass. Burns put in a decent kick, and Chick dribbled up to the Army 25 lines. Cass drove the attack back with a good kick. Then Bryan got going on the Army left wing and looked dangerous, but Chick got back and saved the situation. The play went back to the Army 25, but they boldly began to attack from there, and a couple of dropped catches by Burns in quick succession brought the play back to the Air Force goal line. Ross burst over, but went into touch on the way and was whistled back. The Air Force defended stoutly for some time and almost worked clear. But the Army passed out to Bryan who ran strongly and then passed in to R. B. Maxwell. He too made ground and returned the ball to Bryan who now found his path to the

goal line clear and scored the second try. It was a very masterly piece of work. Ross missed the kick, and half time found the scores :—

Army, 8 points ; R.A.F., nil.

The second half opened with an Air Force attack ; but soon Young started a fine Army movement, and Bryan not only crossed the line but ran right behind, and Cass kicked the goal. It was then discovered that G. H. H. Maxwell had been laid out through having encountered Browne's head in his torso (talk about stopping a bullet !) and he had to be carried to the touch line to recover. On coming back, he frequently distinguished himself. There was a rather long wait over this incident. The Air Force seemed to do better for a time and there was a series of scrums on the Army line. But there was no finishing power in the team, and two Army forwards, Chamberlain and Browne, brought the ball back, running and passing like threequarters. This sporting effort ended in the Irish international scoring the Army's fourth try, which Ross failed to convert. Two minutes later Young made a fine opening and sent in R. B. Maxwell for a fifth try. There were about 20 minutes more to go, and the Army now seemed all over the Air Force. Chick once got well away by himself, but no one backed up to take a pass from him, and he was tackled.

A heavy shower came on, but it seemed to make little difference to the play.

The Air Force were given a free kick, and had a futile shot at goal, and for a while pressed again. Christie, to all appearance, manfully fisted the ball over the line, but the referee did not whistle and Ross saved a try. The pressure was cleared by the Army captain, Tucker, who broke through the centre. Burns put in his best kick about this time, and it gained a lot of ground, but the Army threequarters were soon attacking again. A free kick to the Air Force sent them back, but Vines spoilt all chance of a score by punting into touch in goal. Russell distinguished himself by finding touch just by the corner flag, but again the Army broke away. Had not Palmer suddenly been seized by an unwonted attack of fumbling, more Army scores might have been made. But Young got right away by himself and just at the right moment slung out a beautiful pass to Bryan. The Sapper scored the sixth and last try of the match.

Shortly after Russell from the base of the scrum opened up for his threequarters, and the ball, for once, went along the line like a book to Harvey. Had the latter been an Ian Smith—but he did his best and is not to be blamed for lack of pace. Just before the whistle went for time the Air Force had a shot at a penalty goal. But it was not written on their foreheads that they should score that day.

F. A. DE V. R.

The Teams

The Army : *Full Back* : Lieut. E. E. E. Cass, D.S.O., M.C. *Threequarters* : Right Wing, Lieut. G. V. Palmer ; Right Centre, Lieut. A. R. Aslett*; Left Centre, Lieut. R. B. Maxwell; Left Wing, Lieut. G. J. Bryan. *Half Backs* : Stand-off, Capt. B. H. G. Tucker ; Scrum, Lieut. A. T. Young,* *Forwards* : Lieut. E. P. Sewell, Private F. Dowas, Lieut. d'E. G. Chamberlain, Lieut. C. K. T. Faithfull,* Sergeant W. Thomas, Captain J. A. Ross, Lieut.W. F. Browne,* Lieut. H. McVicker.*

The Royal Air Force :—*Full Back* : F.O. E. S. Burns. *Threequarters* : Left Wing, F.O. G. D. Harvey ; Left centre, Flt.-Lieut. O. C. Bryson, M.C., D.F.C., A.M. ; Right centre, P.O. F. S. Hodder ; Right Wing, F.O. C. P. Vines. *Half backs* : Stand-off, F.O. R. V. M. Odbert ; Scrum, Sqdn.-Ldr. J. C. Russell, D.S.O. *Forwards* : Flight-Lieut. J. S. Chick, M.C., A.F.C. ; Flight-Lieut. G. H. H. Maxwell* ; F.O. C. J. S. O'Malley, Corporal M. G. Christie, F.O. P. C. Chichester F.O. J. G. Franks, Ldg. Aircraftsman C. Rollings, F.O. F. V. Beamish.

* International.

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HOUSE OF LORDS' DEBATE ON AIR ACCIDENTS

In the House of Lords, on March 23, Lord Gorell called attention to the frequency of accidents in the R.A.F. He said that he had no intention of attacking the Government or Air Ministry or of reflecting on the efficiency of the R.A.F. He knew that no one regretted accidents more than that able and gallant man, Sir Hugh Trenchard. He asked for information on certain technical aspects relating to accidents. It was admitted that the stalling of a machine, especially near the ground, caused frequent accidents. He was informed that in January, 1925, an anti-stall gear was designed to warn pilots when this was about to happen. It was subjected to many tests, and in October, 1925, twelve were ordered. He found criticism of the dilatoriness on the part of the Air Ministry in testing and possibly applying these devices. He did not associate himself with these criticisms ; he merely asked for information. He was informed that the device was being put in mass production in France. The second point on which he asked for information was the question of devices to prevent petrol tanks bursting into flames. He was informed that there had been an invention which complied with the specifications of the competition instituted by the Air Ministry ; and it appeared that the inventor was now negotiating with foreign Governments. His third question concerned the publication of details and names in connection with air accidents. He was informed of instances where the Press had asked relatives for photographs of the victims of accidents before the relatives were aware of the accidents, and then cruelly informed them. There was something ghoulish and horrible in that procedure. He asked whether the Air Ministry could not appeal to the Press to suspend publication until the Ministry had communicated the facts to the relatives.

Replying for the Government, The Duke of Sutherland, Paymaster-General, said that the Prime Minister, in his recent speech, had covered practically every aspect of the subject of air accidents, which had gone a long way towards allaying anxiety. It was obviously essential that the Secretary of State should be furnished with all evidence concerning each accident, and that in itself precluded publication of the inspectors' reports. Judging from recent criticisms in the Press and in the House of Commons, it might also be supposed that the Air Ministry kept no record of the statistics of accidents and simply accepted them as necessary and made no real endeavour to reduce their number, which was far from the truth. The Prime Minister had satisfied himself that statistics had been kept since the war, and the whole problem was under constant review from every angle. It was too much to hope that accidents could be entirely eliminated. The real question was whether their number could be reduced, and the real criterion in that respect was surely our own experience and that of other nations. Leaving out war years, there had been a constant improvement from 1921 to 1925 in the ratio of accidents to hours flown, and a comparison to other countries did not suggest that the rate was excessive. Information was confidential, and he was not at liberty to state the actual figures, but they were reassuring. In accidents due to mechanical causes and maintenance our record was much better. The Air Ministry were continually trying in any direction that seemed even remotely capable of yielding results. The training given was progressive but not hurried. Pilots had to have 100 hours' flying experience before they were graduated to squadrons. Any pernicious habits were, as far as possible, enforced by regulation and inculcated by example. There was no more cruel libel on Air Force officers as a whole than to accuse them of over-indulgence in alcohol. Human nature being what it was, there was bound to be an occasional case of intemperance now and then among a body of more than 3,000 officers ; but any suggestion that that was a contributory cause to accidents was absolutely without foundation. In not a single case could over-indulgence in alcohol be proved to be the cause of accidents. He earnestly hoped that in the case of announcements of accidents by the Press it would be possible, after a consultation between the Air Ministry and the Press, to revise the procedure, that the relatives might be spared pain and anxiety. The Ministry had made rearrangements in the allocation of personnel so as to secure a higher standard of technical work in the care and maintenance of machines with a view to increasing safety.

Two sets of special gear which gave a pilot warning of a stall had been fitted for experimental purposes. Efforts to check needlessly reckless flying had been made, and since last summer four pilots had been court-martialled for that offence and two were convicted and two acquitted. Experiments were also being made to increase the safety of fuel tanks on three types. During 1926 four lives were saved by parachutes.

Lord Thomson said that of the accidents that occurred during his tenure of office not one could be directly or indirectly attributed to drunkenness on the part of the pilot. The average of our pilots, from the temperance point of view, was at least as high as that of any other set of men in the world. Military aviation was inherently dangerous, and he did not believe that any ingenuity and effort would ever make it safe. After all, it was 90 per cent. of the danger of warfare in the time of peace. The young fellows knew what they were in for, and had to be trained at concert pitch and live in that state. Unless they were trained to be as skilful as any opponents it was hardly worth while sending them up. The demand for the publication of accidents was misplaced. On the effect of accidents on recruiting he did not agree with the Prime Minister that, so far as the lads themselves were concerned, it made the least difference. But the parents had to be considered and that was where the Press could help. When we had such magnificent pilots and people in this country it was the duty of others and the Press to give them every encouragement possible. He joined in the appeal to the Press to be more considerate in the matter of accidents, and he was sure that the Ministry were doing all they could to see that accidents were reduced to the minimum.

The Marquess of Londonderry eulogised the Air Ministry for the present position of the Air Force, wondered at the fewness of accidents rather than the number, and appealed tolerantly for the consideration of the Press in the matter of accidents.

Lord Gorell thanked the Duke of Sutherland for his speech and withdrew his motion for papers.

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Italian Air Activities

IT would seem that Signor Mussolini intends to launch a big civilian air offensive this spring throughout Italy. Several new air routes are to be inaugurated on April 1, mainly with the object of improving the tourist services. The new air routes include the following : Milan-Genoa ; Milan-Geneva ; Milan-Zurich ; Milan-Brindisi ; Milan-Munich ; Naples-Brindisi ; Rome-Cagliari ; Rome-Messina-Tripoli ; Rome-Venice-Klagenfurt-Vienna ; Genoa-Barcelona ; Genoa-Ostia-Naples-Palermo ; Venice-Trieste-Zara ; Turin-Pavia-Venice-Trieste ; Brindisi-Athens-Constantinople. It is also reported that an Aerial Police Force is to be established in Italy, the chief function of which will be to prevent airmen from crossing into forbidden zones and areas. They will have the power to request an airman to descend in the nearest field or aerodrome.

AIR TRAFFIC IN GERMANY

Well-attended Meeting of the R.Ae.S.

IT was to a very large and distinguished gathering that Maj. Wronsky, Political Director of the German Luft Hansa, delivered his lecture on Air Traffic in Germany on March 24. In fact, we do not remember ever having seen a larger audience at any of the meetings of the Royal Aeronautical Society.

In remarkably good English Maj. Wronsky outlined the history of civil aviation in Germany since the war, explaining the development which has taken place, and pointing out how German civil aviation commenced with a number of separate companies operating various lines in Germany. Then came the period in which nearly all of these companies ceased to exist, with the exception of the German Aero Lloyd and the Junkers companies, which were in keen competition, and the German-Russian Air Traffic Company (Deruluft), which was, and still is, something rather apart.

The lecturer then pointed out how in the late autumn of 1925 the negotiations were commenced which ended early in January of 1926 in the amalgamation of the German Aero Lloyd and Junkers companies into a single German air traffic company, which was given the name Luft Hansa. Regional air traffic companies still exist in Germany, but their activities are limited and cover only certain districts, and their chief task is to arouse the public interest in aviation.

Maj. Wronsky stated that the Luft Hansa is actually *the* German air traffic company, backed by German commerce, trade, industry and banks. On the Board of Directors are well-known German business men, as well as representatives of the various German Reich and State ministries interested, and representatives of a number of German cities. In addition to the Board of Directors the Luft Hansa has a technical advisory committee which comprises the leading men of the German aircraft industry.

The lecturer made the interesting statement that the direct revenue of the company amounts to 30 per cent. only of the actual cost, the remaining 70 per cent. being furnished by public means, the subsidy being given by the German Government, various German States and communities and various corporations.

Types of Aircraft Used

Maj. Wronsky stated that the number of machines in use by the Luft Hansa during the summer season of 1926 was about 120 aeroplanes, the main types in use being Albatros, Dornier, Junkers and Rohrbach machines. He pointed out that all the machines at the disposal of the company in April, 1926, were still built under the restrictions of the "Nine Rules," and were for the greater part single-engined machines, which could carry six passengers including luggage and freight. The only multi-engined type in service was the Junkers G.24, which also had to conform to the "Nine Rules."

When the negotiations between the Ambassadors' Conference and the delegates of the German Ministry of Transport came to a conclusion in May 1926 with the so-called "Paris Aeronautical Agreement," the German aircraft firms were at last free to work unrestrained, but the lecturer pointed out that the time which has elapsed since then has not been sufficient to revolutionise the design and construction of aeroplanes. Nevertheless the German factories had put at the disposal of the Luft Hansa a number of very effective multi-engined types. Mention was made of the Albatros L.73 and the three-engined Rohrbach "Roland." The lecturer stated that the multi-engined types were used chiefly on the international lines, while the single-engined machines were used on the internal lines.

In spite of the preponderance of monoplanes used in German civil aviation, the lecturer stated that they were not able yet to settle definitely the old question as to whether the monoplane or the biplane was the more economical. He mentioned that only quite recently had they put on the Albatros L.73 twin-engined biplane. He thought, however, that it might be said that the initial cost of the biplane was essentially cheaper than that of the all-metal monoplane.

The next section of Major Wronsky's paper dealt with propellers, and apparently the Germans make extensive use of metal propellers, more particularly those made by the Haw Company. These propellers have the advantage that the pitch of the blades can be very simply adjusted by undoing and re-tightening a few bolts, although the pitch is not variable in flight.

Inspection of Flying Stock

Concerning the regulations in force relating to the inspection of aircraft and engines, the lecturer pointed out that inspection takes place before every flight and on every aerodrome, while the aircraft are thoroughly examined after about 150 hours' flying. Thorough overhaul of aeroplanes is carried out after an average of about 400 to 500 hours' flying. The average time taken for overhaul amounted, the lecturer stated, to 3 to 4 weeks for Fokker-Grulich machines, 4 to 5 weeks for Junkers monoplanes, and 6 to 7 weeks for multi-engined machines.

In the case of engines, the following times were given as averages for overhauling: Rolls-Royce "Eagle" VIII and IX, 4 to 5 weeks; B.M.W. IV and Junkers L.2, 2½ to 3 weeks; B.M.W. VI, 3½ to 4 weeks; Junkers L.5, 3 to 3½ weeks; and Siddeley "Puma" engines, 4 to 5 weeks.

On the subject of comfort for passengers, the lecturer said that in Germany an endeavour was always made to give passengers a feeling of roominess, and pointed out that, for instance, the cabin of the Albatros L.73 had a width of 1½ m. In the Rohrbach "Roland" silencers were provided which enabled passengers to converse in the cabin without raising their voices.

Pilots and Their Training

Major Wronsky stated that the system of recruiting pilots for commercial flying in Germany is as follows:—before a pupil is admitted to the German Air Traffic School at Staaken (founded in 1926) he must have obtained the general pilot's licence from an aviation training school. This licence entitles him to pilot a machine of 1,200 kg. total weight with a maximum speed of 150 kms. per hour. This licence does not entitle a pilot to fly a machine carrying passengers. Another way of obtaining "A" licence is through the Sportflug Co. When a pilot is found capable he goes to the Traffic Aviation School at Staaken. Here the requirements are strict. In addition to a practical course of flying there are scientific and technical courses, which have to be taken. Before a pupil can take the first examination entitling him to fly a commercial aeroplane, he must have covered 5,000 kms. on cross-country flights. Having passed his examinations he is given his "B" licence. This only entitles a pilot to fly the smaller commercial aeroplanes over short distances. The general time taken in obtaining "A" and "B" licences is 1½ to 2 years. Two more licences are required, known as "C" and "D." Before these can be obtained there are more examinations and greater distances to be flown across country. The manner in which a man is given practice for the bigger machines is as follows: on the larger machines in use on the international lines "B" licence pilots are carried as second pilots, and after a certain time of service as second pilot a man obtains his "C" licence. The "D" licence is the high-water mark, so to speak, and among the requirements for a "D" licence is that a man shall have flown at least 100,000 kms.

The German pilots of commercial aircraft in the Luft Hansa are remunerated by salaries and by premium fees. The latter consist of a kilometre fee varying from 5 to 8 Pfennigs, per kilometre, according to the type of machine. For night flying, the kilometre fee is double, and a premium of 100 marks is paid for every 5,000 kms. flown without accident. The salaries vary, according to the distances flown by each pilot, between 275 marks and 410 marks per month. Married pilots receive an extra pay of 50 marks, and 15 marks for one child and 12 marks for each additional child. According to the reports of 1926, the lecturer stated that the average income of a pilot who had been in service the whole year amounted to about 800 to 1,000 marks per month.

Air Traffic Results

Major Wronsky gave some interesting statistics regarding the air traffic results of the Luft Hansa. This company opened regular air traffic on April 6, 1926. During the first quarter of the year the traffic was at a standstill pending the amalgamation of the Aero Lloyd and Junkers companies. In the height of the season 54 lines were operated and 3

foreign and 57 inland air ports were reached. The total length of the German network of air routes was 20,408 kms. On October 16, the winter services came into operation, and the total length of routes was about 40 per cent. of that of the summer routes, viz., 8,152 kms. Ten foreign and 23 inland air ports were touched during the winter services. In the scheduled air traffic of the whole year a total distance of 6,141,479 kms. was flown, as against 4,949,661 in 1925. The passenger traffic of 1926 increased by about 50·3 per cent. and the mails by about 86·4 per cent. In absolute figures the results for 1926 were : Passengers, 56,268 ; luggage, 384 tons ; freight, 260 tons ; and mail, 300 tons. The lecturer stated that as regards mails carried, the night service on the Berlin-Königsberg route showed the best results. The regularity of the summer service was, in spite of unfavourable weather, very satisfactory, being generally not under 90 per cent. On a great number of routes 100 per cent. regularity was achieved. Two accidents resulting in death of passengers happened in 1925, and only one in 1926.

Insurance

Some interesting information was given by Major Wronsky concerning insurance. He stated that by arrangements made, passengers travelling by the German Luft Hansa machines are automatically insured, by purchasing a ticket, for 25,000 marks. For temporary disability a daily compensation of 25 marks is granted. The cost of the insurance is paid by the Luft Hansa without any increase in the price of tickets compared with the fares obtaining in previous years. He pointed out that this procedure had helped greatly to prove to the passengers as well as to the insurance companies the safety of air travel, and the favourable results of the passenger insurance were followed by a continuous lowering of premiums for accident insurance.

Concerning the policy of the German Luft Hansa, Major Wronsky pointed out that the object of commercial aviation should be to connect world trade centres in about a third of the time taken by other means of transport. As a result of this policy one found today in the European air-net lines which were deservedly called "trans-continental," such as the London-Berlin-Moscow, the Zurich-Munich-Vienna-Budapest, and the Malmö-Copenhagen-Berlin-Prague-Vienna. The endeavours of the German Luft Hansa were to interest those countries which had as yet not been joined up with the central European air-net. The negotiations with Czechoslovakia were finished recently, and it was hoped that the trans-Alpine air line between Munich and Milano would be sanctioned shortly, while it was also hoped to ease the way of aerial communication with Spain.

In addition to the international lines, the German Luft Hansa, Major Wronsky stated, keeps up a closely meshed inner German network of lines. Major Wronsky, in referring to this internal German air-net, admitted that one of its great advantages was that as the network of routes passed over the larger German cities regularly, the population is impressed, and is thus gradually educated into becoming "air-minded." In addition, this internal German air-net was also of great material importance in that it enabled the organisation to develop and the staff to be trained, while valuable experience was collected. Moreover, with a twinkle in his eye, Major Wronsky said that they did not feel justified in refusing the subsidies which various states and communities inside Germany placed at the disposal of the company for the development of commercial air traffic.

Major Wronsky then gave an outline of the conditions under which German civil aviation had developed during recent years, explaining the effect of the Treaty of Versailles and the restrictions placed upon German aviation as a consequence of this. As these various restrictions have been from time to time dealt with fully in FLIGHT there is probably no need to refer to them here in detail.

The International Air Traffic Association I.A.T.A., a society comprising air traffic companies of almost all the European states, was formed at The Hague on August 25, 1919. The lecturer mentioned briefly that the first work of the I.A.T.A. was the establishment of an international air traffic service between Denmark, Germany and Holland in 1921. In 1922 followed a German-Dutch-English air traffic route, and to-day the German Luft Hansa is not only operating joint services with the companies who are members of the I.A.T.A. but also with Austria, France, Russia, Sweden, Switzerland and Hungary. Major Wronsky flatly denied the intention on Germany's part to establish supremacy in European air traffic. Germany solely fulfilled an economical and cultural duty imposed upon it by its geographical position. As proof that Germany is sincere in this, Major Wronsky stated that Germany does not make use of this vast air traffic organisation only for itself, but puts it at the disposal of all European states, which are permitted to make use of the company's aerodromes. Service for Europe, service for the progress of culture, that was the great national thought which led above political controversies of the day to the aim of bringing air traffic to such a standard that it was of service to all states.

At the conclusion of the lecture a series of lantern slides was shown as well as a film illustrating the flight of two Junkers G.24 machines from Berlin to Pekin. A trick film showing in the form of diagrams the movements of the machines from town to town caused considerable amusement, especially the way in which the machines got round the various turning points in a flat spin.

THE DISCUSSION

The Chairman (Col. The Master of Sempill) remarked that it was very obvious from Major Wronsky's paper that the Germans were what Sir Samuel Hoare would call "Air minded." He did not know whether the large and distinguished audience, the largest he ever remembered seeing at one of the Society's lectures, was due to that new beacon of uncertain sex " Neon " who had set out to prove that aviation was of no use and never could be. He remarked that it was perhaps significant that the first valuable paper on civil aviation should come from Germany. He was very glad to welcome there that evening Lord Haldane, who had attended at considerable inconvenience to himself, and he called upon Lord Haldane to open the discussion.

LORD HALDANE, who was greeted by tremendous applause, said he ought to be in the House of Lords, but he had preferred to come and hear Major Wronsky speak on German commercial aviation. He pointed out that the future development of commercial aviation must be on international lines. The cost of the ground organisation was high, but as the distances covered increased, so it became a diminishing percentage. In flying there were no frontiers, and he hoped there never would be. One disadvantage of present day commercial aircraft was the relatively long run taken to get off and for landing, and one should not overlook possible new developments, such as the "Autogiro" which went up very quickly and came down very quickly, a statement that was received with some amusement by the audience, evidently somewhat to the surprise of the speaker. Lord Haldane recalled the old story about Stephenson and the "cow," and said that as Stephenson had said it would be worse for the "cow," so also would it be the worse for those who put obstacles in the way of civil aviation. Nothing would stop it. "

MR. HANDLEY PAGE pointed out that it was somewhat curious that the development of commercial aviation in Germany had followed much the same lines as in England. They had started with separate firms operating air lines and had finally amalgamated these into a single monopoly company. Just as we had done in this country. It was an unfortunate fact that civil aviation still largely depended on Government aid, and he was somewhat surprised at Major Wronsky's figures, which showed that the income only covered 30 per cent. of the costs—the other 70 per cent. having to come from Government and other subsidies. Unless there was a change, it looked as though civil aviation could never become commercial aviation at all. It was essential that there should be development, not only in the operation of aircraft, but also in the machines themselves, and he was very pleased to learn about the advisory body in Germany, which kept in close touch with the operating company. To this country it was a little disquieting to find from the curves shown that the German curves were rising and the British were dropping. On the subject of biplane versus monoplane he would like to have further details if the lecturer could give these. Concerning the "Autogiro," this had been called by "Neon" " the flapper of the air," and as such had appealed strongly to the Director of British Civil Aviation. He thought, however, that the development would be along ordinary lines, and not by novel experiments. One thing that was necessary was hard work in operating and hard work in the production of suitable machines.

LORD THOMSON said he would like to know whether the 70 per cent. Government subsidy referred to the period when the " Nine Rules " were in operation, and if so, whether the percentage had become lower since the raising of the restrictions on German aviation. It was obviously not possible to make aviation pay under the " Nine Rules " restrictions. In our own country it would be necessary to tackle civil aviation on Imperial lines over long routes, in order to make it pay, as England itself was too small a country to hold out any great hopes of making internal air lines pay.

COLONEL EDWARDS, of the Air Ministry, said he wished to thank Major Wronsky for the wealth of information contained in his paper. He did not think there was any need to be alarmed at the 70 per cent. subsidy. Aviation was still an infant, and the increase in traffic would, he felt sure, soon lower that percentage, and he did not think it would be very long before subsidies would disappear. At the moment we were in a vicious circle. The cost of commercial aviation could not be reduced until there was a greater volume of traffic, and the traffic could not be attracted until the fares and rates were down. Moreover, commercial machines had not yet reached perfection, and there were great improvements coming. Like Mr. Handley Page, he would like more information concerning the monoplane-versus-biplane controversy. He, personally, was a believer in the monoplane for civil aviation.

GENERAL GROVES said he regretted that Major Wronsky's lecture had not been broadcast, since it would have acted as a long deferred antidote to " Neon's " book, " The Great Delusion." He was very impressed by the air enthusiasm of the German public. Here the public was sceptical. We could not afford to go on as we were doing to-day, and the British Empire needed transportation communications more, perhaps, than any other country. A more vigorous propaganda should be pursued, and facts such as those contained in Major Wronsky's paper should be placed before the British public. Great Groves referred to railways a hundred years ago, which were claimed to go against the laws of God, and he quoted from the " Quarterly Review " of 1825, which was very much against railways, and stated that locomotives should not be allowed to travel faster than eight miles an hour, since any higher speed would constitute a danger. We laughed at that to-day, but we ought to take care than in 20 years' time people should not laugh at us over our attitude towards civil aviation. He thanked Major Wronsky for the object lesson he had given in what Germany had done. It was a wonderful achievement, in the teeth of difficulties, and Germany was leading the entire world.

MR. BERIEAW was impressed by the interest taken in flying in Germany, and he looked forward to the extension of lines in and out of Germany. Germany had developed the all-metal monoplane, and we the biplane of mixed construction. The problem was to discover which of the two was likely to be the more economical.

MAJOR F. M. GREEN would like the lecturer, if possible, to add certain statistics to his paper, referring to the performance and weight carried of the machines used by the German Luft Hansa. He would also like to know what had been the experience of that company with their all-metal, and more particularly their aluminium alloy machines.

MR. F. L. BRAMSON said he was very interested in the state aids con rain insurance. That was an excellent move, and nothing like that was to be found in this country. He would also like the lecturer to tell them whether their three-engined machines would definitely fly on two engines, because if they would that might have a considerable bearing on the insurance question.

MR. HULBERT was impressed by the fact that the German *Luft Hansa* had been able to persuade various states and cities to contribute towards the cost of the air lines, and would like more information as to how they had been able to persuade them to do this.

COLONEL THE MASTER OF SEMPILL said that before calling upon Major Wronsky to reply to some of the questions, he had a correction to make. Major Wronsky had been described as the Managing Director of the Luft Hansa. Actually, the position was that there were three managing directors of that company : A Financial Director, a Technical Director, and a Political Director. It was the duties of the latter to arrange for the negotiations with foreign countries when it was contemplated to start new international lines, or to extend existing ones, and this actually was the post filled by Major Wronsky.

MAJOR WRONSKY said he was not a technical man, and so could not reply to some of the technical questions put to him. Concerning the 70 per cent. and 30 per cent. figures, these were not entirely German, but were international, and applied more or less in all countries, and to civil aviation in general. The figures related to 1924 and 1925, since the statistics for 1926 were not yet available. He would point out that steamers had subsidies for more than 50 years after their beginning, and Mussolini was still giving subsidies to Italian liners. Before the war, both Germany, England and France gave subsidies to their liners.

As regards the question of the development of air traffic, he pointed out that traffic in general was developed, not for traffic, but for trade. If the air routes carried, say 50,000 traders, and these 50,000 developed business as a result of their journeys, then flying would pay. For aviation to pay it was necessary that the constructors should do all they could to produce efficient machines, but it was also a question of operation and of the comfort of passengers. In Germany they were working in close co-operation with the railways, and were now making arrangements for railway offices in all the various German cities to handle air consignments. Concerning the reasons why German states and cities subscribed considerable sums to the Luft Hansa, there was no secret about this, and it was a result of the structure of the German Reich. There were a number of important towns and states, and they were jealous of one another, and the only secret lay in making them jealous enough.

Amongst those who accepted invitations to the reception held by Colonel, the Master of Sempill at the Hotel Cecil, to meet Maj. Wronsky, prior to his lecture before the Royal Aeronautical Society, were : Capt. Acland, The Hon. Lady Bailey, Count Bernstorff, Mr. F. G. L. Bertram, Commander J. Bird, Maj. Brackley, Mr. L. Bramson, Sir Alan Cobham, Lieut.-Col. Edwards, Brig.-Gen. P. R. C. Groves, Lord Haldane, Col. Holt, Maj. Woods Humphreys, Sir Samuel Instone, Col. Barrett Lennard, Capt. Lingham, Maj. A. R. Low, Mr. F. Handley Page, Mr. J. L. Pritchard, Flight-Lieut. Reid, Mr. J. D. Siddeley, Sir Archibald Sinclair, Commander Smart, Mr. T. O. M. Sopwith, Mr. S. Spooner, Dr. Shamer (German Ambassador), Mr. Holt Thomas, Lord Thomson, Col. Thwaites, Mr. H. T. Vane, Maj. Villiers, Sir Vyell Vyvyan, Lady Vyvyan, Capt. Walker, Mrs. Weir.

IN PARLIAMENT

Parachutes

COL. DAY, on March 23, asked the Secretary of State for Air if he could state the makers of the parachute now in use in the Royal Air Force, and in which country these parachutes are made ; whether any recent tests have been made or demonstrations given for the use of the Salvator parachute invented by Lieut. Freri, either at Hendon or elsewhere ; and, if so, when and with what result ?

Sir Samuel Hoare : As regards the first part of the question, the makers are the Irving Air Chute of Great Britain, Ltd., of Letchworth, where the parachutes are being made. As regards the remaining parts, the position remains as stated in my reply to the hon. member on December 15 last.

Col. Day : Is the right hon. gentleman aware that the Salvator parachute has never failed yet, and does he not think the saving of life is of paramount importance ?

Sir S. Hoare : I should not like to express an opinion on the Salvator parachute until we have carried our experiments further than we have done.

Maj.-Gen. Sir Frederick Sykes asked whether delivery of 2,230 parachutes against orders outstanding on August 7, 1925, was duly completed by December, 1926 ; whether, in accordance with the arrangements made, one-third of these were manufactured in this country ; whether further orders have been placed ; if so, whether manufacture will take place in this country ; whether British material will be used ; and whether, before any such order was placed, every available British type of parachute was thoroughly tried out ?

Sir S. Hoare : As regards the first and second parts of the question, the number of parachutes due for delivery by December, 1926, was 1,500, and these were all actually delivered in June, 1926, the contract date thus being anticipated by some months. The contract was for 2,261 parachutes in all, and of these 761 were to be manufactured in this country and are at present in process of delivery. The answer to the third and fourth parts is in the affirmative. As regards the fifth part, all the materials and components other than the silk will be British. As regards the last part, I would refer to the reply which I gave on November 25, 1925, and to my speeches in the House, on February 26 and June 24, 1925, explaining the circumstances in which the contract with the Irving Company was placed.

Col. Day : Can the right hon. baronet say whether we are pledged to take a further contract for any further number ?

Sir S. Hoare : There is a contract running until December, 1927.

Mileage Costs of Air Transport Services

MR. RENNIE SMITH asked the Secretary of State for Air if he could give the average costs per mile flown for British aeroplanes for each of the years since 1921, and the total number of miles flown each year ?

Sir S. Hoare : On the assumption that the purpose is to ascertain the cost to the State per mile flown resulting from the division of the total amount of the subsidies paid each financial year by the total mileage flown on all British Air Transport Services, the figures are as follow :

1921-22, miles flown 289,000, average cost per mile, 5*s.* 10*d.* ; 1922-23, 778,000, 4*s.* 8*d.* ; 1923-24, 1,004,000, 2*s.* 6*d.* ; 1924-25, 890,000, 3*s.* 1½*d.* ; 1925-26, 865,000, 3*s.* 2*d.*

These costs, however, are misleading as no account is taken in them of the progressive increase in the capacity of the machines employed.

More comparable figures are furnished by the cost to the State per ton-mile in respect of Imperial Airways, Ltd.'s services, which is as follows since that company began to operate :—

1924-25, cost per ton mile, 7*s.* ; 1925-26, 6*s.* 11½*d.* ; 1926-27 (estimated), 5*s.* 5½*d.*

Airship Experiments, Cardington

MR. ROSE, on March 24, asked the Secretary of State for Air if the airship now under experiment at Cardington is to be inflated by helium or hydrogen gas ; and the estimated cost of 5,000,000 cub. ft., respectively, of these gases ?

Sir Philip Sassoon : The airship will be inflated with hydrogen, and the estimated cost of 5,000,000 cub. ft. of hydrogen is £2,500 ; the cost of helium would be very much greater, but no exact data are available.

Mr. Wells : Can the hon. member say whether they have started to build the airship at Cardington yet ?

Sir P. Sassoon : No, sir.

Cardington and Howden Airsheds

MR. ROSE asked the total cost of the alterations to the Cardington airshed ; and whether any cost has accrued to the State in respect of the airshed at Howden, in which an airship is being constructed by private contract ?

Sir P. Sassoon : The answer to the first part of the question is approximately £100,000. As regards the second part, £50,000 was paid to the contractors for the Howden airship, in accordance with the terms of the contract, as a contribution towards their capital expenditure on shed, plant, etc., necessary for the execution of the contract.

Howden Airship

MR. ROSE asked the dimensions, major diameter, and total length of the airship now under construction by the Airship Guarantee Co. at Howden ; how much money has already been advanced to the company ; and what was to be the full cost involved ?

Sir P. Sassoon : The diameter is about 130 ft. and her length about 710 ft. As regards the second and third parts, the contract provides for the payment of a contribution of £50,000 towards the company's capital expenditure on shed, plant, etc., and of a sum of £300,000 for the airship itself ; the former sum and an instalment of £100,000 of the latter have been paid.

Oxford and Cambridge Squadrons

SIR H. BRITTAIN asked what progress was being made with the air squadrons at Oxford and Cambridge ; and, having regard to the possibilities of research dealing with the whole science of aeronautics, was he prepared to give the fullest possible facilities to encourage the work being done in these two universities ?

Sir P. Sassoon : As regards the first part of the question, I am very satisfied with the progress made with these squadrons to date, and should like to express my appreciation of the assistance which I have received from the University authorities in their development. They have undoubtedly stimulated interest in aviation in the Universities. Each squadron now consists of about fifty undergraduate members, and at Cambridge there is a considerable waiting list. In addition to flying training, courses of instruction have been arranged in aeroplane construction and rigging, engine construction and maintenance, wireless telegraphy, air navigation, and other subjects of aeronautical interest. The number of applications for commissions is very satisfactory. The answer to the last part of the question is in the affirmative. I am anxious to give every encouragement to the universities to undertake problems of aeronautical research, and I hope that valuable results will thus be obtained.

Lubricating Oil

MR. H. WILLIAMS asked the Secretary of State for Air whether he was considering the purchase of a branded lubricating oil for use in aeroplanes in place of lubricating oil to a specification, as hitherto in use ?

Sir P. Sassoon : The whole question of obtaining lubricating oil for aircraft is under consideration.

Civil Aviation

MR. LANSBURY asked the Under-Secretary of State for India whether, in connection with the Imperial Airways scheme, it was the intention of the Government of India to proceed with 15 additional stations and the appointment of staff for the same ; whether he would inform the House of the total cost involved in carrying out this scheme ; and whether the whole amount would be chargeable to Indian revenues and subject to the vote of the Indian Assembly ?

Earl Winterton : The total demand for civil aviation in the Budget for 1927-28 was Rs. 3,96,000. This was all votable and has actually been voted. The Secretary of State for India has not received full details of the manner in which the money is intended to be used, and cannot say how many new stations are to be proceeded with.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House on March 24. Mr. W. S. Field was in the Chair, and the other Member of the Committee present was Mrs. L. M. K. Pratt-Barlow, O.B.E. The Committee considered in all 6 cases and made grants to the amount of £70 19*s.* The next meeting was fixed for April 13, at 4 p.m.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, March 22, 1927.

General Duties Branch

Lt.-Cmdr. V. A. L. Bradell-Johnson, R.N., is granted a temp. commn. as a Squadron Leader on being seconded for two years' duty with R.A.F. (March 15) ; R. St. A. Mallseon, Lt., R.N., Flying Officer, R.A.F., is promoted to rank of Flight Lt. (March 8). The follg. Pilot Officers are promoted to rank of Flying Officer :—L. B. McGoverne (Sept. 6, 1926) ; B. A. C. Danbury, R. W. Knox (Jan. 30) ; F. G. H. Ewens, E. C. L. Richardson, H. V. Crowder, W. J. M. Spaight, E. H. Collinson, M.A. (Mai., E. Surrey Regt., R.A.R.O.), C. A. C. Patton, H. A. S. Byrne (Feb. 7) ; J. W. Stokes, R. A. Wills, F. W. H. Hall (Feb. 18).

Wing Commander J. T. Babington, D.S.O., is placed on half-pay, Scale B, March 9 to 30, 1927, inclusive ; Flight Lt. F. L. Luxmoore, D.F.C., is restored to full pay from half-pay (March 21) ; Pilot Officer C. R. McEvoy takes rank and precedence as if his appointment as Pilot Officer bore date Jan. 6, 1926, immediately following Pilot Officer C. D. G. Welch on the gradation list. Reduction takes effect from March 1. The follg. are placed on the retired list : —Flight Lt. J. C. Coulson (March 21) ; Flying Officer F. C. Jenner (March 23).

The follg. Flying Officers are transferred to Reserve :—Class B.—C. J. A. Delany (March 21). Class C.—L. H. Cooper (March 18).

Flying Officer L. W. Lane, M.C. (Lt., R. Sussex Regt.), relinquishes his temp. commn. on return to Army duty (March 16) ; Pilot Officer C. M. Peabody is dismissed the service by sentence of General Court-Martial (March 10).

Stores Branch

Flying Officer A. M. Reidy is granted a permanent commn. in this rank, with effect from April 6, 1926, on completion of probationary service.

Medical Branch

Flight Lt. L. C. Palmer-Jones, M.B., is granted a permanent commission in this rank. (March 23).

Reserve of Air Force Officers

The follg. are confirmed in rank :—Flying Officer, on probation, S. F. Woods (Feb. 17) ; Pilot Officer, on probation, V. P. Field (March 7) ; Flight Lt. L. C. Shoppee, D.S.C., is transferred from Class A to Class C (March 18) ; Flying Officer W. A. Syme is transferred from Class B to Class C (March 16).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commanders : A. Corbett-Wilson to H.Q., Coastal Area, for Tech. Staff duties, 15.3.27. C. C. Miles, M.C., to No. 10 Group H.Q., Lee-on-Solent, for Air Staff duties ; 16.3.27.

Squadron Leaders : F. E. P. Barrington, to No. 216 Sqdn., Egypt ; 25.2.27. J. C. P. Wood, to No. 4 Flying Training Sch., Egypt ; 11.3.27. W. H. Park, M.C., D.F.C., to No. 28 Sqdn., Hawkinge ; 28.3.27.

Flight Lieutenants : C. Porri, to R.A.F. Depot, Uxbridge ; 24.3.27. A. R. Churchman, D.F.C., to H.Q., Air Defence of Great Britain, on transfer to Home Establt., 6.3.27. J. R. Cassidy, to H.Q., Egypt ; 7.3.27. T. H. Newton, D.S.C., to R.A.F. Depot, Uxbridge, on transfer to Home Establt. ; 18.3.27. H. W. Baggs, to Central Flying Sch., Wittering ; 6.4.27. A. E. Case, to R.A.F. Base, Malta ; 22.3.27.

Stores Branch

Wing Commander R. W. Thomas, O.B.E., to No. 1 Stores Depot, Kidbrooke ; 21.3.27.

Sqdn. Ldr. H. L. Crichton, M.B.E., to Air Ministry, Directorate of Equipment ; 21.4.27.

Flying Officer D. A. W. Sugden, to Elec. and Wireless Sch., Flowerdown ; 1.4.27.

Accountant Branch

Wing Commander C. G. Murray, O.B.E., to H.Q. Accountant Office, Iraq ; 8.3.27.

Flight Lieutenant P. Hay, M.C., to R.A.F. Station, Tangmere ; 17.4.27.

Flying Officers : W. E. V. Richards, to R.A.F. Depot, Uxbridge, on transfer to Home Establt. ; 15.3.27. F. J. S. Short, to H.Q., Egypt ; 22.3.27.

ex-airmen to the Officer-in-Charge, R.A.F. Record Office, Ruislip, Uxbridge, Middlesex.

Openings for Flying Officers in Royal Air Force

The Air Ministry announces :—A considerable number of short service commissions (for five years on the active list and four in the reserve) will be granted in July, and the Air Ministry is prepared to consider applications now from candidates between 18 and 25 who wish to fly. Officers will be trained in this country or in Egypt, and will subsequently be employed in units at home or in the Middle East, India or other overseas commands of the Royal Air Force. The opportunity to see the world, to learn to fly and to master the technical side of air work should appeal to young men of spirit and especially to those who have a bent towards mechanical studies.

A year is spent in learning flying, aeronautical engineering and ancillary subjects, and in their subsequent service officers receive every encouragement to continue their studies by reading, correspondence courses provided and supervised by air force educational staff, and by practical work in squadron workshops. The officer who, after five years' service in the Air Force, reverts to civil life will, if he has taken advantage of the facilities provided for him, find himself well qualified to obtain civil employment. He will leave the service with a gratuity of £375, and will remain in the R.A.F. Reserve, where he will keep up his flying.

Only a small number of short service officers can be retained on permanent commissions in the service, but every year a competitive examination is held in mathematical and scientific subjects, open to officers who are recommended, have three years' service and are under 26. Those successful are trained as specialists in aeronautical engineering, armament, wireless or photography, and are granted permanent commissions. Apart from this examination a small number of short service officers are selected for permanent commissions on the recommendation of their commanding officers.

Applications for forms and regulations should be addressed, in writing, without delay to the Secretary, Air Ministry, Adastral House, Kingsway, W.C.2. Candidates should have received a whole-time education at least up to the age of 16 and possess good physique and eyesight. Candidates selected will be appointed to commissions as Pilot Officers on probation at a rate of 18s. a day, and will either be provided with accommodation, rations and personal attendance in kind or with cash allowances in lieu, amounting at present home rates to about 8s. a day. After 18 months' service they will normally be given the rank of Flying Officer, the present pay of which is 18s. 10d. a day on promotion and 21s. 8d. a day after two years' service in the rank.

R.A.F. Rugby

At Gloucester, on March 17, the R.A.F. fifteen were beaten by Gloucester by three goals (one penalty and five tries (28 points) to one goal and two tries (11 points). Gloucester played several reserves, but were the better side from the start, and after Millington had kicked a penalty goal Loveridge and Short crossed for unconverted tries. Before the interval Vines scored a try for the Air Force, the kick failing. When ends were exchanged both sides brought off many clever passing bouts, but again the home men held the advantage, Goodwin, Rea, Sayle, Millington and Stephens obtaining tries, two of which Millington converted. For the R.A.F. Hodder and Hardy added tries. Maxwell kicking one goal.

R.A.F. Cross-Country Championship

Aircraftsman F. W. Turner, of Uxbridge, again won the individual title in the R.A.F. Cross-Country Championship at South Farnborough on March 16, but his station lost the team honours, finishing third to Manston and Henlow. The once famous Uxbridge team, which won the Middlesex County Championship, has been broken up, and several members have gone to Manston. Hence that station's success. The race was over six miles, and there was also a team contest for stations below a certain strength.

R.A.F. Boxing

The finals of the open team championship of the R.A.F. Boxing Association took place at Henlow Aerodrome on March 25, when the cup was won by the Henlow Depot, the runners-up of last year, who defeated the Manston Depot by 16 points to 13. Group-Capt. A. E. G. Board, the chairman of the association, reported that this year there had been an increase of 100 per cent. in the number of boxing matches and competitors in the R.A.F. The trophy was presented by Air-Marshal C. A. H. Longcroft, who congratulated the Henlow station on qualifying to meet the Loyal Regiment in the Sir Phillip Sassoon Cup Competition.

ROYAL AERONAUTICAL SOCIETY

(Official Notices)

Parachutes.—On Thursday, April 7, at 8.15 p.m., Flight-Lieut. F. O. Soden, M.C., will give his lecture before the Society, at the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, on "Parachutes." Flight-Lieut. Soden is one of the best known experts on parachutes in the Royal Air Force, and has carried out many remarkable descents in the course of instructing others in the use of parachutes.

During the course of his lecture he will show, for the first time outside official circles, two films, one a slow motion film. The lecturer will cover the following points among others : trend of design ; uses of parachutes ; aims to R.A.F. ; number of lives saved recently by their use in this and other countries ; causes of accidents ; types of parachutes and their detailed construction ; how R.A.F. personnel are trained in the use of parachutes ; and parachutes for passengers.

J. Laurence Pritchard, *Secretary.*

Royal Aeronautical Society, Coventry Branch

Capt. Bygrave had a keenly interested audience for his lecture upon "Instruments and Automatic Control," given under the auspices of the Coventry Branch of the Royal Aeronautical Society on March 22. The part of the subject which proved most attractive was that devoted to gyro controls. A technical discussion followed and various points raised replied to. The lecturer received a hearty vote of thanks proposed by the Chairman, Major Green.

AIR MINISTRY NOTICES TO AIRMEN

Aintree Aerodrome (Liverpool) : Landing Forbidden

The attention of all pilots is again drawn to the fact that the Aintree Aerodrome (Liverpool), which was formerly occupied by A.D.C. Aircraft, Ltd., is no longer available for use by aircraft.

It is dangerous for aircraft to attempt to land on the site owing to the extensive building works which are in progress, and the owners of the ground decline to give permission for its use as a landing place.

(No. 29 of 1927.)

Italy : Centocelle Aerodrome

It is notified :—1. The aerodrome of Centocelle, Rome, is divided into two distinct parts, Centocelle North and Centocelle South. Centocelle North is available for the use of civil aircraft, and all dealings with civil pilots will be conducted by the Officer-in-charge of this part of the aerodrome.

2. *Previous Notice.*—The list of Italian Air Stations published in Notice to Airmen, No. 62/24 should be annotated accordingly.

(No. 23 of 1927.)

Gordon Shephard Memorial Prize Essay Awards

The Gordon Shephard Memorial Prizes, which are given annually for the best essays submitted by members of the Royal Air Force on subjects selected by the Air Council, have been awarded as follows in the 1926 competition :—

First Prize.—Squadron Leader J. L. Vachell, M.C., Directorate of Organisation and Staff Duties Air Ministry.

Second Prize.—Squadron Leader A. A. B. Thomson, M.C., A.F.C. Armament and Gunnery School, Eastchurch.

The competition was established as a memorial to the late Brigadier-General G. S. Shephard, D.S.O., M.C., Royal Air Force.

War Medals of Ex R.A F. Personnel

The Air Ministry announces that the British War and Victory Medals of a large number of ex-officers and ex-airmen of the Royal Air Force still remain to be issued, despite the efforts made to distribute them by sending communications to the latest-known addresses of all those concerned. It is particularly desired that those still in the possession of the department should be issued *without further delay*, and the Ministry would therefore appeal to ex-service personnel entitled to them to apply at once and give the necessary information. Applications should be addressed by ex-officers to the Secretary, Air Ministry, Adastral House, Kingsway, W.C. 2, and by

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

(Editor of "The Stamp Collector")

New Lithuanian Air Stamps

SPECIMENS are to hand of two recent air post stamps from Lithuania, where the service was resumed last summer. Lithographed in upright rectangular form at the central motif common to both values is a swallow flying with a letter in its beak, with a glimpse of the castle tower of Kowno in the background. Across the foot of the stamp runs the designation "ORO PASTAS" (air post), the respective denominations and colours being, 20 centu rose-carmine, 60c. blue and black. Presumably they are the forerunners of a complete series.

Fonck Flight Souvenirs

An ingenious method of meeting the demands of air post collectors for letters to be carried upon the ill-fated non-stop flight from New York to Paris had been adopted by the promoters, Argonauts Incorporated. One thousand contributions of £1 were invited towards the cost of the flight, in return for which an equal number of duly authenticated covers would be transmitted and delivered to subscribers within three months. The flight, as previously recorded in this journal ended in disaster.

Roumanian Air Post Inaugurated

Upon the occasion of the opening of an air-post line between Bucharest-Galatz–Jassy and Bucharest–Galatz–Kischenew on June 24 last, a special cachet was applied to first flight covers inscribed as under in three lines :—

"INAURUGAREA LINIEI AERIENNE,
BUCURESTI–GALATI–JASI (or CHISIWAU),
24 Junie, 1926."

Regular air-post stamps for use in this service are in preparation, and will be issued at an early date.

Air Mail for Chili

According to a correspondent of the *Air Plane Stamp News*, it was proposed to put an air mail service in operation in January last, radiating north and south from Santiago, and also from Valparaiso to Santiago, under the auspices of the Sociedad de Aeronavigacion Comercial. Passengers and freight were to be carried in addition to mails, and special air-post stamps issued.

More American First Flights

First flights over contract air mail routes in the U.S.A. were carried out on May 31 between Cheyenne (Wyo.) and Pueblo (Colo.), on June 7 from Chicago to the Twin Cities, on July 1 from Boston to New York, and on July 6 from Washington to Philadelphia. Regulation air-mail cachets were used in each instance, whilst for the inaugural flight to New York souvenir cards were prepared by the Boston Chamber of Commerce.

Air Stamps in Prospect

The extension of the air mail service is reflected in the number of new issues of air post stamps that are impending in different parts of the world. Both Norway and Finland have such issues in an advanced stage of preparation. Greece was recently provided with semi-official air stamps in denominations 2, 3, 5, and 10 drachmae for use in the Athens–Brindisi–Stamboul service ; Austria and Hungary are on the point of extending their present air post series, whilst Belgium is reported to have a similar series on the way. Consequently there should be no lack of novelties for the air-post collector for some time to come.

Costa Rican Aero Stamps

A recent addition to the world's air post stamps is a handsome vignette having from Costa Rica. The design shows an aeroplane in flight with the words "CORREO AEREO" inscribed thereon in conjunction with the national arms. Its denomination is 20 centimos and its colour blue.

First Portuguese Air Post

A SPECIAL air post flight from Lisbon to Tangier took place on September 18, 1926, under the auspices of the Latecoere Company. A special cancellation was provided for the occasion, in hexagon form, lettered CORREO AERIO, 18 Set. 26. Lat. 17°, and struck in black, which was afterwards destroyed. The mail was made up at the Rucio Railway Station P.O., Lisbon, on the night of September 17, and comprised in all 480 letters. It is reported, however, that a number disappeared *en route*, so that the actual number of flown covers available is somewhat less than that figure. This was the first official air post flight to take place in Portugal, and up to the time of writing is the only one recorded.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS.

THE following is the list of fixtures for 1927 :—

Date.	Place.	Cup, etc.	Competition.
April 9	Hendon ..	Gamage Cup ..	Duration Twin Pusher.
,, 23	Wimbledon ..	K.& M.A.A. Cup ..	Distance, Rubber Driven Fuselage.
May 7	Sudbury ..	Model Engineer Cup	Fuselage Glider
,, 21	Hendon ..	Pilcher Cup ..	Duration, Fuselage R.O.G. (Max. Span 6 ft.).
June 4	Wimbledon ..	Sir John Shelley Cup	Duration, Fuselage (Non-Rubber)
		FLIGHT Cup ..	Autogiro.
,, 18	Sudbury ..	Farman ..	Hand Launched Single Screw.
?	Hatton ..	Farrow Shield ..	(Date and Details later).
July 17	Dental Hospital S.M.A.E. Cup		Speed, Fuselage I sq. ft.R.O.G.
Aug. 6	Brockwell Park	Weston Cup ..	Rubber Driven Fuselage.
,, 13	Sudbury ..	Freshmen's ..	Open to Members of S.M.A.E. who did not win a prize in 1926. Any type.
,, 20	Wimbledon ..	Novices ..	Open to Non-Members. Any type.
,, 27	Stag Lane ..	Records ..	—
Sept. 10	Home Park ..	Lady Shelley Cup	Amphibian R.O.G.
,, 24	Sudbury ..	Model Engineer Cup No. 1.	Wing only.

PUBLICATIONS RECEIVED

Pocket Diary, 1927. G. Elias and Bro., Inc., Manufacturers of Timber, Lumber, Millwork and Boxes, Buffalo, N.Y., U.S.A.

Aluminium Data : Aluminium Sections and Matting. The British Aluminium Co., Ltd., Adelaide House, King William Street, London, E.C.4.

Revue Juridique Internationale de la Locomotion Aerienne, October, November, December, 1926. Per Orbem, 4, Rue Tronchet, Paris.

Aeronautical Research Committee Reports and Memoranda : No. 1047 (*Ae.* 233).—Model Tests of a Combined Slot and Aileron Control on a Wing of R.A.F. 15 Section, Push Forward Type of Auxiliary. By F. B. Bradfield and A. S. Hartshorn. May, 1926. Price 9*d.* net. *No.* 1048 (*Ae.* 234).—Slot and Aileron Control on a Wing of R.A.F. 31 Section with Various Types of Ailerons. By F. B. Bradfield and A. S. Hartshorn. May, 1926. Price 1*s.* net. *No.* 1052 (*Ae.* 237).—Full Scale and Model Measurements of Lift and Drag of Bristol Fighter with R.A.F. 30 Wings. By A. E. Woodward Nutt, R. G. Harris and L. E. Caygill. August, 1926. Price 6*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

NEW COMPANY REGISTERED

WESTERN AVIATION, LTD., Crescent Place, Cheltenham. Capital £1,000, in £1 shares. Manufacturers of and dealers in flying machines, aeroplanes, seaplanes or other aircraft or machines, etc. Directors, E. W. Jordan, J. Sheils.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations : Cyl. = cylinder ; i.c. = internal combustion ; m. = motor The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1925
Published March 31, 1927

30,846. H. LEITNER. Variable-pitch airscrews. (266,829.)

APPLIED FOR IN 1926
Published March 31, 1927

1,581. F. RANDALL. Aeroplanes. (266,867.)
3,443. BLACKBURN AEROPLANE AND MOTOR CO., LTD., and G. E. PETTY. Means for carrying windmill-driven accessories on aircraft. (266,884.)
11,528. F. H. ROYCE. Crankshafts. (266,938.)
11,761. H. J. POLLARD AND BRISTOL AEROPLANE CO., LTD. Connections for light structural components. (266,941.)