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HIGH EFFICIENCY OF SEAPLANES.

By

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In the January number of "Le Vie del Mare e dell' Aria" Engineer Luigi Acampora takes advantage of the last international seaplane contest, the victor of which was the Savoia "S12" built by the "Societa Idrovolanti Alta Italia" of Sesto Calende (Milan), to make some remarkable statements concerning seaplanes in general and this victor in particular. These statements seem worth repeating integrally in their essential parts.

There is a universal feeling that the efficiency of airplanes is greater than that of seaplanes, perhaps because of the greater head resistance offered by the hull and the necessity of a separate cockpit for the engine of the seaplane, while for airplanes it is usually installed in the fuselage. Pegna** and Magaldi, observes Acampora, have repeatedly, with ample technical arguments, demonstrated the inexactness of this opinion, by showing that the seaplane has little to covet from the terrestrial airplane. But here Acampora adds on his own authority that, by analyzing the effi-

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*Taken from "L'Aeronautica" Jan-Feb. 1921, pages 29-30.

**In acknowledging Acampora's friendly mention of myself, I wish to express the conviction I have held for some time that the maximum speeds of aircraft above a certain power, will be obtained by seaplanes.

ciency of the "S12", he was able to confirm its superiority over many terrestrial machines (of course among those of similar speed and load), even the newest and best. Of which fact the constructing firm can be justly proud, all the more because the S12 was projected by Conflenti at the end of 1917 as the result of designs submitted at that time to the Technical Military Administration.

The fame which preceded the seaplane of the S.I.A.I. at the international contest was therefore justified. And if the "Temps," "Auto", and "Echo des Sport" declared that France and England did not participate in the contest, because they had a slim chance of victory, this sincere declaration honored their sense of justice, as it honors the sacrifices of the oldest Italian seaplane factory and demonstrates that the eliminatory contests first take place on the designer's table, before being carried out in the skies.

The S12, in the recent publication of the Royal Naval Academy of Livorno (Magaldi, "Italian Seaplanes") was judged "perhaps the best seaplane yet constructed," to which L'Aeronautica rejoins that, from a synthetic and objective comparison, it is evident that the S12 has the indisputable endowments of superiority which entitle it, without any "perhaps," to the very first place among aircraft yet constructed.

Desiring to make an analysis of efficiency, L'Aeronautica had recourse to what had been established by a technical commission, after having already been the object of much discus-

sion in 1919, in connection with the rules for judging in an announcement of an important aviation contest, on which occasion it was decided to adopt, as the basis of the comparison, a "number of merit" or an "index of efficiency," concerning which there was an extended discussion as to the formula which would best express it. Professor Anastasi proposed

$$\text{Index of Efficiency} = \frac{Q\ D\ V}{C}$$

in which Q = commercial load, D = operating range, V = speed corresponding to D, C = weight of fuel and oil required for attaining the operating range D at the speed V. Other formulas more or less similar were proposed by other technicians and the commission finally decided to adopt the following

$$\text{Ir. (Index of efficiency)} = \frac{QD}{C}$$

in which Q = commercial load, D = operating range, and C = weight of fuel and oil necessary to attain the range D with normal load. This formula was published in the official proclamation of the contest.

It is therefore proper to use this formula, with the adoption, however, of the following regulations:

a) To classify aircraft of total minimum load of about 800 kg.

b) To determine a fixed operating range, corresponding to the mean radius of action adapted to the aircraft under investigation, namely 800 km.

c) To assume for all a total hourly consumption of 250g of fuel and oil per HP in order to avoid confusing the coefficient of the thermodynamic efficiency of the engine.

d) To consider that the crew consists of a single pilot weighing 75 kg.

e) To consider as the commercial load the remainder of the total load, after subtracting the weight of the pilot (75 kg) and of the fuel and oil consumed for a fixed range of 800 km.

We thus obtain the following table, whose data for calculating the index of efficiency are taken from the last official publication of the "Direzione Technica Aviazione" (Technical Aviation Administration) for January 1, 1920, and from other foreign documents.

The value, superior to all, of the index of efficiency of the S12, fully demonstrates our claims regarding its indisputable superiority and, in regard to the high efficiency of seaplanes, that the latter can not be held inferior, a priori, to terrestrial airplanes.

The author concludes his communication with the prediction that these facts will be considered on their merits by those on whom devolves the great responsibility and the great honor of guiding the fortunes of Italian aviation at this difficult time, and that they will favor the development of seaplanes, as is rendered desirable by the geographic configuration and location of Italy, in the interest of its commercial expansion and maritime power.

Translated by the National Advisory Committee for Aeronautics.

TABLE.

MAKE AND TYPE	Kind and Nationality of aircraft	ENGINES: Number and type.	ENGINES: Power: Unit	ENGINES: Power: Total	Speed, km/hr.	Hours to fly 800 km.	Fuel and oil consumed per hr. (kg.)	Total load - kg.	Kg. fuel for D = 800	Fuel and weight of pilot (75 kg.)	Com. or Mil. load. kg.	Index of efficiency.	Remarks.
Caproni Ca 3	Airplane Italian	3 I. F. V.4b	150	450	142	5.6	112.5	1000	630	705	295	374.6	
Caproni Ca 5	Ditto	3 I. F. V 6	250	750	142	5.6	187.5	1800	1050	1125	675	514.2	
Fiat Br.	Ditto	1 Fiat A 14	700	700	253	3.1	175.0	1000	542	617	383	569.0	
H. 16.A	Seaplane American	2 Liberty	330	660	150	5.3	165.0	1500	874	949	551	504.3	
Handley P Wasp. 8	Airplane English	2 Napier Lion	450	900	180	4.4	225.0	1450	900	1065	385	311.1	Last Olympic exhibition of London.
I. A. M. R. 1 bis	Seaplane Italian	3 I. F. V 6	250	750	160	5.0	187.5	1500	937	1012	488	416.6	
Macchi M 12	Ditto	1 Ansaldo 4 E	450	450	180	4.4	112.5	810	495	570	240	387.8	In practice the fuel is less & hence the Ir is still greater in the S 12
Savoia S. 12	Ditto	1 Ansaldo 4 E	450	450	214	3.7	112.5	800	416	491	309	594.2	