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Summary.—In this report the results are given of an investigation, without the application of suction, into the lift, drag and pitching moment of an aerofoil of 31·5 per cent thickness/chord ratio designed specifically for use with a single suction slot at 0·69*c* from the leading edge.

The object of the tests was primarily the estimation of the behaviour of the wing at high Reynolds numbers in the event of the failure of the suction, but it was also hoped to obtain information concerning some reasonable method of countering any serious effects that might arise.

Consequently, the tail of the aerofoil was hinged to form an unslotted main flap and fitted with a detachable split flap. Tests were also made with a slotted main flap. The Reynolds number range extended from $0·3 \times 10^6$ to $7·3 \times 10^6$.

Critical regions were observed and the scale effects were found to be large.

The influence of the flaps was generally more or less normal, although the increase in $C_{L\,max.}$ was less than half that for a conventional aerofoil of similar thickness/chord ratio, the NACA 0030. At $R = 7·25 \times 10^6$ without flaps, $C_{L\,max.}$ for the Glas II was 1·21 compared with 0·7 for the NACA 0030. A 15 per cent split flap at 90 deg on the latter increased $C_{L\,max.}$ to 2·2 whereas the values for the Glas II only reached 1·71 with a similar split flap and 1·64 with a main flap angle of 40 deg.

The effect of the slot between the main flap and the forward portion of the wing was found to be comparatively small.

Introduction.—The tests described in this report were carried out in order to estimate the behaviour, at high Reynolds numbers, of a wing specifically designed for use with a single suction slot in the event of the failure of suction. Some previous observations in respect of this particular wing shape without suction had been made in the 13 × 9 ft wind tunnel at the National Physical Laboratory at a Reynolds number of one million, but no information as to scale effect was available.

The investigation in the Compressed Air Tunnel was extended to the examination of the effect of main, split and slotted flaps in the hope of obtaining information relating to some reasonable method of countering any serious effects that might arise.

Glas II Wing.—The particular shape of wing section chosen for these experiments is known as the Glas II and has been described in R. & M. 2111[2]. The main theoretical characteristics are as follows :—

Thickness 31·5 per cent,

C_L range 0 to 2·0,

Position of suction slot 0·691*c* from leading edge,

Aerodynamic centre 0·3077*c* from leading edge.

An outline of the section is given in Fig. 1, in which is indicated the arrangement of the main flap in its two positions (0 deg and 40 deg) and of the split flap at 90 deg to the main flap. In the first three series of tests there was no air gap at all between the main flap and the rest of the wing.

The slot connecting the upper and lower surfaces and thereby converting the unslotted main flap into a slotted flap was formed by, cutting away some of the main bulk of the wing, and is shown by the appropriate dotted lines in the same figure. The flap was suitably built up in each of its two positions by the packing piece A which, of course, maintained the same position in each case with respect to the forward portion of the aerofoil.

The span of the wing was 4 ft and the chord 8 in (aspect ratio 6). It was made of mahogany (except for the metal flaps) and Phenoglazed, and was the first of the wooden models tested in the Compressed Air Tunnel to be completely free from blistering of the surface after repeated subjection to a pressure of 350 lb/in.

Range of Tests.—The Reynolds number range extended from $0{\cdot}3 \times 10^6$ to $7{\cdot}3 \times 10^6$ with pressures up to 25·5 atmospheres and wind speeds up to 78·3 ft/sec.

Observations of lift, drag and pitching moment over this range and from low angles of incidence to angles well above the stall covered the five cases as follows :—

(*a*) Unslotted Main Flap at 0 deg (Wing shape as designed)
(*b*) ,, ,, ,, ,, 40 deg. No split flap
(*c*) ,, ,, ,, ,, 0 deg. Split flap at 90 deg
(*d*) Slotted Main Flap at 0 deg. No split flap
(*e*) ,, ,, ,, ,, 40 deg. No split flap.

Results.—Tables.—Tables are given of values of the usual parameters and coefficients α, α_0, C_L, C_D, C_{D0} and of the moment coefficient C_M about the quarter-chord line.

In the calculations the following standard relations were used :—

$$\alpha_0 = \alpha - 3{\cdot}54\ C_L$$

$$\text{Induced drag coefficient} = 0{\cdot}0555\ C_L^2.$$

The observed values of the drag and profile drag coefficients were corrected for the horizontal force resulting from the variation of static pressure along the axis of the tunnel. This force may become appreciable with thick wings and in these tests acted in opposition to the drag force, the correction amounting to 0·001.

Figures.—The results for the normal wing shape as originally designed (case a) are plotted in Figs. 2, 4, 5 and 6. The inserts in Fig. 2 illustrate the movement of the lift curves at low lift coefficients and the variation of the angle of maximum lift with Reynolds number, while in Fig. 4 the change in the value of $C_{D\ min}$ over the range is indicated. Fig. 3 is a comparison of the lift with the results of experiments in the 13 × 9 ft tunnel.

Figs. 7 and 9 give the curves of C_L against α_0 and C_M against C_L for the highest Reynolds number of all the five series of tests.

Fig. 8 demonstrates the variation of $C_{L\ max.}$ with Reynolds number and also show for comparison the $C_{L\ max.}$ curves for the NACA 0030 aerofoil with and without a split flap.[2]

Discussion of Results.—Lift Curves—General.—The scale effect on the C_L curves is considerable and Fig. 2 is fairly typical of all the variations examined. The changes affect not only $C_{L\ max.}$ but also the incidence at maximum lift and the incidence at any specified value of C_L below the stall.

Lift Curves.—$C_{L\ max.}$—Except for the fifth series of tests (case e) there is a tendency for a minimum value of $C_{L\ max.}$ to occur between the two extremities of the range of Reynolds number (Fig. 8). With the slotted main flap set at 40 deg however (case e) $C_{L\ max.}$ appears to settle down to a fairly constant value at the higher end of the range. In the case of the unslotted main flap at 40 deg there was evidence of a double regime between values of R of roughly $0{\cdot}4 \times 10^6$ and 3×10^6 (Fig. 8).

The increase in $C_{L\,\text{max.}}$ produced by setting either the unslotted or the slotted main flap to 40 deg or by fitting the split flap was roughly 0·5. The curves for an NACA 0030 wing with and without a split flap have been plotted in Fig. 8 for comparison[2] and it will be noticed that although the unflapped Glas II gives and appreciably greater lift than the NACA 0030, which is approximately of the same thickness/chord ratio, the gain of lift resulting from the incorporation of flaps is less than half that for the more conventional section.

The split flap appears to be slightly better than the others and at the highest Reynolds numbers the slotted main flap with a flap angle of 40 deg is the least effective (Figs. 7 and 8). It is interesting to note that, at zero flap angle, the effect on $C_{L\,\text{max.}}$ of slotting the main flap is negligible except for a slight indication of some loss of maximum lift at the top end of the range.

Lift Curves.—Incidence at $C_{L\,\text{max.}}$—The movement of the angle of incidence at maximum lift is rather interesting and the value of α_0 at $C_{L\,\text{max.}}$ for the normal wing shape has been plotted in Fig. 2. Here we have two fairly stable ranges with respect to Reynolds number with a critical region at $R = 0{\cdot}9 \times 10^6$ between them. The curve for the slotted main flap at zero flap angle is somewhat similar.

The corresponding values of α_0 with the unslotted main flap at 40 deg do not change much except for a region of uncertainty at about $R = 1{\cdot}5 \times 10^6$. The slotted main flap at 40 deg however, gives a sharp critical change at $R = 2{\cdot}5 \times 10^6$ while the curve for the split flap rises continuously except for a pronounced dip in the region of $R = 0{\cdot}8 \times 10^6$.

Generally speaking there appear to be two fairly stable ranges of α_0 at $C_{L\,\text{max.}}$ with a more or less critical region between them, the greatest incidence of the peaks of the lift curves occurring at the highest Reynolds humber.

Just above the critical regions referred to the curves of C_L against α_0 tend to be very flat-topped.

Lift Curves.—Below the Stall.—With increasing Reynolds number there is generally speaking a shift of the lower part of the lift curve, firstly in the direction of the lower values of α_0 and then reversing. The variation of α_0 at $C_L = 0$ for the normal wing shape has been plotted on Fig. 2.

The corresponding curves for the other series of tests show a minimum value of α_0 (at a selected value of C_L) somewhere in the range of $R = 1{\cdot}0 \times 10^6$ to $1{\cdot}5 \times 10^6$.

The curve for the unslotted main flap at 0 deg is much like that in Fig. 2, but when this flap is set at 40 deg the first part of the curve continues below 0 deg and does not recover appreciably from a minimum of 3 deg (selected value of $C_L = 1{\cdot}0$). That for the slotted main flap at 0 deg falls to a minimum of 7 deg ($C_L = 1{\cdot}0$) and then rises progressively. With the split flap ($C_L = 1{\cdot}25$) there is a sharp increase at $R = 1{\cdot}5 \times 10^6$ to 2×10^6 after which the curve flattens out.

In all cases the lower part of the lift curve settles down or tends to settle down at the higher Reynolds numbers, but at the low end of the range the movement of all the curves is very rapid, as in Fig. 2.

Comparison with Tests in 13×9 *ft Tunnel.*—The curve of C_L previously obtained by pressure plotting in the 13 × 9 ft wind tunnel is shown in Fig. 3 and points obtained at adjacent Reynolds numbers ($0{\cdot}75 \times 10^6$ and $1{\cdot}21 \times 10^6$) in the C.A.T. are superimposed.

Agreement is excellent except in the region of maximum lift where the latter results are seen to be appreciably lower.

The turbulence of the 13 × 9 ft tunnel is much lower than that in the C.A.T., so that from some points of view the maximum lift in the latter might be expected to be the greater.

There is not sufficient evidence available to justify any comments on the differences between the two curves at high angles of incidence.

Drag Curves.—The curves of profile-drag coefficient against C_L for the normal wing shape are plotted in Fig. 4 and the approximate values of $C_{D\,\min.}$ at various Reynolds numbers are also indicated.

The latter shows the usual rapid decrease of $C_{D\,\min.}$ for values of R increasing to about $1{\cdot}5 \times 10^6$ followed by a very slight increase. The values for case d (slotted main flap at 0 deg) vary in a similar manner but are slightly greater in magnitude.

At higher angles of incidence the variation of C_D with Reynolds number was slight in each case, and this also applies to the three sets of flapped wing tests.

The conversion of the main flap at 0 deg into a slotted main flap at the same setting results in a slight general increase in C_{D0} although the curves are otherwise much the same as in Fig. 4. The variations of C_{D0} with Reynolds number are considerable.

Pitching-moment Curves.—The variation of C_M (about the quarter-chord line) over the range of tests was found to be very large, and Figs. 5 and 6 for the normal wing are also typical of the case of the slotted main flap at 0 deg. Because of the large variations of C_M with R below the stall and because of the disappearance of the loop in the region of maximum lift at an intermediate point in the range, it has been convenient to plot the curves on two separate figures.

The pitching moment appears to become nearly independent of Reynolds number above values of the latter of $3{\cdot}6 \times 10^6$ for the normal wing, $2{\cdot}1 \times 10^6$ for the wing with the unslotted main flap at 40 deg and also when fitted with a split flap and $5{\cdot}0 \times 10^6$ for the slotted main flap at zero flap angle. There is, however, no sign of the curve for the case of the slotted main flap at 40 deg having reached a stable condition even at $R = 7{\cdot}3 \times 10^6$.

The C_M curves at the highest values of Reynolds number have been plotted in Fig. 9.

Conclusions.—The scale effects observed in the course of the above investigations were found to be very large and in many cases the changes in the various functions showed critical regions of Reynolds number. Generally speaking, however, the curves tended to show that fairly stable conditions had been reached at the highest Reynolds numbers of the tests, although $C_{L\,\max.}$ for the unmodified wing was still rising at $R = 7{\cdot}2 \times 10^6$.

At this Reynolds number the minimum drag coefficient C_D was found to be about 0·06.

The gain of maximum lift resulting from the use of main and split flaps was roughly 0·5 on C_L, and has been shown to be less than half of the gain achieved on an NACA 0030 wing by the use of a similar split flap.

The effect of slotting the main flap as described was found to be comparatively small and rather detrimental than otherwise.

APPENDIX

Note on the Effect of the New Honeycomb Straightener on the Flow in the C.A.T.

These experiments were carried out after the new honeycomb had been installed. This is made up of alternate flat and corrugated strips 2-in wide, the cells being approximately triangular with a height of $\frac{1}{4}$-in on a $\frac{1}{2}$-in base. The previous honeycomb had $2\frac{5}{8}$-in square cells 21-in long.

APPENDIX—*continued.*

Repeat observations have been made on NACA 0012, NACA 23021, NACA 66—2—215, Piercey 12 per cent and EQH 1250/1050. Except for the first two of these the Reynolds number for minimum drag increased from roughly $1\frac{1}{4}$ millions to about $2\frac{1}{4}$ millions. For the conventional aerofoils NACA 0012 and 23021 there was no appreciable change and in all cases the effect on $C_{L\,max.}$ was insignificant.

The critical Reynolds numbers of 6-in, 1·5-in and 0·75-in spheres were also investigated for comparison with the values given in R. & M. 1832. The 6-in sphere at pressures up to 2·5 atmospheres gave a critical value of $3{\cdot}05 \times 10^5$ against the previous value of $2{\cdot}25 \times 10^5$. For the 1·5-in spheres at 9 atmospheres the increase was from $2{\cdot}85 \times 10^5$ to $2{\cdot}95 \times 10^5$, but the 0·75-in sphere at 11 and 16 atmospheres pressure indicated no change.

It was found, however, that under the new conditions the shapes of the curves relating the pressure at the back of the sphere to the Reynolds number were similar in the axial and in the 12-in offset positions, whereas they had previously been noticeably different.

The general conclusion is that the new honeycomb has resulted in a slight reduction of turbulence and improved the uniformity of the turbulence across the jet, but the evidence at the highest Reynolds numbers obtainable (25 atmospheres pressure) is inconclusive.

A report giving more detailed information will be issued in due course.

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2	D. H. Williams, A. H. Bell and W. G. Raymer	Test on a 20 per cent Piercey Aerofoil and on NACA 0030 with and without Flaps in the C.A.T. A.R.C. 4511. (To be published).
3	A. Fage and D. H. Williams	Critical Reynolds Numbers of Spheres in the Compressed Air Tunnel. R. & M. 1832. (1938).

TABLE 1

Unslotted Main Flap at 0 deg

C_M is the pitching-moment coefficient about the quarter-chord line.

P = 1·005 atmos. V = 72·5 ft/sec ρV^2 = 12·09 lb/sq ft R = 0·291 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−4·4	−0·683	0·117	0·091	0·0247	−2·0
−0·55	−0·478	0·105	0·092	0·0234	+1·15
+3·15	−0·259	0·104	0·100	0·0200	4·15
7·0	−0·050	0·110	0·110	0·0147	7·2
10·65	+0·185	0·122	0·120	0·0052	9·0
14·25	0·596	0·133	0·113	−0·0246	12·15
16·55	0·917	0·127	0·081	−0·0402	13·3
19·0	1·135	0·149	0·077	−0·0530	15·0
21·5	1·23	0·176	0·092	−0·0538	17·15
24·15	1·205	0·216	0·135	−0·0487	19·9
26·9	1·095	0·253	0·186	−0·0420	23·0
29·5	1·08	0·303	0·238	−0·0533	25·7
32·25	1·03	0·340	0·280	−0·0569	28·6

P = 1·68 atmos. V = 58·7 ft/sec ρV^2 = 13·55 lb/sq ft R = 0·406 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−4·4	−0·679	0·113	0·087	0·0235	−2·0
−3·1	−0·599	0·105	0·085	0·0207	−1·0
−1·85	−0·510	0·0965	0·082	0·0167	−0·05
−0·6	−0·410	0·0925	0·0835	0·0119	+0·85
+0·6	−0·302	0·090	0·085	0·0043	1·65
3·05	−0·060	0·0905	0·0905	−0·0142	3·25
6·8	+0·250	0·0925	0·089	−0·0300	5·9
10·45	0·522	0·091	0·074	−0·0369	8·5
14·05	0·867	0·108	0·066	−0·0503	11·5
16·45	1·045	0·130	0·069	−0·0580	12·75
18·95	1·175	0·154	0·0775	−0·0599	14·8
20·25	1·22	0·171	0·0885	0·0611	15·95
21·5	1·235	0·188	0·104	−0·0591	17·1
22·85	1·215	0·207	0·125	−0·0544	18·55
24·15	1·215	0·227	0·145	−0·0550	19·85
25·55	1·15	0·244	0·170	−0·0475	21·5
28·2	1·10	0·298	0·231	−0·0547	24·3

P = 2·28 atmos V = 60·1 ft/sec ρV^2 = 19·15 lb/sq ft R = 0·559 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−4·45	−0·577	0·103	0·0845	+0·0020	−2·4
−0·8	−0·169	0·099	0·083	−0·0396	−0·2
+2·9	+0·153	0·102	0·089	−0·0583	+2·35
6·7	0·401	0·0915	0·0825	−0·0545	5·3
10·35	0·654	0·0905	0·0665	−0·0539	8·15
14·0	0·933	0·118	0·0705	−0·0655	10·7
16·45	1·045	0·138	0·0775	−0·0655	12·75
18·95	1·171	0·17	0·095	−0·0646	14·8
20·25	1·175	0·187	0·110	−0·0635	16·1
21·55	1·175	0·199	0·123	−0·0553	17·4
22·85	1·175	0·212	0·136	−0·0505	18·7
24·15	1·165	0·227	0·152	−0·0480	20·05
25·6	1·105	0·246	0·178	−0·0458	21·7
28·2	1·10	0·290	0·223	−0·0553	24·3

P = 2·97 atmos V = 63·7 ft/sec ρV^2 = 27·65 lb/sq ft R = 0·754 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
0·4	−0·018	0·0805	0·0805	−0·0487	0·45
1·7	+0·072	0·0795	0·0795	−0·0511	1·45
2·9	0·159	0·0785	0·078	−0·0518	2·35
4·15	0·252	0·0795	0·076	−0·0540	3·25
6·65	0·428	0·0815	0·0715	−0·0558	5·15
9·15	0·600	0·088	0·0675	−0·0579	7·05
11·6	0·775	0·104	0·0705	−0·0649	8·85
14·0	0·94	0·124	0·075	−0·0702	10·7
16·45	1·05	0·146	0·0845	−0·0682	12·75
19·0	1·145	0·172	0·100	−0·0678	15·0
20·25	1·16	0·187	0·112	−0·0629	16·15
21·55	1·155	0·196	0·122	−0·0542	17·45
22·85	1·15	0·213	0·140	−0·0521	18·8
24·2	1·11	0·227	0·159	−0·0470	20·3
26·9	1·08	0·276	0·211	−0·0519	23·1
29·55	1·06	0·310	0·248	−0·0547	26·3

Conversion factor, British to Metric system. 1 Lb/sq ft = 4·882 4 Kg/m. Multiply the British quantity by the conversion factor.

TABLE 1—*continued*.

P = 4·28 atmos. V = 70·75 ft/sec			ρV^2 = 49·15 lb/sq ft R = 1·21 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
−0·85	−0·117	0·049	0·048	−0·0478	−0·45
+0·35	−0·025	0·050	0·050	−0·0493	+0·45
1·65	+0·075	0·053	0·0495	−0·0520	1·4
2·85	0·167	0·0555	0·054	−0·0535	2·25
4·1	0·262	0·060	0·056	−0·0551	3·15
6·6	0·437	0·074	0·0635	−0·0622	5·05
9·1	0·584	0·092	0·073	−0·0684	7·05
9·1	0·625	0·095	0·0735		6·9
11·55	0·725	0·111	0·082	−0·0721	9·0
11·55	0·741	0·111	0·0805		8·95
14·0	0·864	0·141	0·099	−0·0777	10·95
14·0	0·883	0·141	0·098		10·9
16·45	0·974	0·162	0·109	−0·0708	13·0
19·0	1·065	0·181	0·118	−0·0610	15·25
20·3	1·065	0·184	0·121	−0·0486	16·55
21·6	1·065	0·193	0·130	−0·0436	17·85
22·85	1·075	0·221	0·167	−0·0430	19·05
24·2	1·06	0·229	0·166	−0·0434	20·45
25·45	1·095	0·254	0·187	−0·0496	22·05
26·85	1·105	0·274	0·207	−0·0514	23·45
28·1	1·10	0·289	0·222	−0·0530	24·7
29·45	1·09	0·308	0·243	−0·0553	26·1
32·2	1·01	0·344	0·287	−0·0607	28·6

P = 7·85 atmos. V = 67·9 ft/sec			ρV^2 = 82·0 lb/sq ft R = 2·09 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
−0·85	−0·162	0·0495	0·498	−0·0624	−0·3
+0·4	−0·070	0·054	0·0535	−0·0595	+0·65
1·7	−0·003	0·0585	0·0585	−0·0606	1·7
2·9	+0·101	0·062	0·0615	−0·0601	2·55
4·1	0·218	0·067	0·0645	−0·0603	3·35
6·65	0·357	0·0785	0·0715	−0·0569	5·4
9·2	0·450	0·095	0·0835	−0·0561	7·6
11·65	0·622	0·108	0·0865	−0·0532	9·45
14·1	0·754	0·131	0·100	−0·0521	11·4
16·55	0·833	0·145	0·107	−0·0410	13·6
19·1	0·914	0·159	0·113	−0·0322	15·85
20·35	0·947	0·169	0·119	−0·0299	17·0
21·65	0·978	0·185	0·132	−0·0326	18·2
22·9	1·015	0·211	0·144	−0·0375	19·3
24·2	1·07	0·235	0·172	−0·0450	20·4
25·5	1·095	0·251	0·185	−0·0485	21·65
26·95	1·105	0·269	0·201	−0·0521	23·05
28·15	1·115	0·288	0·219	−0·0530	24·25
29·45	1·09	0·305	0·239	−0·0555	25·6
32·2	1·03	0·350	0·291	−0·0633	28·55

TABLE 1—*continued.*

P = 9·46 atmos. V = 59·9 ft/sec			ρV^2 = 76·75 lb/sq ft R = 2·22 × 10^6			P = 10·3 atmos. V = 61·9 ft/sec			ρV^2 = 98·4 lb/sq ft R = 2·75 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0	α	C_L	C_D	C_{D0}	C_M	α_0
0·35	−0·022	0·0505	0·0505	−0·0417	0·45	0·45	−0·149	0·0485	0·047	−0·0252	1·0
0·35	−0·036	0·0565	0·0565	−0·0504	0·45	0·45	−0·158			−0·0307	1·0
1·65	+0·045	0·058	0·058	−0·0396	1·5	1·75	−0·061	0·045	0·045	−0·0264	2·0
1·65	0·061	0·067	0·067	−0·0514	1·45	1·75	−0·076	0·053	0·0525	−0·0361	2·0
2·85	0·128	0·0545	0·0535	−0·0388	2·4	2·95	+0·008	0·0505	0·0505	−0·0314	2·9
2·85	0·133	0·057	0·056	−0·0421	2·4	2·95	0·016	0·0545	0·0545	−0·0361	2·9
4·1	0·222	0·0715	0·069	−0·0531	3·3	4·2	0·096	0·0585	0·058	−0·0355	3·85
4·1	0·228	0·075	0·072	−0·0572	3·3	4·2	0·109	0·065	0·0645	−0·0438	3·8
6·65	0·403	0·0845	0·0755	−0·0637	5·25	6·75	0·239	0·069	0·0655	−0·0360	5·9
6·65	0·407	0·083	0·074	−0·0664	5·25	6·75	0·261	0·080	0·0765	−0·0497	5·85
9·15	0·553	0·100	0·083	−0·0663	7·2	9·25	0·399	0·085	0·076	−0·0322	7·85
11·6	0·675	0·118	0·098	−0·0588	9·2	9·25	0·400	0·090	0·081	−0·0385	7·85
14·1	0·748	0·126	0·095	−0·0454	11·45	11·7	0·539	0·105	0·089	−0·0358	9·8
16·55	0·848	0·144	0·104	−0·0452	13·55	11·7	0·548	0·110	0·093	−0·0416	9·75
19·1	0·925	0·157	0·109	−0·0320	15·85	14·15	0·672	0·115	0·089	−0·0274	11·8
21·65	0·994	0·181	0·126	−0·0337	18·15	14·15	0·691	0·119	0·093	−0·0330	11·7
24·2	1·07	0·234	0·170	−0·0457	20·4	16·55	0·792	0·140	0·105	−0·0336	13·75
25·5	1·09	0·251	0·185	−0·0486	21·65	19·1	0·886	0·154	0·110	−0·0267	15·95
26·85	1·105	0·269	0·201	−0·0504	22·95	21·7	0·972	0·189	0·137	−0·0333	18·25
28·15	1·115	0·286	0·217	−0·0527	24·2	24·2	1·055	0·231	0·169	−0·0442	20·45
29·45	1·11	0·303	0·234	−0·0561	25·5	25·5	1·085	0·248	0·183	−0·0467	21·65
30·8	1·08	0·327	0·262	−0·0585	27·0	26·85	1·11	0·266	0·198	−0·0487	22·95
						28·15	1·115	0·286	0·217	−0·0523	24·2
						29·45	1·11	0·303	0·235	−0·0551	25·55
						30·8	1·09	0·327	0·261	−0·0606	26·95
						32·2	1·04	0·348	0·287	−0·0644	28·5

TABLE 1—*continued.*

P = 12·85 atmos. ρV^2 = 150·6 lb/sq ft
V = 71·9 ft/sec R = 3·62 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
0.5	−0.220	0.0545	0.0515	−0.0002	1.3
1·8	−0·139	0·056	0·055	−0·0013	2·3
3·0	−0·060	0·057	0·0565	−0·0038	3·2
4·25	+0·019	0·059	0·059	−0·0046	4·2
6·8	0·167	0·0655	0·064	−0·0058	6·2
9·3	0·316	0·078	0·0725	−0·0089	8·2
11·75	0·456	0·089	0·0775	−0·0107	10·15
14·2	0·601	0·105	0·0855	−0·0132	12·1
16·6	0·728	0·125	0·0955	−0·0169	14·0
19·1	0·852	0·157	0·117	−0·0272	16·1
21·6	0·961	0·191	0·140	−0·0331	18·2
24·2	1·05	0·226	0·165	−0·0419	20·5
25·5	1·095	0·245	0·178	−0·0453	21·6
26·85	1·13	0·264	0·193	−0·0496	22·85
28·15	1·145	0·284	0·211	−0·0533	24·1
29·45	1·145	0·305	0·232	−0·0578	25·4
30·8	1·12	0·324	0·254	−0·0618	26·85
32·15	1·08	0·348	0·283	−0·0675	28·35

P = 17·55 Atmos. ρV^2 = 188·6 lb/sq ft
V = 69·2 ft/sec R = 4·67 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−0.75	−0.288	0.0565	0.052	−0.0001	0.25
+0·5	−0·215	0·055	0·0525	−0·0004	1·25
1·8	−0·138	0·0565	0·0555	−0·0016	2·3
3·0	−0·058	0·058	0·058	−0·0024	3·2
4·25	+0·018	0·063	0·063	−0·0032	4·2
6·8	0·171	0·0705	0·069	−0·0059	6·2
9·3	0·318	0·079	0·0735	−0·0079	8·2
11·75	0·456	0·094	0·0825	−0·0118	10·15
14·25	0·608	0·110	0·089	−0·0155	12·1
16·65	0·736	0·130	0·100	−0·0190	14·05
19·15	0·868	0·156	0·114	−0·0257	16·05
21·7	0·978	0·189	0·136	−0·0331	18·25
24·25	1·06	0·220	0·158	−0·0400	20·5
25·55	1·11	0·241	0·173	−0·0456	21·6
26·9	1·14	0·258	0·186	−0·0491	22·85
28·1	1·155	0·278	0·204	−0·0542	24·0
29·4	1·16	0·298	0·223	−0·0567	25·3
30·75	1·15	0·319	0·245	−0·0631	26·65
32·15	1·11	0·344	0·276	−0·0678	28·25
33·55	1·06	0·369	0·307	−0·0730	29·8

P = 24·7 Atmos. ρV^2 = 323 lb /sq ft
V = 76·7 ft/sec R = 7·21 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
1.8	−0.137	0.058	0.057	−0.0012	2.3
3·0	−0·071	0·061	0·061	−0·0021	3·25
4·25	+0·022	0·063	0·063	−0·0035	4·15
5·5	0·099	0·067	0·062	−0·0045	5·15
6·8	0·176	0·073	0·071	−0·0058	6·2
9·3	0·331	0·083	0·077	−0·0099	8·15
11·75	0·482	0·096	0·083	−0·0135	10·05
14·2	0·624	0·113	0·091	−0·0168	12·0
16·6	0·770	0·135	0·102	−0·0231	13·9
19·1	0·891	0·158	0·114	−0·0278	15·95
21·6	1·005	0·182	0·126	−0·0343	18·05
24·2	1·10	0·221	0·154	−0·0420	20·3
26·8	1·175	0·258	0·181	−0·0514	22·65
28·1	1·20	0·278	0·198	−0·0572	23·85
29·4	1·21	0·301	0·220	−0·0623	25·1
30·75	1·18	0·327	0·250	−0·0679	26·6
32·1	1·15	0·358	0·284	−0·0740	28·0
33·55	1·09	0·379	0·312	−0·0791	29·65

TABLE 2

Unslotted Main Flap at 40 deg

C_M is the pitching-moment coefficient about the quarter-chord line.

P = 1.0 atmos. V = 72.3 ft/sec; ρV^2 = 12.09 lb/sq ft R = 0.292 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.25	0.483	0.263	0.250	−0.206	−2.95
+1.35	0.588	0.273	0.254	−0.198	−0.75
3.85	0.698	0.288	0.261	−0.195	+1.35
6.4	0.812	0.297	0.260	−0.193	3.55
8.9	0.981	0.322	0.269	−0.198	5.45
11.3	1.215	0.347	0.265	−0.216	7.0
13.65	1.47	0.360	0.240	−0.233	8.45
14.85	1.59	0.368	0.228	−0.237	9.25
16.0	1.68	0.384	0.227	−0.241	10.1
17.2	1.75	0.401	0.231	−0.243	11.0
18.6	1.735	0.418	0.251	−0.236	12.5
19.9	1.68	0.445	0.288	−0.232	14.0
21.3	1.585	0.459	0.320	−0.216	15.7
22.65	1.50	0.483	0.358	−0.208	17.35
25.35	1.42	0.520	0.407	−0.199	20.3

P = 1.70 atmos. V = 58.4 ft/sec; ρV^2 = 13.56 lb/sq ft R = 0.406 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.3	0.569	0.242	0.224	−0.213	−3.3
+1.2	0.786	0.272	0.238	−0.228	−1.6
3.65	0.991	0.297		−0.241	+0.15
5.95	1.17	0.330	0.254	−0.251	1.8
8.65	1.305	0.344	0.249	−0.251	4.05
11.1	1.445	0.345	0.230	−0.245	6.0
13.55	1.605	0.369	0.227	−0.250	7.85
14.75	1.675	0.383	0.227	−0.251	8.85
16.05	1.72	0.397	0.233	−0.250	9.95
17.2	1.755	0.409	0.238	−0.246	11.0
18.6	1.735	0.432	0.265	−0.239	12.45
19.9	1.68	0.455	0.298	−0.233	13.95
21.3	1.575	0.466	0.329	−0.219	15.7
22.65	1.50	0.488	0.363	−0.210	17.35

P = 2.26 atmos. V = 60.4 ft/sec; ρV^2 = 19.18 lb/sq ft R = 0.558 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.4	0.737	0.257	0.227	−0.244	−4.0
+1.1	0.945	0.290	0.240	−0.261	−2.25
3.55	1.11	0.311	0.242	−0.265	−0.35
6.1	1.235	0.325	0.240	−0.260	+1.7
8.65	1.345	0.336	0.235	−0.255	3.9
11.1	1.455	0.350	0.233	−0.251	5.95
13.6	1.54	0.365	0.233	−0.246	8.2
14.85	1.585	0.373	0.235	−0.246	9.25
16.05	1.60	0.387	0.245	−0.239	10.4
17.3	1.60	0.406	0.264	−0.234	11.65
18.7	1.585	0.425	0.286	−0.223	13.1
20.0	1.555	0.453	0.319	−0.218	14.5
20.75	1.52	0.481	0.354	−0.217	15.4
22.15	1.49	0.499	0.376	−0.212	16.9

P = 3.04 atmos. V = 62.8 ft/sec; ρV^2 = 27.6 lb/sq ft R = 0.77 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.5	0.842	0.259	0.220	−0.267	−4.45
+1.0	1.01	0.277	0.221	−0.271	−2.55
3.45	1.16	0.301	0.226	−0.272	−0.65
6.05	1.295	0.319	0.226	−0.274	+1.45
8.55	1.44	0.332	0.217	−0.270	3.45
11.0	1.565	0.351	0.215	−0.270	5.5
13.45	1.67	0.386	0.231	−0.267	7.55
14.7	1.69	0.400	0.241	−0.260	8.7
15.95	1.70	0.409	0.249	−0.253	9.95
17.25	1.69	0.426	0.267	−0.243	11.25
18.6	1.67	0.454	0.300	−0.240	12.7
20.0	1.59	0.479	0.339	−0.232	14.4
21.3	1.545	0.499	0.366	−0.226	15.85
22.65	1.51	0.504	0.377	−0.214	17.3

P = 4.42 atmos. V = 69.55 ft/sec; ρV^2 = 49.15 lb/sq ft R = 1.23 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.6	0.778	0.206	0.174	−0.246	−4.35
+1.05	0.916	0.224	0.177	−0.246	−2.2
3.5	1.035	0.249	0.189	−0.242	−0.15
6.15	1.155	0.274	0.200	−0.237	+2.05
8.6	1.265	0.308	0.220	−0.242	4.15
11.0	1.385	0.344	0.238	−0.247	6.15
13.6	1.455	0.372	0.255	−0.244	8.5
14.85	1.50	0.388	0.264	−0.246	9.5
16.05	1.525	0.406	0.277	−0.238	10.65
17.3	1.535	0.429	0.299	−0.240	11.75
18.65	1.53	0.447	0.317	−0.229	13.25
19.95	1.51	0.462	0.336	−0.223	14.6
21.25	1.51	0.474	0.347	−0.217	15.9
22.55	1.49	0.485	0.362	−0.214	17.3
25.25	1.47	0.526	0.407	−0.213	20.05

P = 5.73 atmos. V = 68.5 ft/sec; ρV^2 = 62.2 lb/sq ft R = 1.59 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1.65	0.908	0.226	0.180	−0.274	−4.85
+0.9	1.055	0.235	0.173	−0.273	−2.35
3.35	1.21	0.257	0.176	−0.273	−0.95
5.9	1.325	0.286	0.189	−0.276	+1.2
8.45	1.445	0.307	0.191	−0.276	3.35
10.95	1.565	0.349	0.213	−0.273	5.4
13.45	1.61	0.382	0.238	−0.270	7.75
14.7	1.62	0.398	0.252	−0.257	9.0
15.95	1.61	0.418	0.274	−0.249	10.25
17.25	1.585	0.438	0.298	−0.241	11.65
18.6	1.555	0.455	0.321	−0.232	13.1
19.95	1.50	0.456	0.333	−0.224	14.65
21.25	1.50	0.466	0.341	−0.217	15.95
22.55	1.51	0.487	0.360	−0.216	17.2

TABLE 2—*continued.*

P = 7·71 atmos. V = 68·0 ft/sec	ρV^2 = 82·0 lb/sq ft R = 2·10 × 10[6]				
α	C_L	C_D	C_{D0}	C_M	α_0
−1·55	0·760	0·214	0·182	−0·240	−4·25
+1·0	0·904	0·250	0·205	−0·248	−2·2
3·45	1·035	0·281	0·221	−0·250	−0·2
6·0	1·16	0·306	0·231	−0·250	+1·9
8·55	1·26	0·330	0·242	−0·249	4·1
11·05	1·35	0·360	0·259	−0·245	6·25
13·5	1·45	0·367	0·250	−0·244	8·35
14·8	1·455	0·374	0·256	−0·227	9·65
16·05	1·485	0·394	0·271	−0·226	10·8
17·3	1·505	0·417	0·291	−0·226	12·0
18·65	1·50	0·435	0·311	−0·222	13·35
19·95	1·485	0·447	0·325	−0·219	14·7
21·25	1·49	0·458	0·335	−0·215	16·0
22·55	1·50	0·482	0·358	−0·215	17·25

P = 12·8 atmos. V = 72·0 ft/sec	ρV^2 = 150·5 lb/sq ft R = 3·61 × 10[6]				
α	C_L	C_D	C_{D0}	C_M	α_0
−1·65	0·762	0·220	0·188	−0·247	−4·35
+0·9	0·909	0·250	0·204	−0·250	−2·3
3·35	1·035	0·277	0·217	−0·251	−0·35
5·95	1·155	0·303	0·229	−0·251	+1·85
8·5	1·27	0·332	0·222	−0·252	4·0
10·95	1·375	0·353	0·248	−0·252	6·1
13·45	1·465	0·381	0·262	−0·246	8·25
14·7	1·51	0·394	0·268	−0·243	9·35
15·9	1·54	0·416	0·284	−0·240	10·45
17·15	1·565	0·439	0·303	−0·236	11·6
18·5	1·59	0·447	0·307	−0·236	12·9
19·85	1·57	0·454	0·317	−0·226	14·3
21·15	1·545	0·464	0·331	−0·223	15·65
22·45	1·54	0·483	0·351	−0·219	17·0
25·15	1·51	0·506	0·379	−0·211	19·8

P = 17·75 atmos. V = 68·5 ft/sec	ρV^2 = 188·5 lb/sq ft R = 4·75 × 10[6]				
α	C_L	C_D	C_{D0}	C_M	α_0
−1·25	0·774	0·222	0·189	−0·248	−4·0
+0·85	0·918	0·252	0·205	−0·249	−2·4
3·3	1·035	0·274	0·214	−0·251	−0·35
5·8	1·165	0·304	0·229	−0·252	+1·7
8·45	1·28	0·335	0·244	−0·253	3·95
10·9	1·38	0·358	0·252	−0·250	6·0
13·4	1·465	0·391	0·272	−0·249	8·2
15·85	1·56	0·428	0·293	−0·247	10·35
17·1	1·60	0·443	0·301	−0·244	11·45
18·45	1·61	0·447	0·303	−0·242	12·75
19·75	1·595	0·454	0·313	−0·231	14·1
22·05	1·575	0·475	0 337	−0·220	16·45
25·05	1·57	0·511	0·375	−0·220	19·5
27·75	1·49	0·548	0·425	−0·215	22·45

P = 24·1 Atmos. V = 78·3 ft/sec			ρV^2 = 328 lb/sq ft R = 7·16 × 10[6]		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·9	0·764	0·220	0·188	−0·249	−4·6
+0·65	0·904	0·243	0·198	−0·250	−2·55
3·15	1·045	0·274	0·214	−0·253	−0·55
5·7	1·17	0·299	0·224	−0·253	+1·55
8·25	1·29	0·330	0·237	−0·258	3·65
10·75	1·405	0·362	0·243	−0·257	5·8
13·25	1·49	0·394	0·271	−0·251	7·95
15·75	1·585	0·424	0·285	−0·250	10·15
16·95	1·62	0·439	0·294	−0·246	11·25
18·3	1·635	0·451	0·303	−0·246	12·5
19·6	1·625	0·461	0·314	−0·247	13·85
20·9	1·605	0·467	0·324	−0·234	15·2
23·6	1·58	0·501	0·362	−0·222	18·0
26·3	1·55	0·511	0·378	−0·215	20·8

TABLE 3

Unslotted Main Flap at 0 deg, Split Flap at 90 deg

C_M is the pitching-moment coefficient about the quarter-chord line.

P = 1·0 atmos. V = 72·1 ft/sec ρV^2 = 12·08 lb/sq ft R = 0·293 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
1·25	0·770	0·311	0·273	−0·251	−1·45
3·7	0·889	0·333	0·289	−0·248	+0·55
6·3	0·998	0·350	0·295	−0·244	2·8
8·7	1·19	0·367	0·289	−0·250	4·5
11·15	1·40	0·383	0·275	−0·258	6·2
13·55	1·62	0·395	0·250	−0·267	7·85
15·9	1·87	0·431	0·236	−0·284	9·3
18·5	1·82	0·453	0·270	−0·254	12·1
19·9	1·70	0·465	0·305	−0·233	13·9
21·25	1·61	0·482	0·338	−0·218	15·55
22·6	1·52	0·503	0·375	−0·211	17·2
25·3	1·47	0·543	0·424	−0·209	20·1
28·05	1·37	0·580	0·476	−0·207	23·7

P = 1·97 atmos. V = 61·4 ft/sec ρV^2 = 19·12 lb/sq ft R = 0·565 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·6	1·03	0·305	0·246	−0·336	−5·25
+0·95	1·22	0·331	0·249	−0·345	−3·35
3·35	1·38	0·357	0·251	−0·348	−1·55
5·95	1·52	0·376	0·248	−0·342	+0·55
8·45	1·60	0·400	0·258	−0·333	2·8
11·0	1·65	0·415	0·263	−0·313	5·15
12·2	1·71	0·418	0·256	−0·303	6·15
13·5	1·74	0·421	0·253	−0·294	7·35
14·7	1·77	0·429	0·255	−0·284	8·45
15·95	1·77	0·435	0·261	−0·272	9·7
17·2	1·74	0·443	0·275	−0·257	11·0
18·6	1·71	0·472	0·310	−0·248	12·55
19·95	1·61	0·483	0·339	−0·228	14·25
22·6	1·56	0·513	0·378	−0·226	17·1

P = 3·12 atmos. V = 61·9 ft/sec ρV^2 = 27·65 lb/sq ft R = 0·782 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
0·8	1·30	0·308	0·214	−0·347	−3·8
3·25	1·46	0·338	0·219	−0·352	−1·95
5·8	1·62	0·367	0·222	−0·356	+0·1
8·35	1·73	0·394	0·228	−0·352	2·25
10·85	1·80	0·410	0·231	−0·333	4·45
13·4	1·78	0·429	0·254	−0·306	7·1
14·65	1·77	0·436	0·260	−0·294	8·4
15·9	1·77	0·445	0·272	−0·279	9·65
17·15	1·75	0·465	0·295	−0·270	10·95
18·6	1·65	0·477	0·325	−0·252	12·75
19·95	1·59	0·498	0·357	−0·241	14·35
22·55	1·55	0·544	0·410	−0·238	17·05
25·25	1·49	0·568	0·444	−0·232	19·95

P = 4·76 atmos. V = 66·7 ft/sec ρV^2 = 49·15 lb/sq ft R = 1·29 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·85	1·21	0·243	0·161	−0·338	−6·15
+0·7	1·35	0·268	0·166	−0·336	−4·1
3·15	1·48	0·303	0·182	−0·338	−2·05
5·75	1·58	0·334	0·196	−0·333	+0·15
8·35	1·64	0·369	0·220	−0·330	2·55
10·85	1·67	0·403	0·248	−0·312	4·95
12·1	1·70	0·417	0·257	−0·304	6·1
13·4	1·71	0·432	0·270	−0·295	7·35
14·6	1·74	0·445	0·278	−0·291	8·45
15·9	1·69	0·456	0·297	−0·275	9·9
17·2	1·64	0·465	0·316	−0·260	11·4
18·6	1·58	0·481	0·342	−0·249	13·0
19·9	1·56	0·501	0·365	−0·244	14·4
22·5	1·55	0·534	0·400	−0·241	17·0

P = 7·82 atmos. V = 67·35 ft/sec ρV^2 = 82·0 lb/sq ft R = 2·13 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·75	0·945	0·229	0·179	−0·301	−5·1
+0·8	1·075	0·257	0·193	−0·299	−3·0
3·35	1·16	0·287	0·212	−0·289	−0·75
5·9	1·29	0·320	0·228	−0·287	+1·3
8·45	1·38	0·362	0·256	−0·292	3·55
10·95	1·46	0·383	0·267	−0·276	5·75
12·2	1·50	0·400	0·275	−0·276	6·9
13·45	1·54	0·417	0·285	−0·276	8·0
14·7	1·54	0·431	0·298	−0·265	9·25
15·95	1·55	0·445	0·311	−0·259	10·45
17·2	1·57	0·466	0·328	−0·251	11·6
18·55	1·57	0·489	0·352	−0·248	13·0
19·85	1·57	0·506	0·370	−0·246	14·3
22·45	1·56	0·529	0·393	−0·246	16·9

P = 12·8 atmos. V = 71·8 ft/sec ρV^2 = 150·5 lb/sq ft R = 3·65 × 10^6

α	C_L	C^D	C_{D0}	C_M	α_0
−1·8	0·90	0·233	0·188	−0·278	−5·1
+0·8	1·03	0·262	0·203	−0·277	−2·8
3·3	1·14	0·301	0·228	−0·275	−0·75
5·85	1·25	0·321	0·234	−0·273	+1·45
8·4	1·34	0·343	0·244	−0·264	3·7
10·95	1·43	0·368	0·254	−0·260	5·85
13·4	1·54	0·424	0·293	−0·271	7·95
14·65	1·57	0·440	0·302	−0·266	9·05
15·9	1·59	0·462	0·321	−0·261	10·3
17·15	1·62	0·478	0·333	−0·260	11·45
18·45	1·62	0·492	0·347	−0·256	12·7
19·7	1·62	0·501	0·356	−0·251	14·0
21·0	1·62	0·514	0·369	−0·249	15·3
22·3	1·62	0·531	0·386	−0·247	16·55
23·65	1·61	0·539	0·394	−0·245	17·95
25·05	1·59	0·559	0·419	−0·242	19·45

TABLE 3—*continued.*

$P = 18{\cdot}0$ atmos. $V = 68{\cdot}0$ ft/sec			$\rho V^2 = 188{\cdot}5$ lb/sq ft $R = 4{\cdot}75 \times 10^6$		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·85	0·916	0·236	0·190	−0·280	−5·2
+0·75	1·035	0·256	0·196	−0·275	−2·9
3·2	1·15	0·283	0·209	−0·273	−0·9
5·85	1·25	0·309	0·222	−0·267	+1·45
8·35	1·35	0·339	0·237	−0·267	3·55
10·35	1·47	0·385	0·266	−0·269	5·65
13·4	1·56	0·430	0·295	−0·273	7·9
14·6	1·58	0·444	0·305	−0·268	9·0
15·8	1·61	0·455	0·312	−0·266	10·1
17·1	1·64	0·474	0·325	−0·264	11·3
18·45	1·66	0·489	0·336	−0·261	12·55
19·7	1·66	0·498	0·342	−0·255	13·8
22·3	1·65	0·526	0·375	−0·251	16·45
25·0	1·64	0·551	0·402	−0·246	19·2

$P = 24{\cdot}75$ atmos. $V = 77{\cdot}0$ ft/sec			$\rho V^2 = 328$ lb/sq ft $R = 7{\cdot}28 \times 10^6$		
α	C_L	C_D	C_{D0}	C_M	α_0
−2·05	0·918	0·243	0·197	−0·283	−5·3
+0·5	1·045	0·273	0·212	−0·283	−3·2
3·0	1·16	0·306	0·231	−0·284	−1·1
5·6	1·27	0·336	0·246	−0·280	+1·1
8·15	1·38	0·369	0·264	−0·281	3·25
10·65	1·48	0·398	0·277	−0·281	4·95
13·2	1·58	0·434	0·296	−0·281	7·6
15·65	1·65	0·465	0·315	−0·277	9·85
16·9	1·67	0·471	0·316	−0·270	11·0
18·25	1·69	0·487	0·328	−0·267	12·25
19·55	1·70	0·501	0·339	−0·266	13·55
20·85	1·70	0·516	0·355	−0·259	14·85
22·15	1·69	0·519	0·360	−0·256	16·15
23·45	1·69	0·536	0·378	−0·256	17·5
26·2	1·60	0·554	0·412	−0·244	20·55

TABLE 4

Slotted Main Flap at 0 *deg*

C_M is the pitching-moment coefficient about the quarter-chord line.

$P = 1{\cdot}01$ atmos. $V = 71{\cdot}2$ ft/sec			$\rho V^2 = 11{\cdot}97$ lb/sq ft $R = 0{\cdot}297 \times 10^6$		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·95	−0·524	0·110	0·0955	0·0275	−0·1
+0·6	−0·376	0·110	0·102	0·0292	+1·95
3·05	−0·213	0·110	0·108	0·0210	3·8
5·55	−0·055	0·115	0·114	0·0125	5·75
8·05	+0·095	0·119	0·118	0·0057	7·7
10·45	0·289	0·127	0·123	−0·0076	9·45
12·9	0·549	0·127	0·111	−0·0224	10·95
15·3	0·853	0·127	0·0865	−0·0367	12·3
17·65	1·09	0·140	0·0745	−0·0523	13·8
20·2	1·215	0·166	0·085	−0·0564	15·9
21·45	1·245	0·183	0·097	−0·0563	17·05
22·7	1·25	0·195	0·109	−0·0523	18·3
24·05	1·24	0·213	0·128	−0·0501	19·65
25·35	1·19	0·234	0·156	−0·0488	21·15
26·75	1·125	0·258	0·187	−0·0472	22·75
28·1	1·08	0·281	0·216	−0·0489	24·3
30·8	1·06	0·312	0·249	−0·0567	27·05

$P = 1{\cdot}55$ atmos. $V = 60{\cdot}5$ ft/sec			$\rho V^2 = 13{\cdot}43$ lb/sq ft $R = 0{\cdot}393 \times 10^6$		
α	C_L	C_D	C_{D0}	C_M	α_0
−2·0	−0·456	0·105	0·0935	0·0146	−0·35
+0·5	−0·198	0·106	0·104	−0·0101	+1·2
1·7	−0·087	0·104	0·103	−0·0179	1·9
2·95	+0·011	0·103	0·103	−0·0240	2·95
4·3	0·112	0·102	0·101	−0·0305	4·25
6·65	0·324	0·101	0·0955	−0·0372	5·5
9·05	0·489	0·101	0·0875	−0·0398	7·35
11·55	0·676	0·103	0·0775	−0·0444	9·15
13·95	0·872	0·118	0·0755	−0·0497	10·85
16·4	1·035	0·141	0·082	−0·0614	12·75
17·65	1·095	0·154	0·0875	−0·0618	13·75
18·85	1·15	0·165	0·0915	−0·0616	14·8
20·15	1·205	1·178	0·097	−0·0627	15·9
21·45	1·22	0·191	0·108	−0·0598	17·15
22·75	1·21	0·204	0·123	−0·0543	18·45
24·05	1·205	0·224	0·144	−0·0533	19·8
25·4	1·135	0·245	0·173	−0·0505	21·4
26·75	1·09	0·264	0·198	−0·0485	23·9
29·45	1·06	0·306	0·244	−0·0535	25·7

$P = 2{\cdot}27$ atmos. $V = 60{\cdot}0$ ft/sec			$\rho V^2 = 19{\cdot}12$ lb/sq ft $R = 0{\cdot}565 \times 10^6$		
α	C_L	C_D	C_{D0}	C_M	α_0
−2·15	−0·205	0·103	0·102	−0·0392	−1·45
+0·35	+0·015	0·102	0·102	−0·0513	+0·3
1·6	0·107	0·103	0·102	−0·0561	1·2
2·8	0·188	0·103	0·101	−0·0595	2·15
4·1	0·273	0·101	0·0975	−0·0595	3·15
6·55	0·438	0·103	0·0925	−0·0616	5·0
9·0	0·591	0·103	0·0835	−0·0608	6·9
11·5	0·753	0·107	0·076	−0·0588	8·85
13·9	0·909	0·123	0·077	−0·0637	10·7
16·4	1·035	0·143	0·083	−0·0632	12·7
18·9	1·135	0·168	0·097	−0·0637	14·95
20·15	1·18	0·181	0·103	−0·0622	16·0
21·45	1·18	0·191	0·113	−0·0564	17·3
22·75	1·18	0·208	0·131	−0·0530	18·6
24·05	1·165	0·228	0·153	−0·0501	19·95
25·4	1·10	0·248	0·181	−0·0469	21·5
26·8	1·075	0·269	0·205	−0·0474	23·0
29·45	1·06	0·308	0·246	−0·0528	25·7

TABLE 4—*continued.*

P = 2·85 atmos. V = 64·35 ft/sec ρV^2 = 27·6 lb/sq ft R = 0·76 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−2·25	−0·142	0·0925	0·0915	−0·0539	−1·75
+0·25	+0·076	0·0925	0·0925	−0·0647	0
2·75	0·247	0·0935	0·090	−0·0676	+1·9
5·2	0·415	0·0945	0·085	−0·0695	3·75
7·7	0·566	0·093	0·075	−0·0649	5·7
10·15	0·726	0·0995	0·070	−0·0644	7·6
12·65	0·878	0·114	0·0715	−0·0673	9·55
15·1	0·990	0·132	0·0775	−0·0673	11·6
17·6	1·095	0·156	0·089	−0·0659	13·7
20·1	1·17	0·183	0·107	−0·0645	15·95
21·4	1·165	0·194	0·119	−0·0568	17·3
22·7	1·16	0·212	0·137	−0·0529	18·6
24·05	1·115	0·228	0·159	−0·0483	20·1
25·35	1·095	0·246	0·180	−0·0456	21·5
28·05	1·06	0·284	0·221	−0·0510	24·3
30·75	1·00	0·323	0·267	−0·0602	27·2

P = 4·35 atmos. V = 68·7 ft/sec ρV^2 = 49·0 lb/sq ft R = 1·27 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−2·3	−0·063	0·054	0·054	−0·0643	−2·1
+0·25	+0·084	0·0595	0·059	−0·0683	−0·05
2·65	0·226	0·071	0·0685	−0·0728	+1·85
5·25	0·362	0·079	0·072	−0·0711	3·95
7·75	0·498	0·0915	0·0775	−0·0705	6·0
10·25	0·626	0·108	0·086	−0·0719	8·05
12·75	0·738	0·124	0·0945	−0·0699	10·15
15·15	0·858	0·144	0·103	−0·0671	12·1
17·7	0·976	0·170	0·117	−0·0683	14·25
20·2	1·04	0·187	0·127	−0·0570	16·55
22·8	1·06	0·209	0·147	−0·0455	18·05
24·1	1·04	0·231	0·171	−0·0443	20·4
25·4	1·04	0·250	0·191	−0·0465	21·75
26·75	1·065	0·264	0·201	−0·0486	23·0
28·05	1·07	0·286	0·222	−0·0531	24·25
29·4	1·07	0·305	0·241	−0·0575	25·6
30·75	1·05	0·328	0·267	−0·0629	27·05
32·1	1·015	0·352	0·295	−0·0702	28·5
34·95	0·095	0·402	0·352	−0·0834	31·6

P = 8·05 atmos. V = 66·5 ft/sec ρV^2 = 81·2 lb/sq ft R = 2·11 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−0·95	−0·047	0·0585	0·0585	−0·0535	−0·8
+1·5	+0·139	0·0605	0·0595	−0·0530	+1·0
2·75	0·213	0·0675	0·065	−0·0589	2·0
4·05	0·311	0·071	0·0655	−0·0593	2·95
6·5	0·466	0·0835	0·072	−0·0670	4·9
8·95	0·598	0·097	0·0775	−0·0640	6·85
11·45	0·757	0·118	0·086	−0·0694	8·85
13·9	0·876	0·138	0·0955	−0·0687	10·8
16·4	0·974	0·157	0·105	0·0657	12·95
18·9	1·005	0·170	0·114	−0·0501	15·35
21·5	1·025	0·191	0·133	−0·0405	17·9
24·1	1·045	0·234	0·173	−0·0466	20·4
25·35	1·075	0·252	0·187	−0·0500	21·55
26·7	1·09	0·268	0·202	−0·0526	22·85
28·0	1·10	0·287	0·220	−0·0563	24·1
29·35	1·095	0·307	0·241	−0·0609	25·5
30·7	1·085	0·329	0·264	−0·0681	26·85
33·5	1·02	0·386	0·328	−0·0796	29·9

P = 11·5 atmos. V = 61·05 ft/sec ρV^2 = 97·7 lb/sq ft R = 2·76 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
0·4	−0·057	0·065	0·065	−0·0329	0·6
1·6	+0·034	0·068	0·068	−0·0364	1·48
2·85	0·097	0·0695	0·069	−0·0392	2·5
4·1	0·199	0·0745	0·0725	−0·0425	3·4
6·55	0·346	0·085	0·0785	−0·0468	5·35
9·0	0·516	0·101	0·0865	−0·0565	7·2
11·5	0·638	0·113	0·091	−0·0561	9·25
14·0	0·770	0·135	0·102	−0·0557	11·3
16·45	0·887	0·153	0·110	−0·0537	13·3
18·95	0·931	0·165	0·117	−0·0401	15·65
21·55	0·984	0·192	0·138	−0·0396	18·05
22·8	1·015	0·215	0·158	−0·0447	19·2
24·1	1·05	0·231	0·170	−0·0479	20·4
25·35	1·085	0·248	0·183	−0·0513	21·5
26·7	1·115	0·264	0·195	−0·0549	22·75
28·0	1·125	0·287	0·217	−0·0589	24·0
29·35	1·125	0·308	0·238	−0·0632	25·35
30·7	1·11	0·316	0·248	−0·0688	26·75
33·5	1·04	0·385	0·325	−0·0811	29·85

P = 13·6 atmos. V = 69·6 ft/sec ρV^2 = 149·6 lb/sq ft R = 3·71 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
1·65	−0·071	0·065	0·065	−0·0137	1·9
4·2	+0·108	0·072	0·071	−0·0208	3·8
6·6	0·262	0·0835	0·0795	−0·0295	5·65
9·1	0·384	0·0905	0·0825	−0·0299	7·75
11·6	0·531	0·103	0·0875	−0·0312	9·7
14·05	0·692	0·124	0·097	−0·0379	11·6
16·5	0·789	0·143	0·109	−0·0377	13·7
19·0	0·878	0·160	0·117	−0·0337	15·9
21·55	0·966	0·194	0·142	−0·0404	18·15
24·1	1·045	0·229	0·168	−0·0472	20·4
25·35	1·085	0·247	0·181	−0·0519	21·5
26·7	1·125	0·268	0·197	−0·0560	22·7
28·0	1·14	0·282	0·210	−0·0598	23·95
29·35	1·15	0·301	0·227	−0·0650	25·3
30·7	1·13	0·323	0·252	−0·0695	26·7
32·05	1·095	0·351	0·285	−0·0760	28·2
34·9	1·02	0·406	0·348	−0·0918	31·3

P = 19·35 atmos. V × 65·1 ft/sec ρV^2 = 187·4 lb/sq ft R = 5·00 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
1·65	−0·109	0·065	0·0645	+0·0008	2·05
2·9	−0·022	0·0625	0·0625	−0·0025	3·0
4·2	+0·060	0·068	0·0675	−0·0076	4·0
5·4	0·136	0·0695	0·0685	−0·0088	4·9
6·65	0·211	0·0765	0·074	−0·0116	5·9
9·1	0·337	0·0835	0·077	−0·0110	7·9
11·65	0·460	0·093	0·081	−0·0108	10·05
14·1	0·599	0·111	0·091	−0·0169	12·0
16·55	0·728	0·131	0·102	−0·0240	14·0
19·0	0·854	0·156	0·116	−0·0287	16·0
21·05	0·965	0·189	0·137	−0·0370	17·65
24·1	1·065	0·223	0·160	−0·0464	20·35
25·35	1·105	0·242	0·174	−0·0507	21·45
26·7	1·135	0·262	0·190	−0·0561	22·65
27·95	1·17	0·283	0·207	−0·0618	23·8
29·3	1·17	0·300	0·224	−0·0634	25·15
30·65	1·165	0·327	0·252	−0·0729	26·55
32·05	1·145	0·355	0·282	−0·0788	28·0
33·45	1·105	0·381	0·313	−0·0873	29·55

TABLE 4—*continued.*

P = 24·6 atmos. V = 76·9 ft/sec			ρV^2 = 327 lb/sq ft R = 7·29 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
0·45	−0·199	0·0695	0·067	0·0121	1·15
1·7	−0·115	0·0705	0·070	0·0054	2·1
2·9	−0·026	0·0715	0·0715	0·0010	3·0
4·2	+0·058	0·0745	0·074	−0·0035	4·0
5·4	0·140	0·0775	0·0765	−0·0073	4·9
6·65	0·212	0·0805	0·078	−0·0097	5·9
9·15	0·326	0·0855	0·0795	−0·0093	8·0
11·65	0·483	0·092	0·079	−0·0077	9·95
14·1	0·584	0·109	0·090	−0·0132	12·05
16·55	0·717	0·127	0·099	−0·0186	14·0
19·05	0·843	0·153	0·113	−0·0268	16·05
21·55	0·962	0·184	0·133	−0·0379	18·15
24·1	1·055	0·223	0·161	−0·0480	20·35
25·35	1·105	0·242	0·174	−0·0535	21·5
26·7	1·14	0·262	0·190	−0·0586	22·65
27·95	1·16	0·284	0·209	−0·0636	23·85
29·3	1·155	0·304	0·230	−0·0681	25·2
30·7	1·125	0·330	0·260	−0·0732	26·7
32·05	1·09	0·361	0·295	−0·0791	28·2

TABLE 5

Slotted Main Flap at 40 deg

C_M is the pitching-moment coefficient about the quarter-chord line.

P = 1·0 atmos. V = 71·4 ft/sec			ρV^2 = 11·98 lb/sq ft R = 0·296 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·25	0·476	0·240	0·228	−0·206	−3·1
+1·25	0·618	0·251	0·230	−0·206	−0·95
3·8	0·765	0·277	0·245	−0·212	+1·1
6·2	0·93	0·302	0·254	−0·221	2·9
8·65	1·14	0·331	0·259	−0·236	4·6
11·1	1·36	0·353	0·251	−0·246	6·3
13·5	1·59	0·370	0·231	−0·259	7·9
14·65	1·67	0·381	0·225	−0·261	8·7
15·9	1·78	0·395	0·220	−0·264	9·6
17·2	1·79	0·412	0·233	−0·261	10·85
18·45	1·79	0·433	0·256	−0·254	12·15
19·8	1·74	0·461	0·293	−0·246	13·65
21·15	1·64	0·476	0·326	−0·233	15·35
22·5	1·56	0·496	0·361	−0·224	17·0

P = 2·28 atmos. V = 59·6 ft/sec			ρV^2 = 19·12 lb/sq ft R = 0·568 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·45	0·755	0·225	0·193	−0·252	−4·15
+1·0	0·985	0·248	0·194	−0·261	−2·45
3·55	1·14	0·275	0·203	−0·272	−0·5
6·0	1·28	0·299	0·209	−0·274	+1·5
8·45	1·41	0·328	0·218	−0·278	3·45
9·7	1·47	0·339	0·219	−0·277	4·5
10·95	1·55	0·351	0·217	−0·278	5·45
12·25	1·59	0·359	0·218	−0·276	6·6
13·45	1·66	0·369	0·217	−0·274	7·6
14·65	1·71	0·382	0·220	−0·273	8·6
15·95	1·74	0·394	0·226	−0·268	9·8
17·25	1·74	0·402	0·234	−0·256	11·1
18·5	1·71	0·436	0·275	−0·254	12·45
19·85	1·64	0·459	0·310	−0·246	14·05
22·55	1·51	0·484	0·357	−0·230	17·2

P = 4·41 atmos. V = 70·1 ft/sec			ρV^2 = 49·0 lb/sq ft R = 1·20 × 10^6		
α	C_L	C_D	C_{D0}	C_M	α_0
−1·7	1·01	0·207	0·150	−0·292	−5·3
+0·85	1·15	0·231	0·158	−0·290	−3·2
3·4	1·28	0·260	0·169	−0·291	−1·15
5·85	1·42	0·294	0·181	−0·294	+0·8
8·3	1·55	0·328	0·195	−0·295	2·8
9·55	1·60	0·347	0·205	−0·295	3·9
10·85	1·66	0·367	0·214	−p·295	4·95
12·1	1·72	0·389	0·225	−0·295	6·0
13·35	1·73	0·405	0·239	−0·292	7·25
14·55	1·74	0·425	0·257	−0·285	8·4
15·9	1·73	0·443	0·278	−0·277	9·8
17·2	1·70	0·465	0·305	−0·269	11·2
18·85	1·62	0·473	0·327	−0·252	12·75
21·15	1·53	0·480	0·351	−0·229	15·75

TABLE 5—*continued.*

P = 5·8 atmos. ρV^2 = 61·8 lb/sq ft
V = 68·7 ft/sec R = 1·55 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·7	1·06	0·217	0·154	−0·305	−5·8
+0·8	1·19	0·242	0·164	−0·302	−3·4
3·35	1·32	0·274	0·177	−0·304	−1·35
5·85	1·44	0·305	0·190	−0·303	+0·75
8·3	1·56	0·338	0·203	−0·301	2·8
10·85	1·66	0·378	0·225	−0·301	4·95
13·35	1·71	0·417	0·254	−0·292	7·25
14·65	1·70	0·436	0·275	−0·287	8·6
15·95	1·66	0·450	0·297	−0·275	10·05
17·25	1·64	0·470	0·321	−0·266	11·45
18·55	1·58	0·465	0·326	−0·249	12·95
19·75	1·54	0·466	0·334	−0·236	14·3
21·15	1·53	0·482	0·352	−0·232	15·75
23·8	1·52	0·511	0·383	−0·230	18·45

P = 8·27 atmos. ρV^2 = 81·3 lb/sq ft
V = 65·8 ft/sec R = 2·14 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·7	1·04	0·231	0·171	−0·305	−5·4
+0·8	1·18	0·250	0·172	−0·306	−3·4
3·35	1·30	0·281	0·187	−0·304	−1·25
5·85	1·40	0·317	0·208	−0·299	+0·9
8·35	1·51	0·353	0·226	−0·301	3·0
10·85	1·61	0·392	0·247	−0·299	5·15
13·4	1·63	0·424	0·276	−0·283	7·6
15·95	1·63	0·461	0·314	−0·270	10·2
18·55	1·54	0·474	0·343	−0·243	13·1
19·9	1·49	0·473	0·349	−0·222	14·6
21·15	1·53	0·493	0·363	−0·228	15·75
22·45	1·52	0·521	0·393	−0·232	17·05
23·8	1·51	0·537	0·410	−0·228	18·45
24·6	1·50	0·557	0·431	−0·227	19·3
27·8	1·41	0·598	0·488	−0·223	22·8

P = 12·95 atmos. ρV^2 = 149·4 lb/sq ft
V = 71·95 ft/sec R = 3·55 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·6	0·868	0·216	0·174	−0·280	−4·7
+0·9	1·02	0·238	0·180	−0·275	−2·7
3·45	1·18	0·273	0·195	−0·273	−0·75
5·95	1·29	0·297	0·205	−0·270	+1·4
8·4	1·39	0·339	0·232	−0·283	3·5
11·0	1·44	0·358	0·243	−0·269	5·9
13·5	1·52	0·390	0·263	−0·264	8·15
16·05	1·50	0·407	0·282	−0·244	10·75
18·6	1·50	0·426	0·301	−0·232	13·3
19·9	1·51	0·444	0·317	−0·232	14·55
21·15	1·53	0·465	0·336	−0·232	15·75
22·45	1·55	0·483	0·351	−0·232	16·95
23·75	1·55	0·505	0·372	−0·230	18·25
25·05	1·54	0·521	0·389	−0·229	19·6
26·4	1·53	0·538	0·407	−0·231	20·95
27·75	1·49	0·557	0·435	−0·229	22·5
29·15	1·40	0·586	0·477	−0·228	24·2

P = 18·7 atmos. ρV^2 = 186·9 lb/sq ft
V = 67·05 ft/sec R = 4·76 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·5	0·759	0·208	0·176	−0·259	−4·2
+1·0	0·900	0·236	0·192	−0·263	−2·2
3·55	1·04	0·269	0·209	−0·270	−0·15
6·0	1·16	0·296	0·221	−0·268	+1·9
8·5	1·26	0·315	0·227	−0·256	4·05
11·05	1·36	0·344	0·241	−0·254	6·25
13·5	1·45	0·367	0·252	−0·247	8·4
16·05	1·47	0·390	0·270	−0·238	10·85
17·35	1·49	0·403	0·279	−0·233	12·05
18·55	1·52	0·418	0·289	−0·233	13·15
19·85	1·54	0·438	0·306	−0·232	14·4
21·15	1·56	0·453	0·318	−0·230	15·65
22·45	1·57	0·474	0·336	−0·229	16·9
23·75	1·57	0·491	0·354	−0·229	18·2
25·25	1·57	0·513	0·377	−0·228	19·7
26·4	1·56	0·530	0·396	−0·230	20·9
27·7	1·54	0·555	0·423	−0·232	22·25
30·5	1·42	0·617	0·505	−0·235	25·5

P = 25·5 atmos. ρV^2 = 326 lb/sq ft
V = 76·8 ft/sec R = 7·30 × 10^6

α	C_L	C_D	C_{D0}	C_M	α_0
−1·5	0·725	0·197	0·168	−0·249	−4·05
+1·0	0·86	0·221	0·180	−0·248	−2·05
3·6	0·98	0·247	0·193	−0·247	+0·1
6·05	1·10	0·275	0·207	−0·248	2·15
8·55	1·21	0·301	0·219	−0·246	4·25
11·05	1·31	0·329	0·234	−0·245	6·4
13·55	1·40	0·360	0·256	−0·242	8·6
14·8	1·43	0·371	0·257	−0·240	9·75
16·05	1·45	0·385	0·267	−0·238	10·9
17·35	1·48	0·399	0·276	−0·236	12·1
18·6	1·50	0·417	0·291	−0·236	13·3
19·85	1·52	0·430	0·302	−0·233	14·45
21·15	1·54	0·452	0·320	−0·233	15·7
22·45	1·56	0·471	0·336	−0·235	16·95
23·75	1·55	0·488	0·354	−0·234	18·25
25·05	1·54	0·511	0·379	−0·234	19·6
26·4	1·54	0·535	0·403	−0·235	20·95
29·15	1·39	0·589	0·481	−0·239	24·2

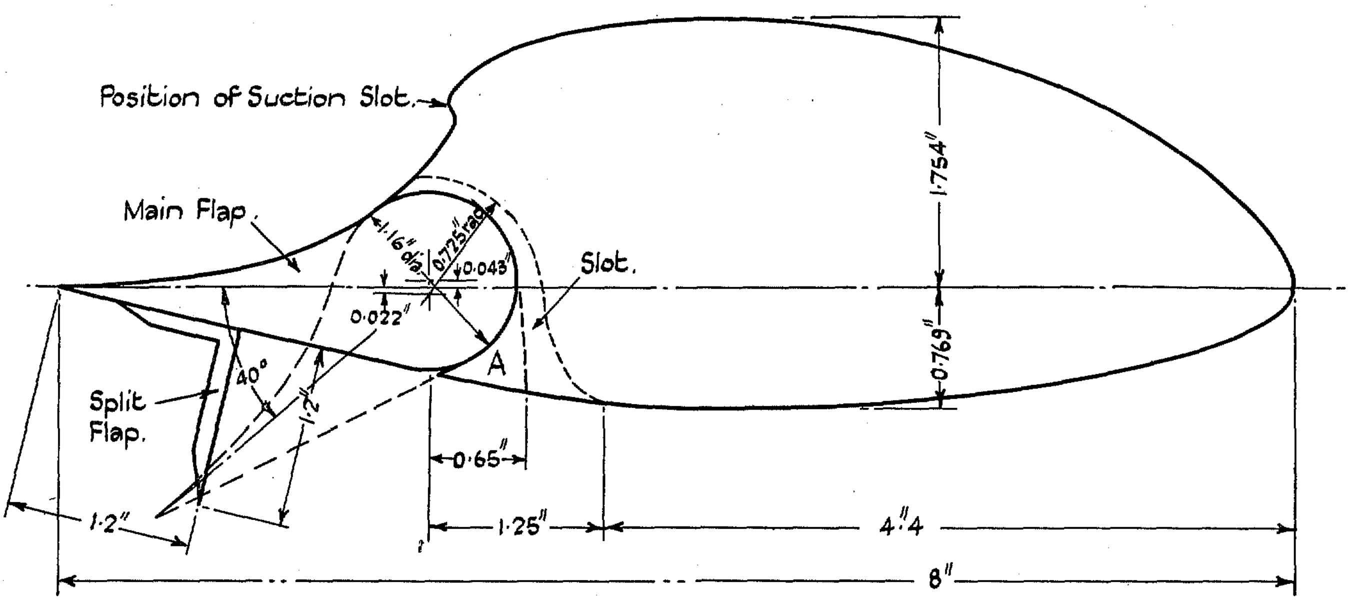

FIG. 1. Glas II, showing main flap, split flap and slot.

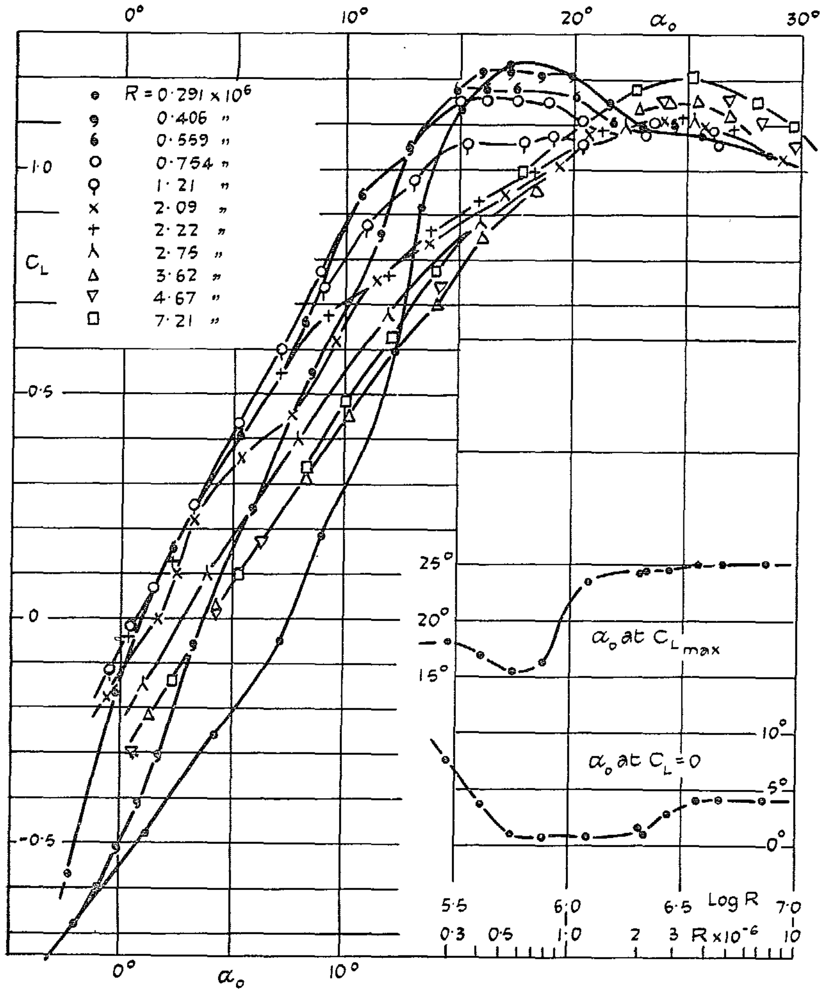

FIG. 2. Unslotted main flap at 0 deg.

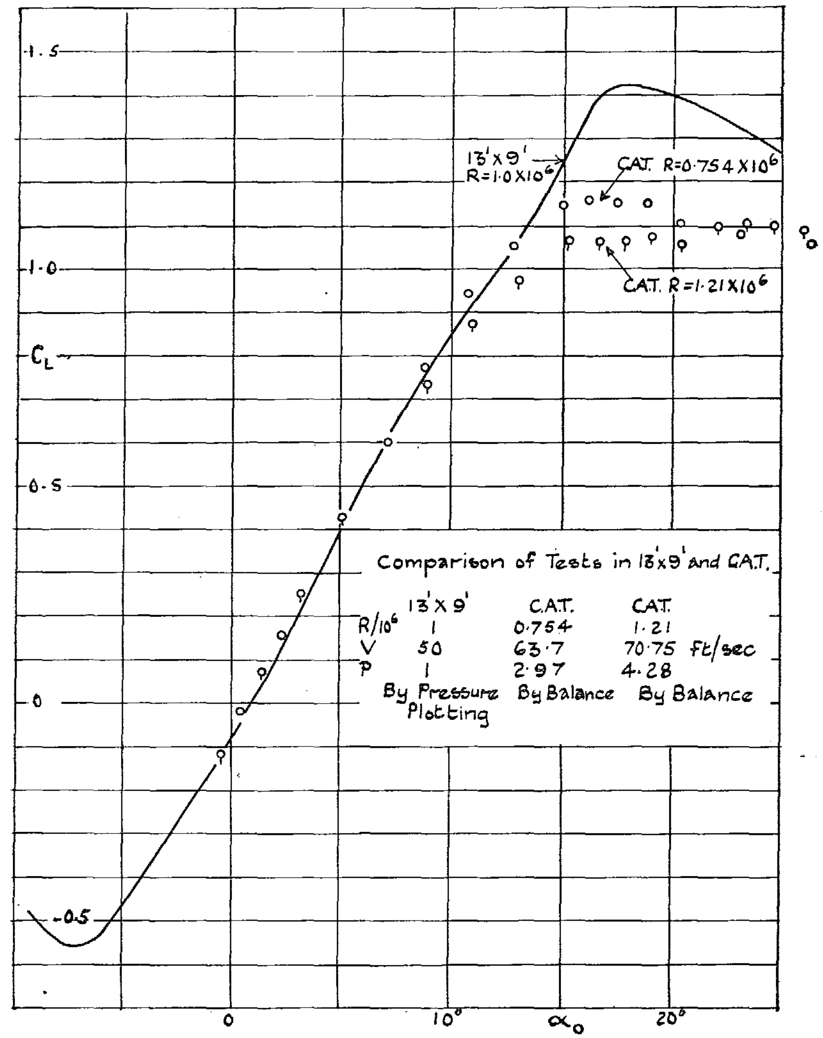

FIG. 3. Unslotted main flap at 0 deg.

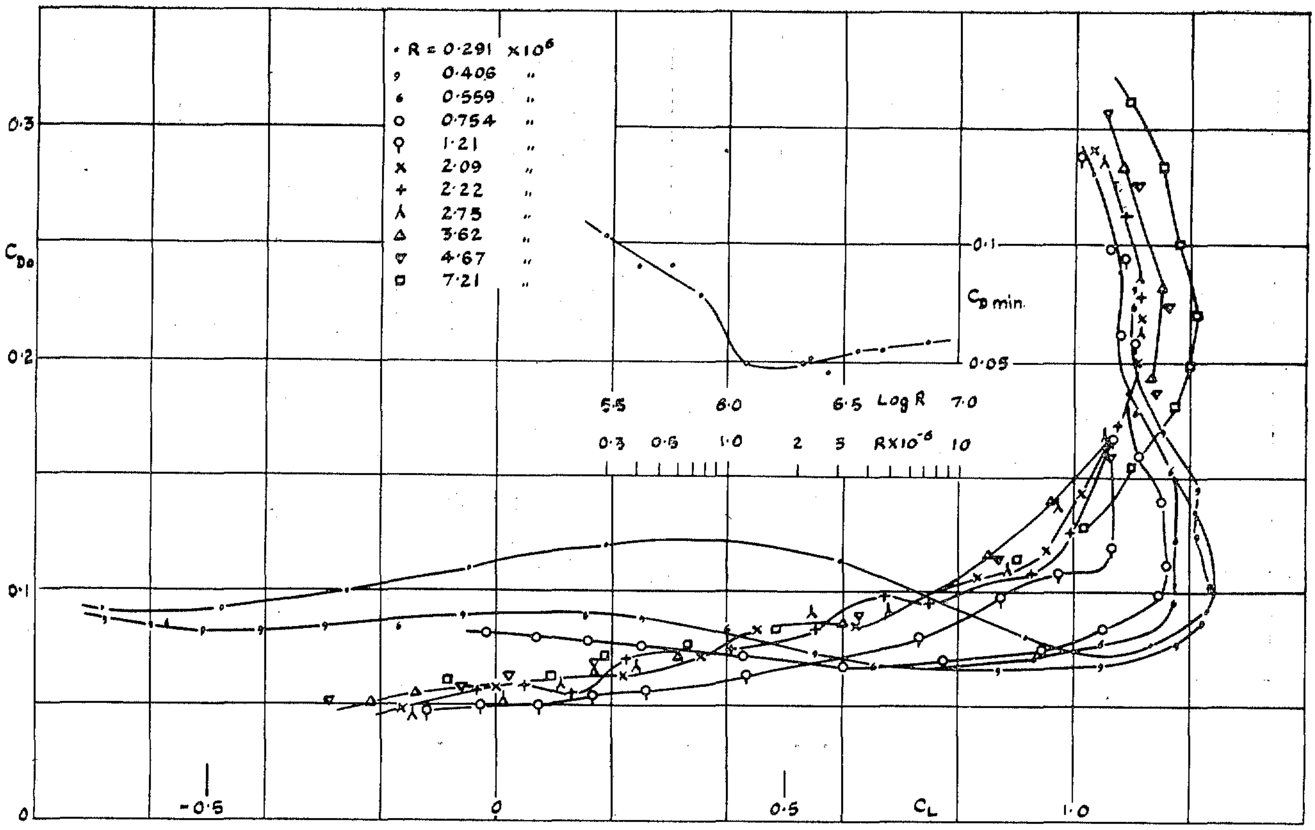

FIG. 4. Unslotted main flap at 0 deg.

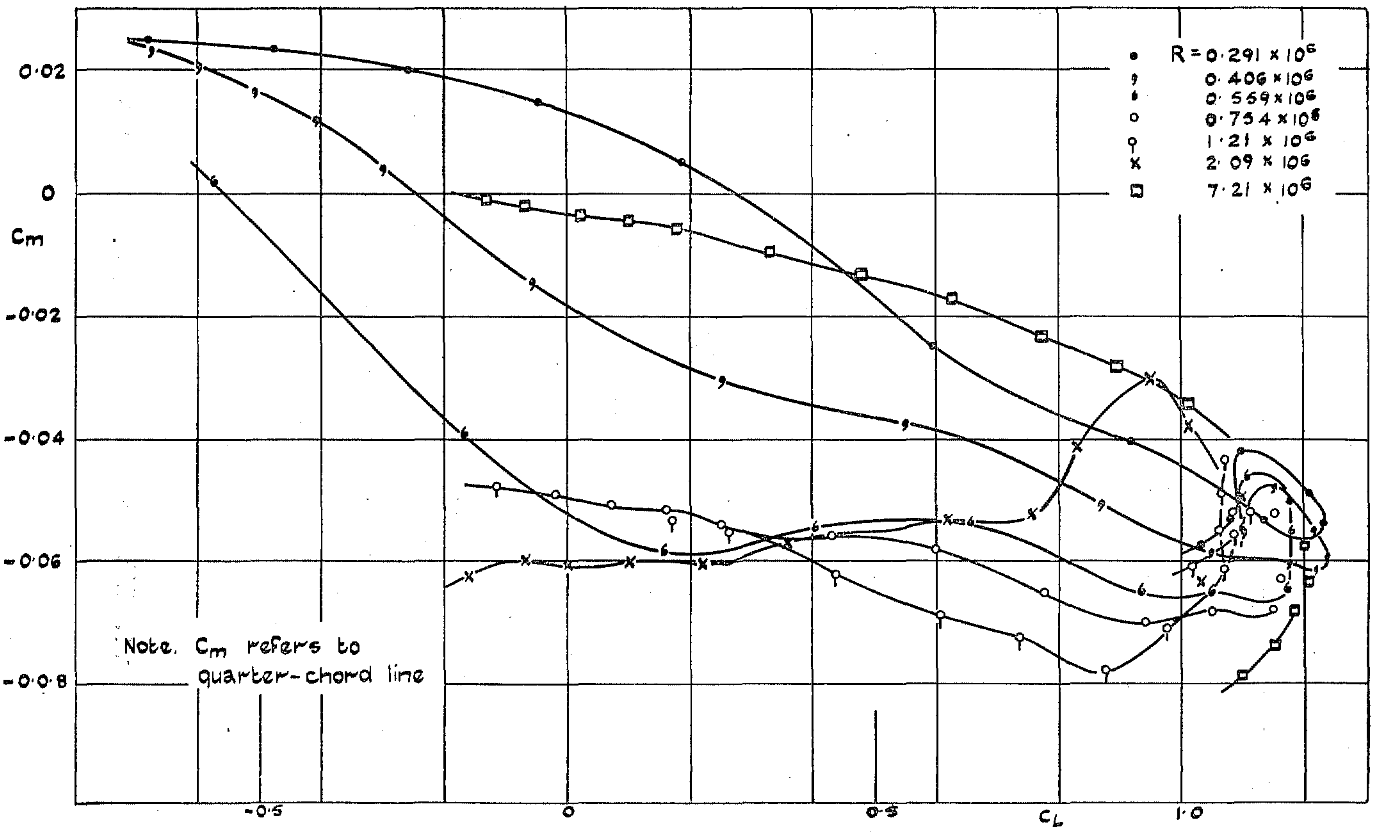

FIG. 5. Unslotted main flap at 0 deg.

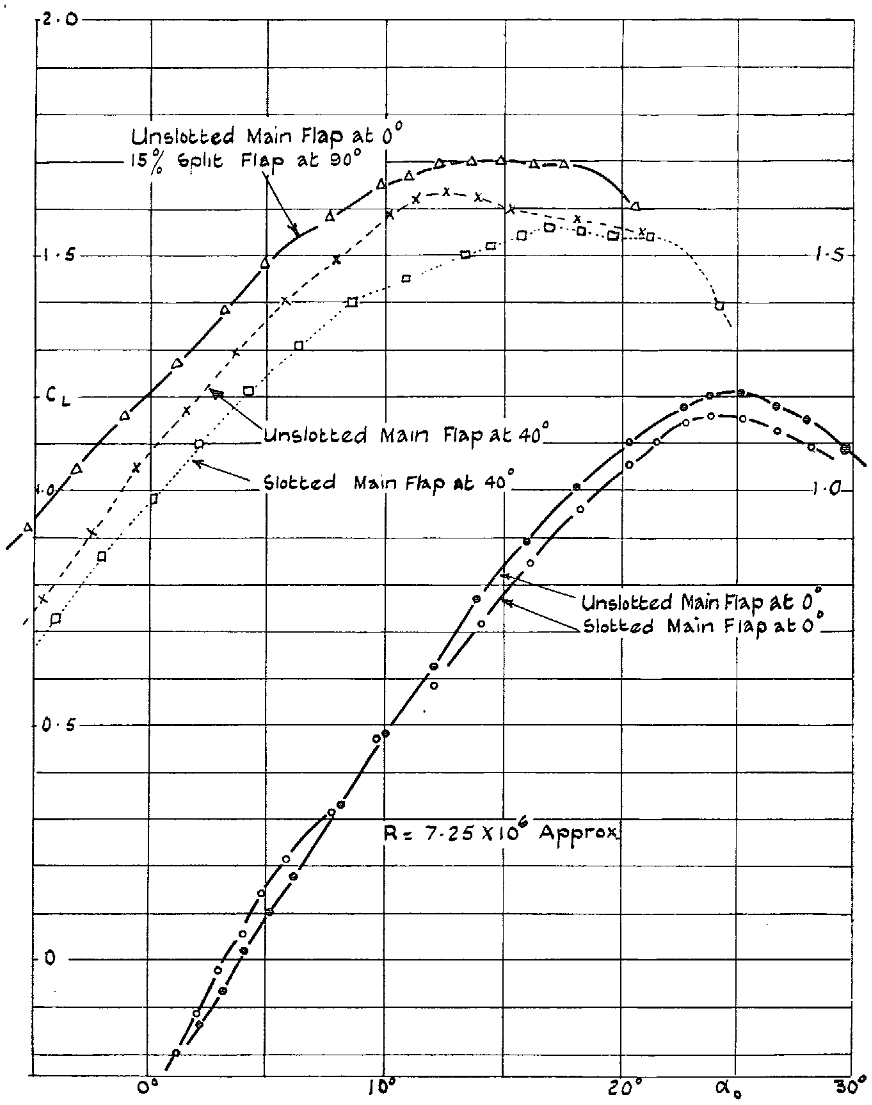

FIG. 7. Lift curves at maximum Reynolds numbers.

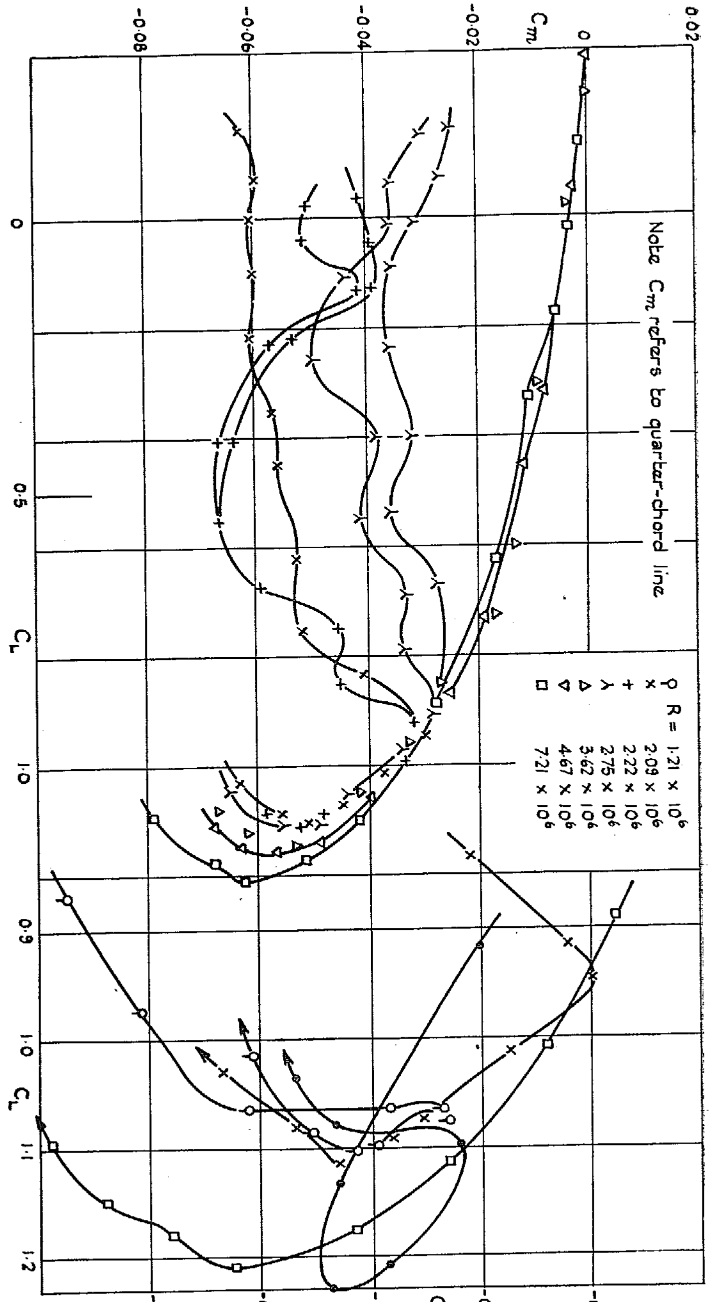

FIG. 6. Unslotted main flap at 0 deg.

J4252 Wt.13/806 K.9 6/51 D&Co. 34/263

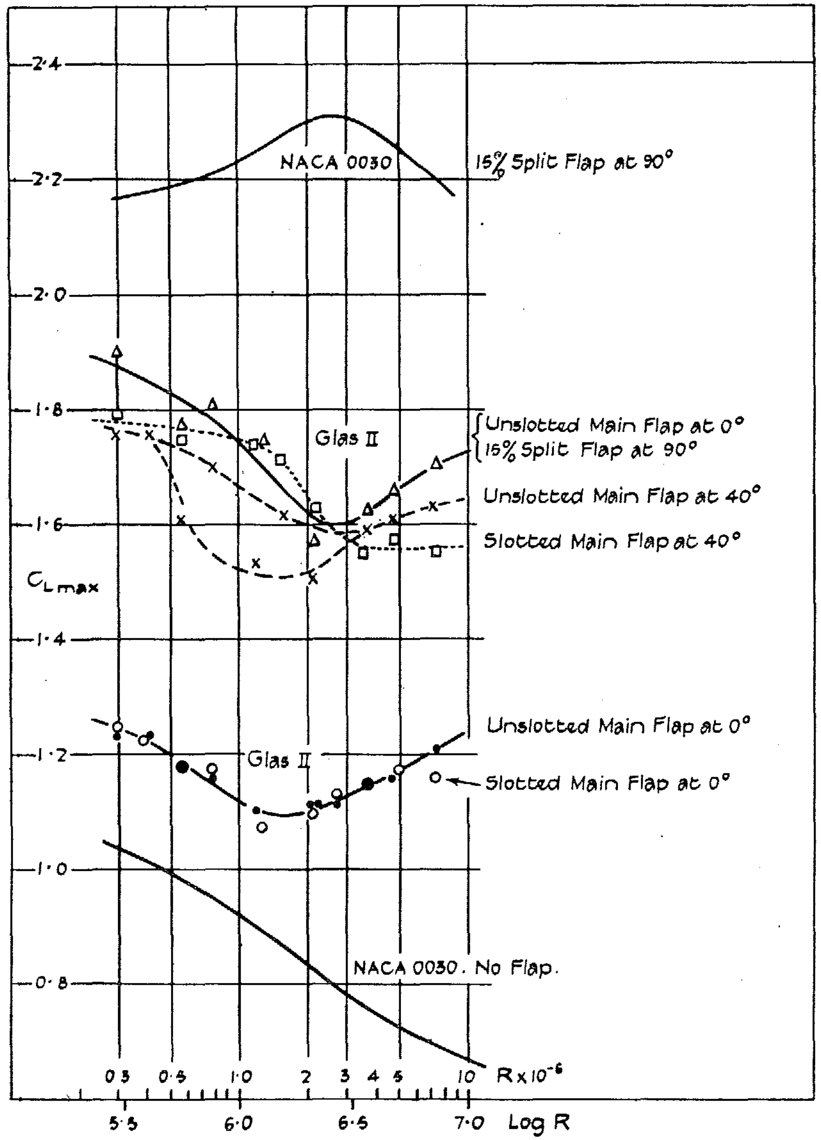

FIG. 8. Glas II and NACA 0030—maximum lift curves.

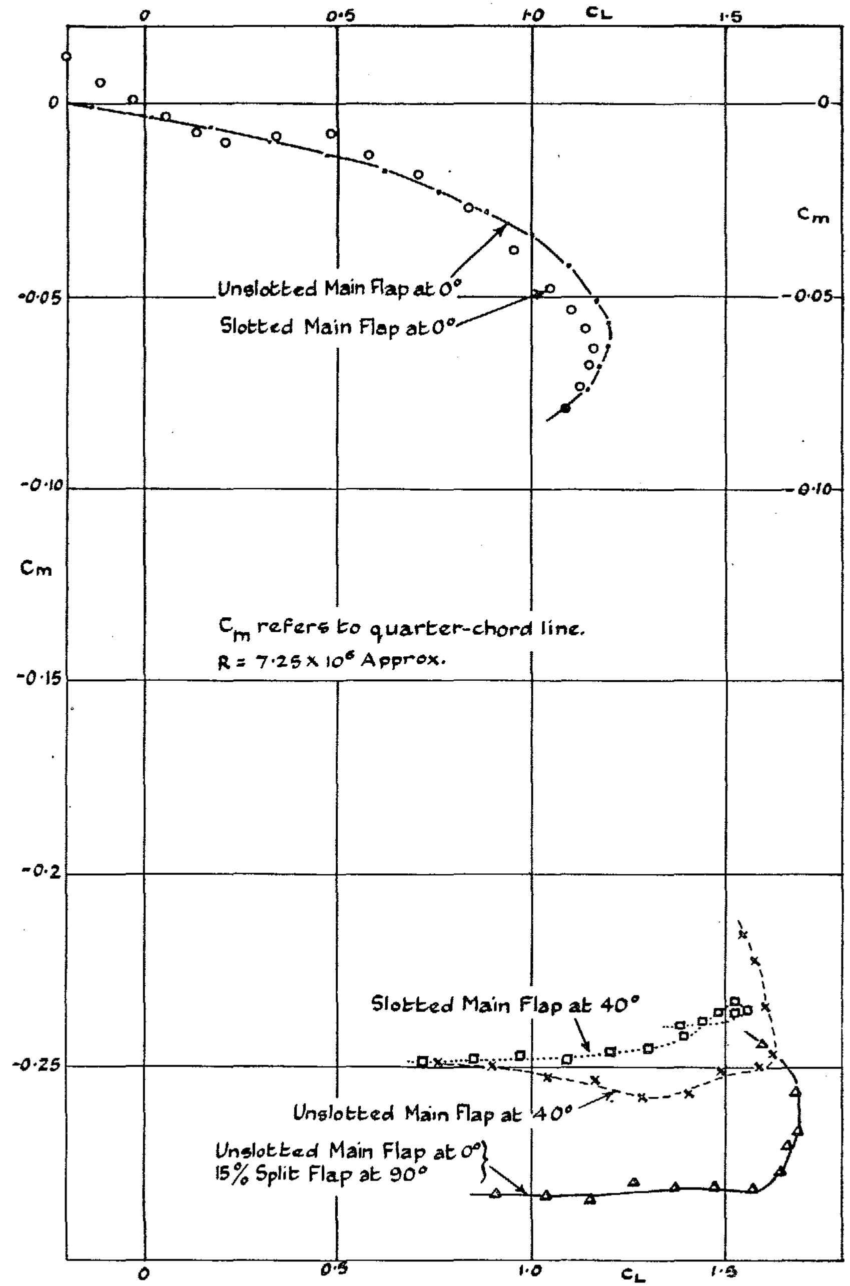

FIG. 9. Pitching-moment curves at maximum Reynolds numbers.

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