Report No. 331

COLLECTION OF WIND-TUNNEL DATA ON COMMONLY USED WING SECTIONS

By F. A. LOUDEN
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Navy Department

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SUMMARY

This report was prepared at the request of the National Advisory Committee for Aeronautics in the Bureau of Aeronautics of the Navy Department in order to group in a uniform manner the aerodynamic properties of commonly used wing sections as determined from tests in various wind tunnels.

The data have been collected from reports of a number of laboratories. Where necessary, transformation has been made to the absolute system of coefficients and tunnel wall interference corrections have been applied. Tables and graphs present the data in the various forms useful to the engineer in the selection of a wing section.

INTRODUCTION

The wing sections most commonly used in this country are the Clark Y, Clark Y–15, Gottingen G–387, G–398, G–436, N. A. C. A. M–6, M–12, Navy N–9, N–10, N–22, R. A. F.–15, Sloane, U. S. A.–27, U. S. A.–35A, U. S. A.–35B. Data were obtained from References 1 to 14 on all of these airfoils that had been tested in the following wind tunnels:

- Large wind tunnel, Göttingen Laboratory.
- Variable density wind tunnel, Langley Memorial Aeronautical Laboratory.
- 7½-foot wind tunnel, Massachusetts Institute of Technology.
- 5-foot wind tunnel, McCook Field.
- 8-by-8-foot wind tunnel, Washington Navy Yard.

Some of the airfoils selected had been tested in as many as four of the five tunnels, others in only one of the tunnels.

The results obtained in the different laboratories are not directly comparable, because of the differences in the methods of testing; in the ordinates, size, and aspect ratio of the models tested and in the test speed. The purpose of this report is not to compare results from different laboratories but to present the data in a uniform manner and to compare different wing sections tested in the same laboratory at the same Reynolds Number.

In the individual laboratory reports, the data in some cases were presented in engineering rather than absolute coefficients; in most cases, the tunnel wall interference corrections had not been applied; for some tests the center of pressure had not been determined; the moment coefficient was given with respect to various axes; the data were presented by some laboratories in polar diagrams and by others in angle-of-attack graphs.

In the present report the collected data have been corrected for tunnel wall interference, the absolute system of coefficients is used, and the data are plotted and tabulated in various forms for the convenience of the engineer.

ABSOLUTE SYSTEM OF COEFFICIENTS

The absolute lift and drag coefficients C_L and C_D are defined by dividing the lift L and the drag D by the dynamic pressure $q=\frac{1}{2}\rho V^2$ and the wing area S.

$$C_L=L/qS \qquad C_D=D/qS.$$

The absolute moment coefficient C_M is the moment M about the leading edge divided by qS times the chord length c and is positive when the moment tends to make the leading edge rise.

$$C_M = M/qSc.$$

The center of pressure coefficient C_p is the fraction of the chord length along the chord from the leading edge to the line of action of the resultant force. This distance is equal to the moment coefficient divided by the normal force coefficient C_N.

$$C_p = C.P./c = C_M/C_N$$

where $C_N = C_L \cos \alpha + C_D \sin \alpha$.

The induced drag coefficient C_{D_i} is equal to C_L^2 divided by π times the aspect ratio.

$$C_{D_i} = C_L^2/\pi\ A.R. = C_L^2 S/\pi b^2$$

where b is the span.

The profile drag coefficient C_{D_0} is the difference between the coefficients of total drag and induced drag

$$C_{D_0} = C_D - C_{D_i}$$

TUNNEL WALL INTERFERENCE CORRECTIONS

A large share of the data taken from References 1 to 14 had not been corrected for tunnel wall interference. The following Prandtl corrections have been applied where necessary:

$$\Delta\ \alpha = \delta \frac{C_L S}{A} \text{radians} \qquad \Delta\ C_D = \delta \frac{C_L^2 S}{A}.$$

A is the cross-sectional tunnel area and δ is equal to 0.125 for a tunnel having a circular cross section. For a tunnel of square cross section, Glauert has shown that δ increases to 0.137.

ORDINATES OF THE AIRFOILS

Table I gives the general shape of the various wing sections. The faired ordinates used by the Bureau of Aeronautics have been given and are called the specified ordinates. These ordinates may be slightly different from those in general use as exact specifications for the various sections do not exist. For this reason, a wing section at one laboratory might be expected to vary to some extent from the same section at another laboratory. The variation becomes greater in the measured ordinates due to the different materials used in airfoil construction and different methods of measuring the ordinates.

The maximum thickness of the airfoils and their thickness for front and rear spar depths are given in Table II. Since the spar depths for a wing to be selected are approximately known, a glance at this table will limit the number of wings for further consideration.

TEST CONDITIONS

No attempt will be made in this report to describe the various wind tunnels or their methods of testing. Only the conditions for the tests selected will be given.

The Göttingen Laboratory tests were made on 20 by 100 centimeter (7.874×39.37 inches) models at a test speed of 30 meters (98.4 feet) per second. This gives a test Vl of 64.58 square feet per second, where l is taken as the chord length. Since the elements of air density and viscosity were not determined, the exact Reynolds Number of the tests is not known. Assuming air of standard density ρ and the coefficient of viscosity μ at standard temperature, $\rho/\mu = 6{,}378$ sq.ft./sec., and the approximate Reynolds Number $\rho\ Vl/\mu$ is 412,000.

The Langley Memorial Aeronautical Laboratory (L. M. A. L.) tests were made on 5 by 30 inch models at a test speed of approximately 76 feet per second. Tests on most of the models were made at several pressures, but only the tests at a pressure of about 20 atmospheres are considered here. The average Reynolds Number for each test was determined and is in the neighborhood of 3,600,000 corresponding to full-scale conditions.

The Massachusetts Institute of Technology (M. I. T.) tests were made on 6 by 36 inch models at a test speed of 40 miles an hour. The test Vl is 29.33 sq. ft./sec.; approximate Reynolds Number, 187,000.

The McCook Field (McC. F.) tests were made on 6 by 36 inch models at various air speeds. Only the tests at 80 miles an hour are considered here, giving a test Vl of 58.67 sq. ft./sec.; approximate Reynolds Number, 374,000.

The Washington Navy Yard (W. N. Y.) tests were made on 5 by 30 inch models at a test speed of 40 miles an hour; test Vl, 24.44 sq. ft./sec.; approximate Reynolds Number, 156,000.

With the exception of the Göttingen airfoils of aspect ratio 5, all of the models had the normal aspect ratio of 6. The experimental results of the Göttingen tests could be corrected to an aspect ratio of 6, but since the results from the different laboratories are not directly comparable, it was thought best to leave the data in the original form.

PRESENTATION OF DATA

The data from the Göttingen tests are given separately for each airfoil in Tables III to VI; L. M. A. L. tests, Tables VII to XIV; M. I. T. tests, Tables XV to XXII; McC. F. tests, Tables XXIII to XXV; W. N. Y. tests, Tables XXVI to XXXVII.

The usual C_L, C_D, and C_L/C_D versus angle of attack curves for the 15 wing sections are presented in Figures 1 to 15, and a table is inserted on each figure giving the test conditions. It might have been preferable to have plotted the data from each laboratory in one figure but this was not practical on account of the interference in the numerous curves.

In Figures 16 to 30 are plotted the Lilienthal polar diagrams, C_D and C_M versus C_L, together with the induced drag polar curves.

C_L/C_D is replotted against speed ratio V/V_s in Figures 31 to 45. The center of pressure is also plotted against speed ratio as the curves are approximately straight lines and are easier to read than the usual plots of center of pressure against angle of attack.

Graphs of the profile drag coefficient C_{DO} versus lift coefficient are presented in Figures 46 to 50. For these graphs it was possible to plot the data from each laboratory in one diagram and therefore the curves in each group are comparable. This same method is followed in Figures 51 to 55 which give the ratio of the faired profile drag coefficient to the maximum lift coefficient plotted against speed ratio.

AIRFOIL CHARACTERISTICS AND CRITERIA

Various characteristic values and criteria for the wing sections derivable from the data and graphs are tabulated in Tables XXXVIII to XLIX. When convenient, the tabulation of the criteria are made with respect to the merit of the wing section and a note to that effect is under the heading to the table.

The above-mentioned tables are self-explanatory and derivations of the criteria can be found elsewhere, but a few brief remarks regarding the meaning of some of the criteria appears desirable.

C_L maximum, Table XLI, is the criterion for minimum speed with a given wing loading or if the minimum speed is given, it is the criterion for the load which can be carried per unit area of wing.

The maximum ratio C_L/C_D, Table XLIII, is well known as a criterion for airfoil efficiency, greatest weight carried for a given thrust. It being also a criterion for maximum speed regardless of minimum, flattest glide, and maximum range. The value of C_L at maximum C_L/C_D is also tabulated and should be considered along with the maximum ratio of lift to drag. The ratio of lift to drag is given for various fractions of C_L maximum in Table XLIV. These data show the effectiveness for speed and climb.

The ratio of C_L maximum to C_D minimum, Table XLV, is the criterion for maximum speed with a given minimum. With constant loading, (C_L^3/C_D^2) maximum, Table XLVI, is an index of minimum power, maximum rate of climb, maximum ceiling, maximum duration; the ratio of C_L^3 maximum to C_D^2 minimum, Table XLVII, is the criterion for maximum speed range. For additional detail on the above-mentioned criteria, the reader is referred to Reference 15.

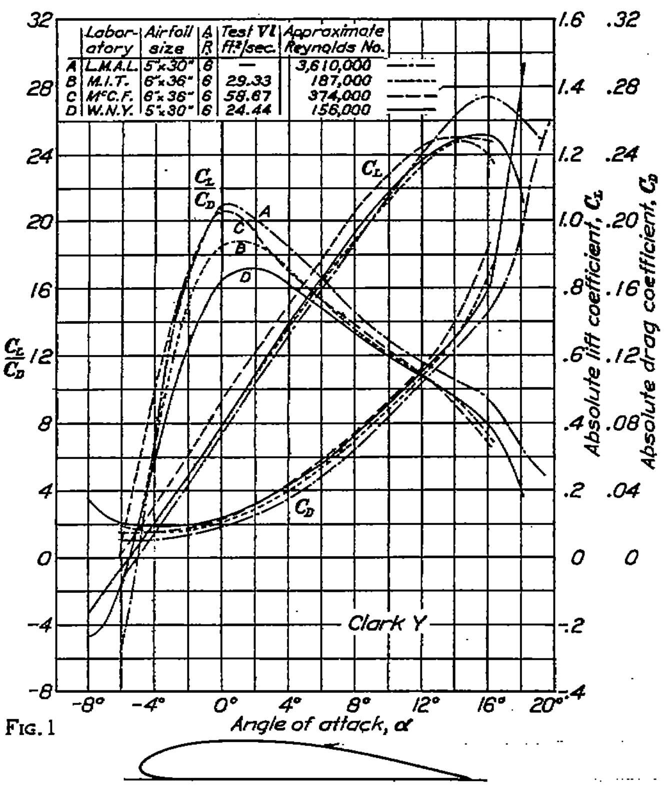

FIG. 1

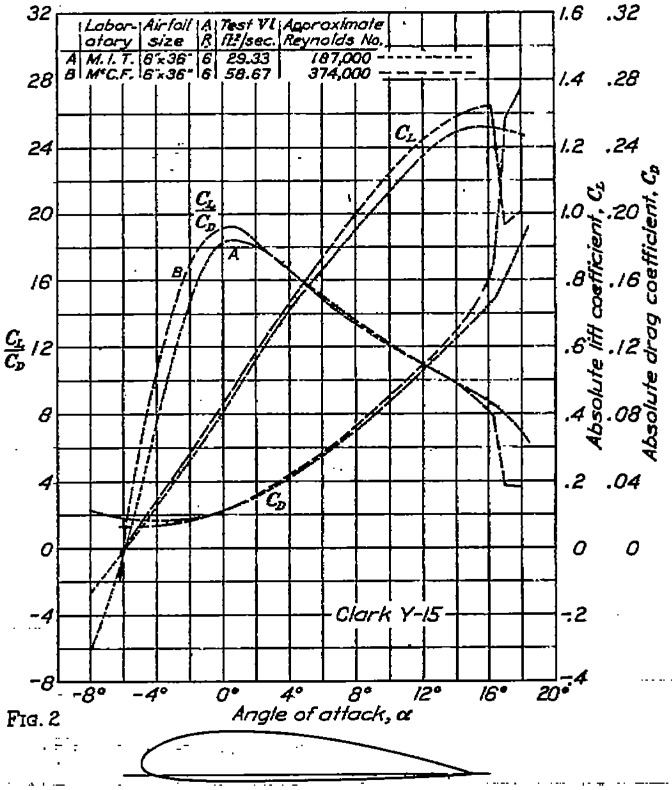

FIG. 2

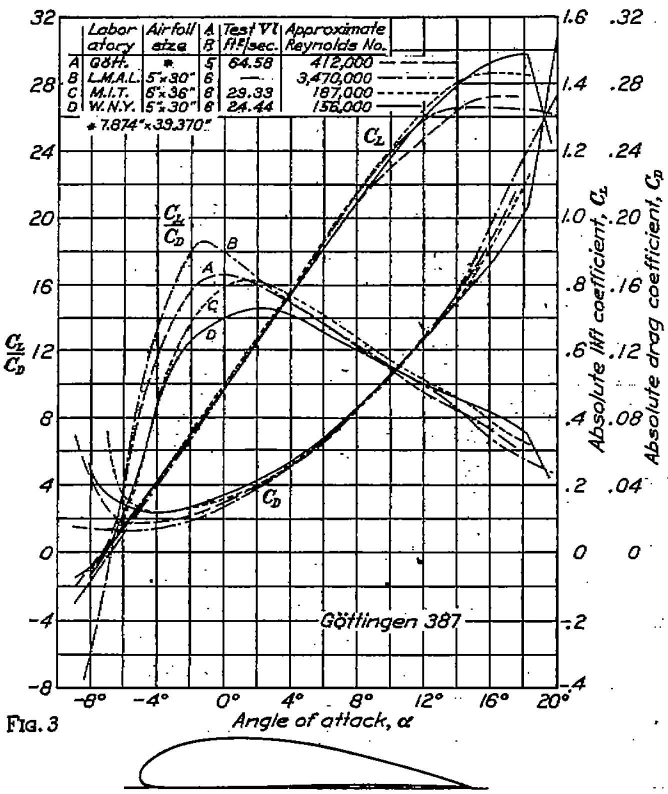

FIG. 3

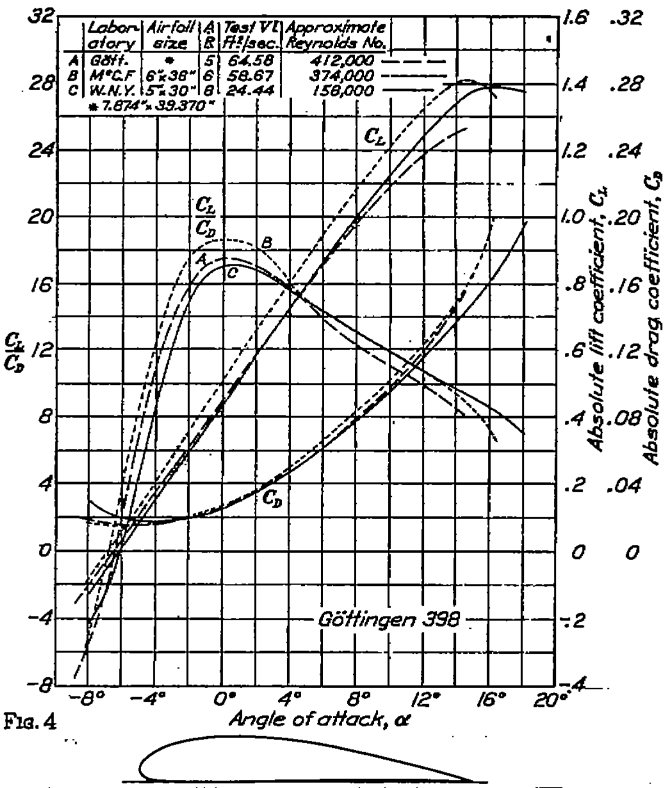

FIG. 4

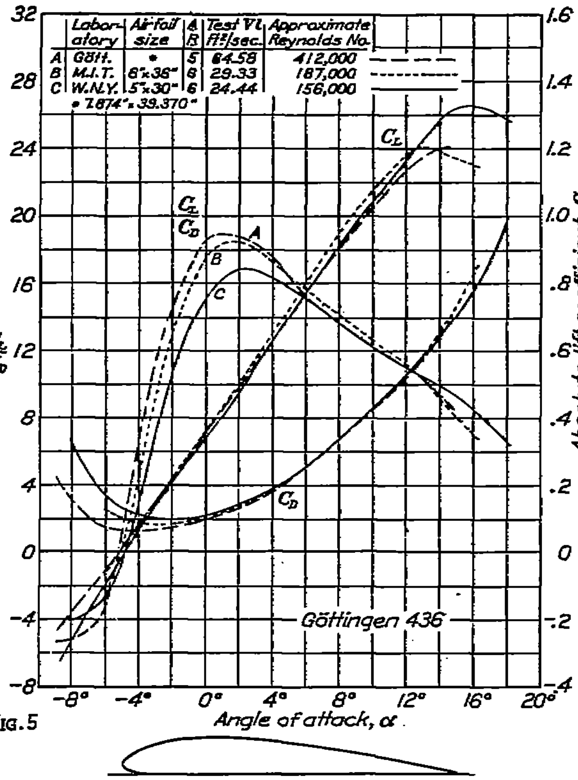

FIG. 5

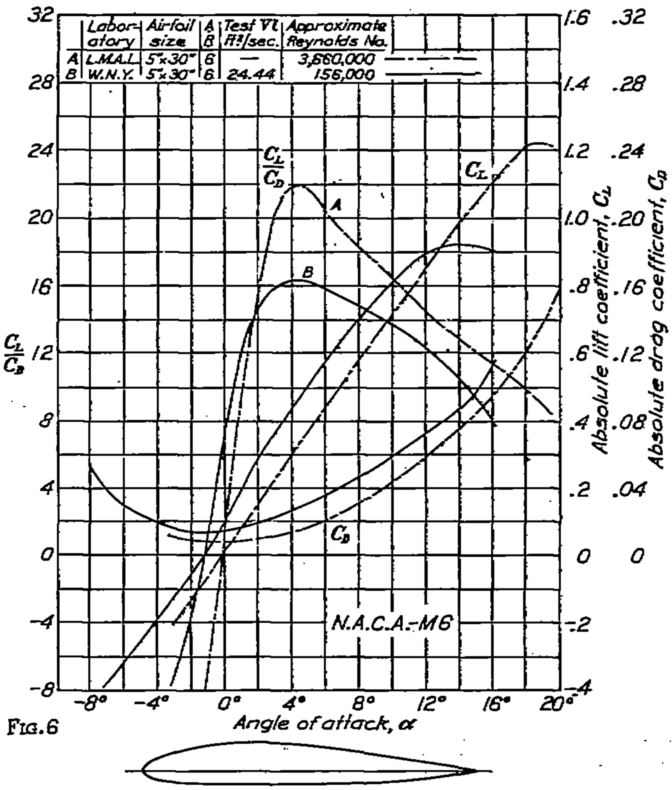

FIG. 6

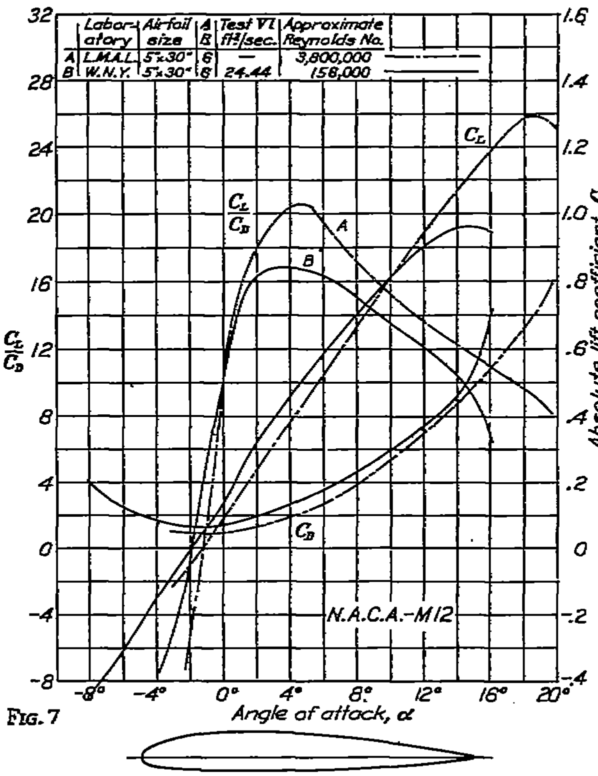

FIG. 7

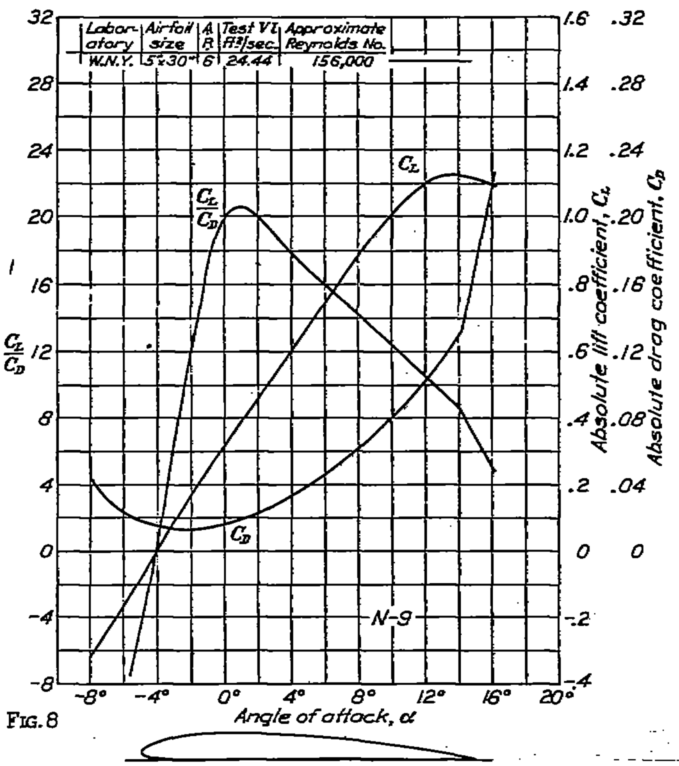

FIG. 8

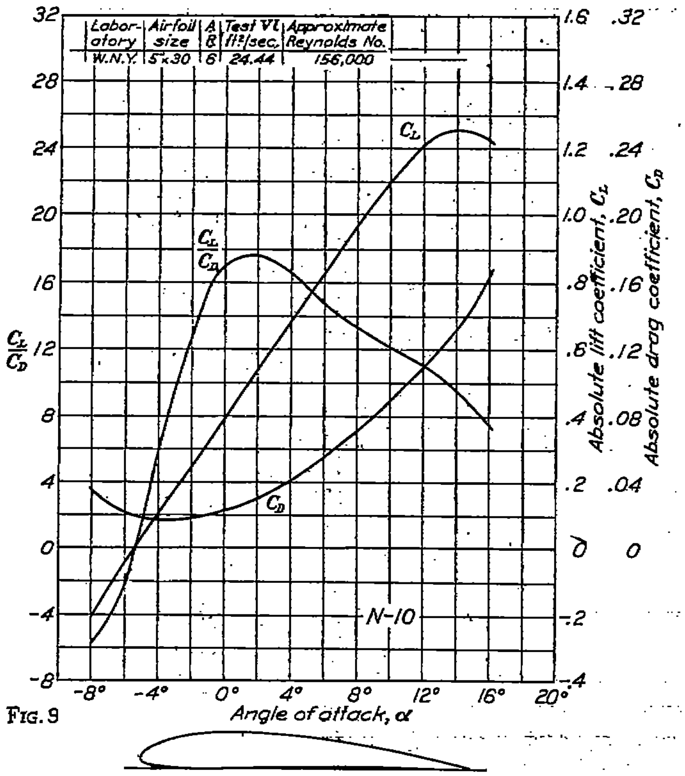

FIG. 9

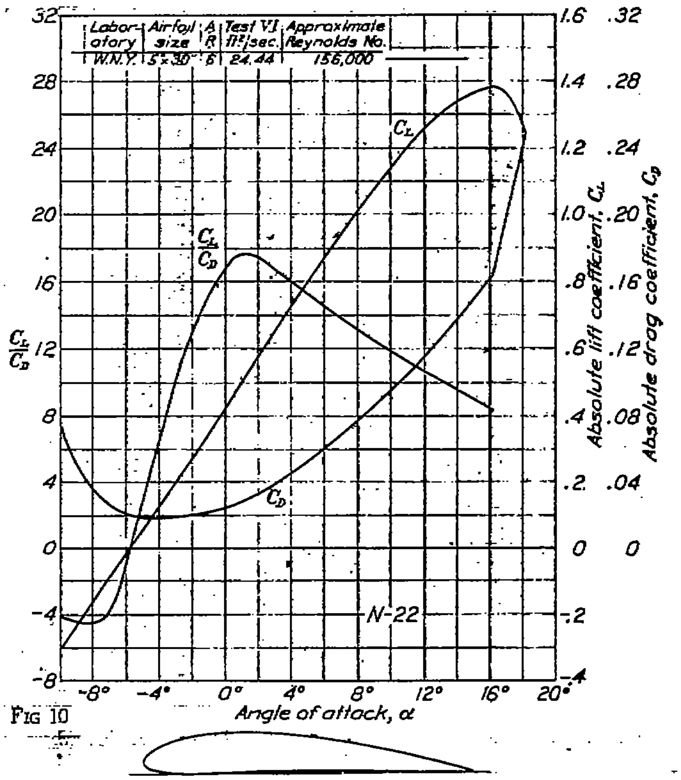

FIG. 10

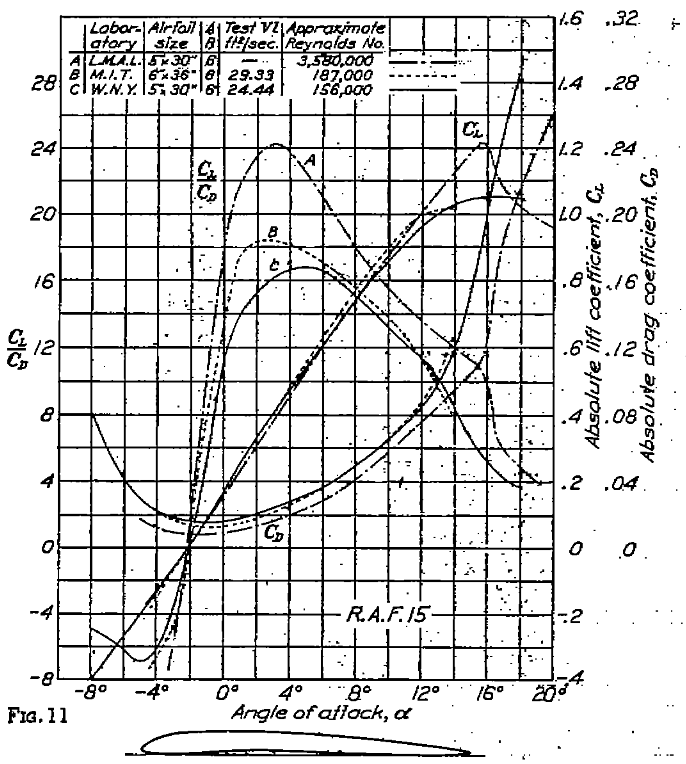

FIG. 11

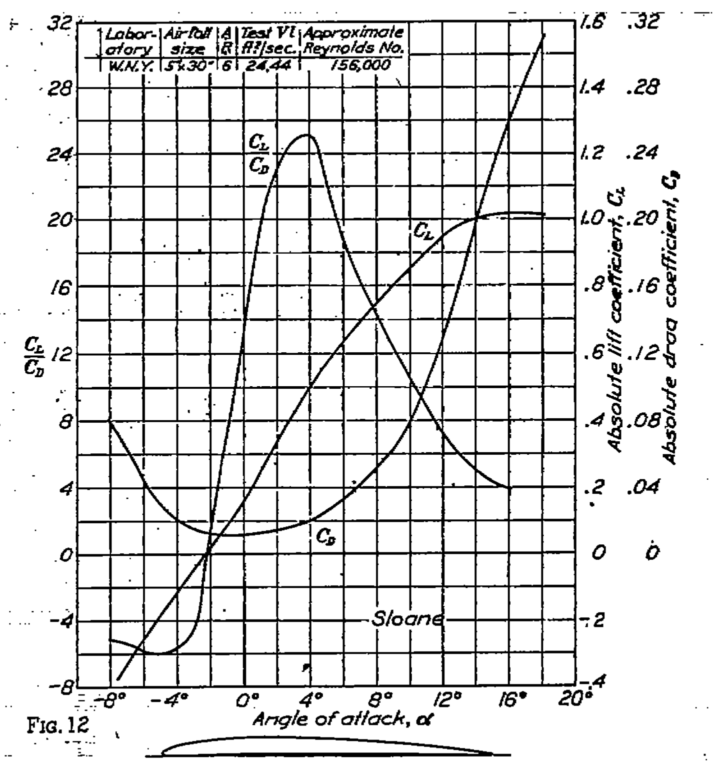

FIG. 12

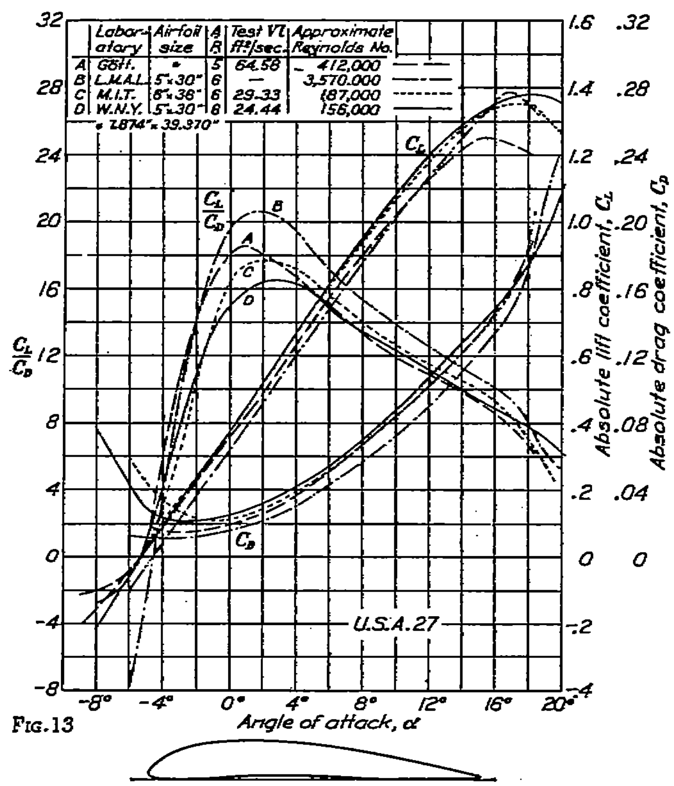

FIG. 13

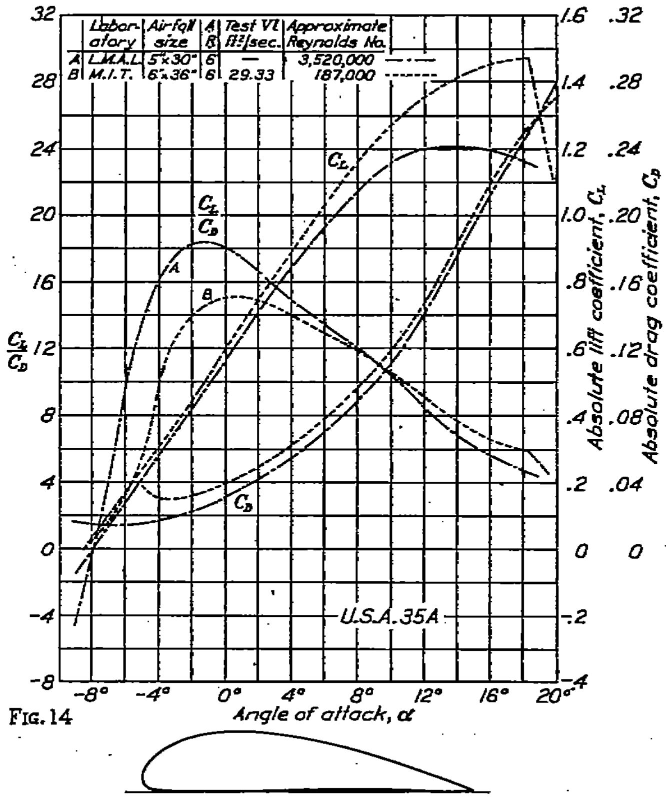

FIG. 14

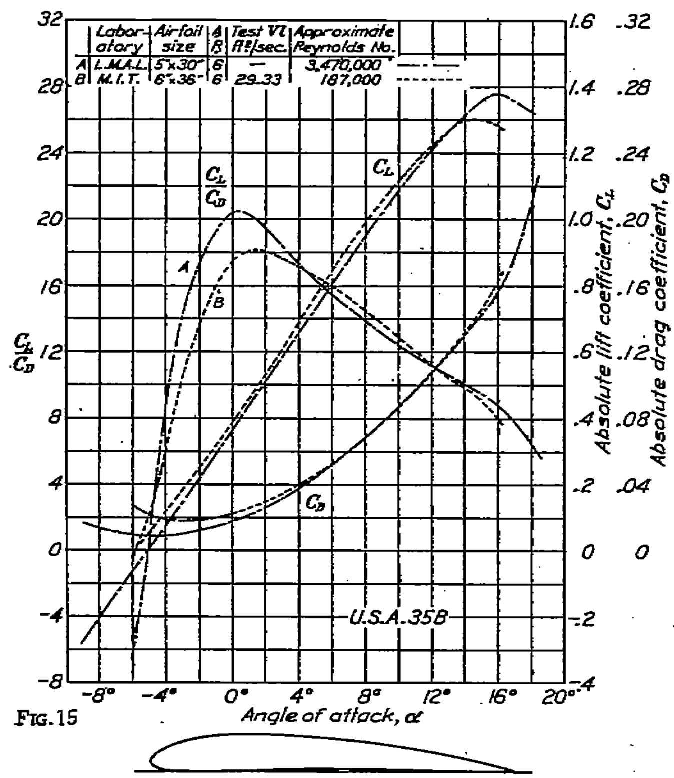

FIG. 15

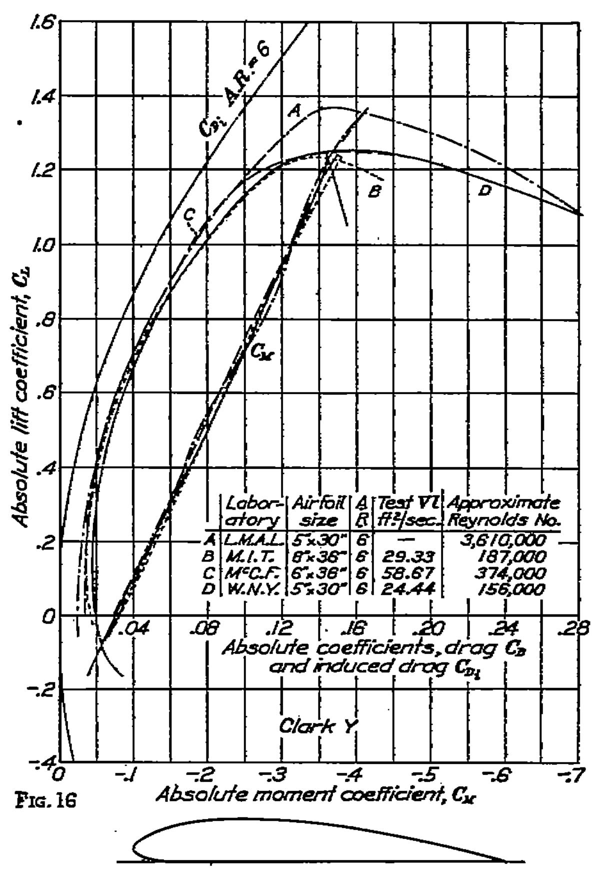

FIG. 16

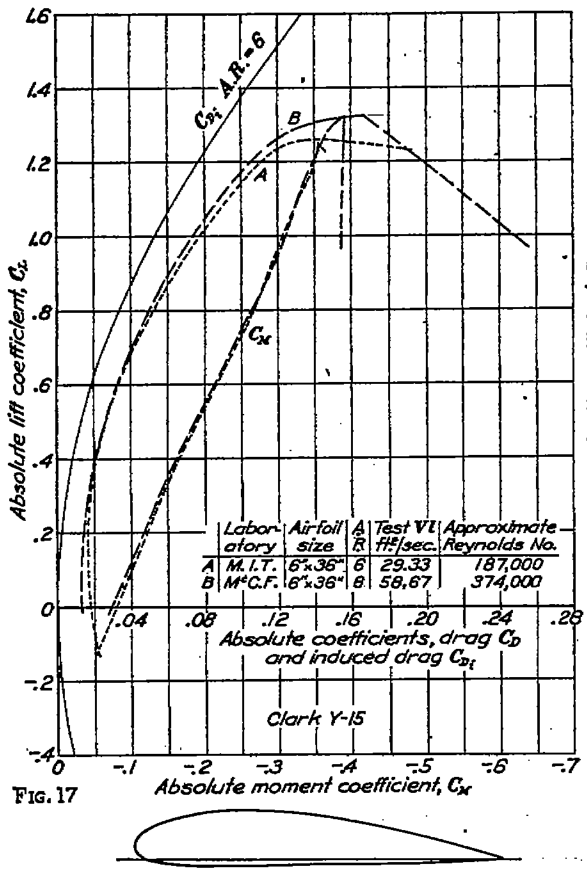

FIG. 17

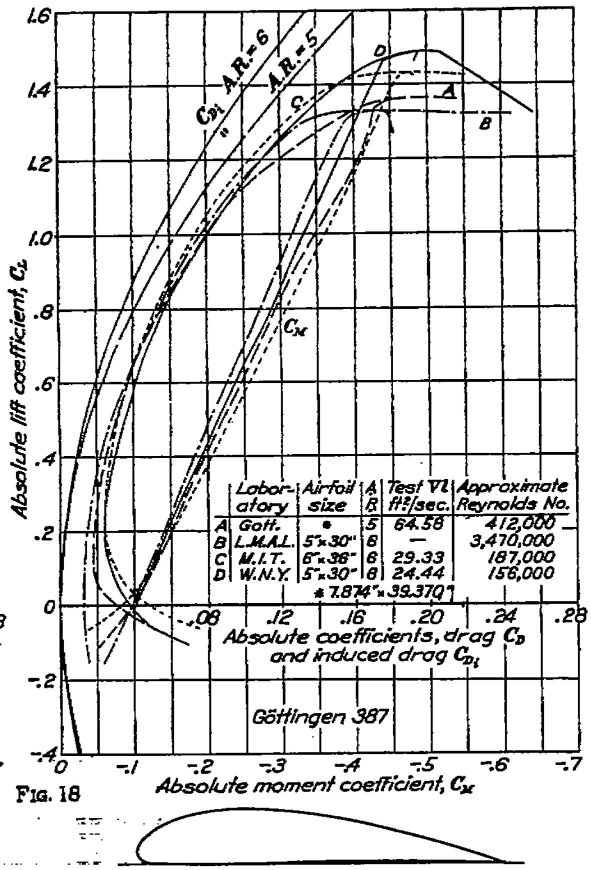

FIG. 18

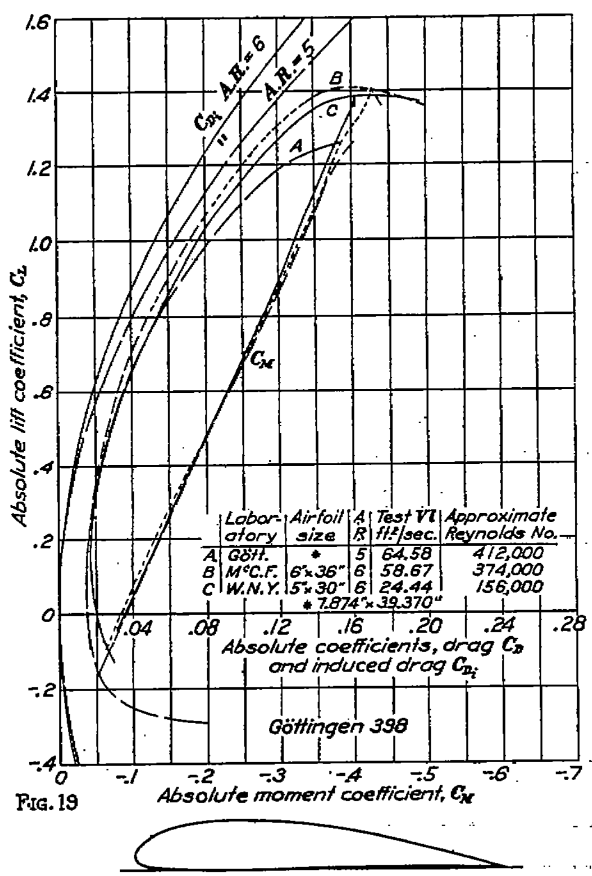

FIG. 19

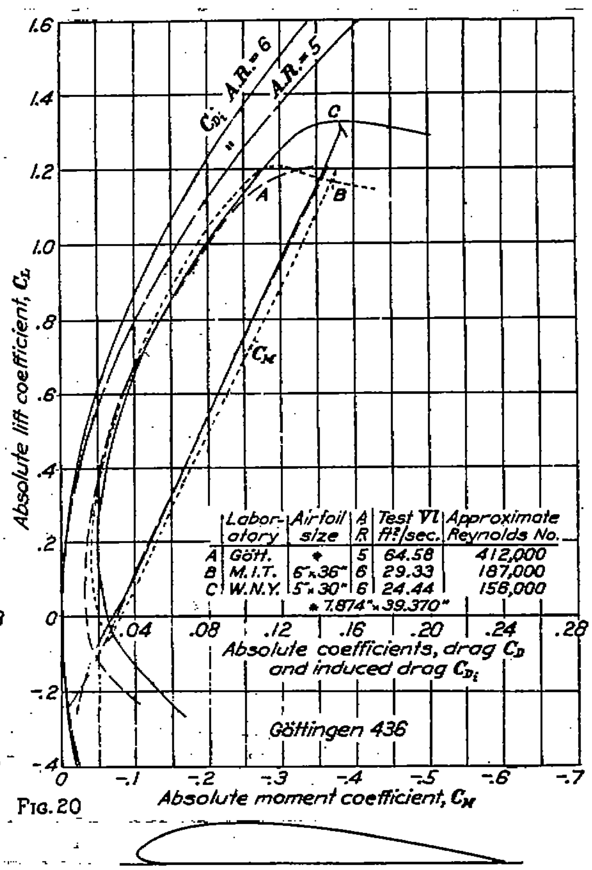

FIG. 20

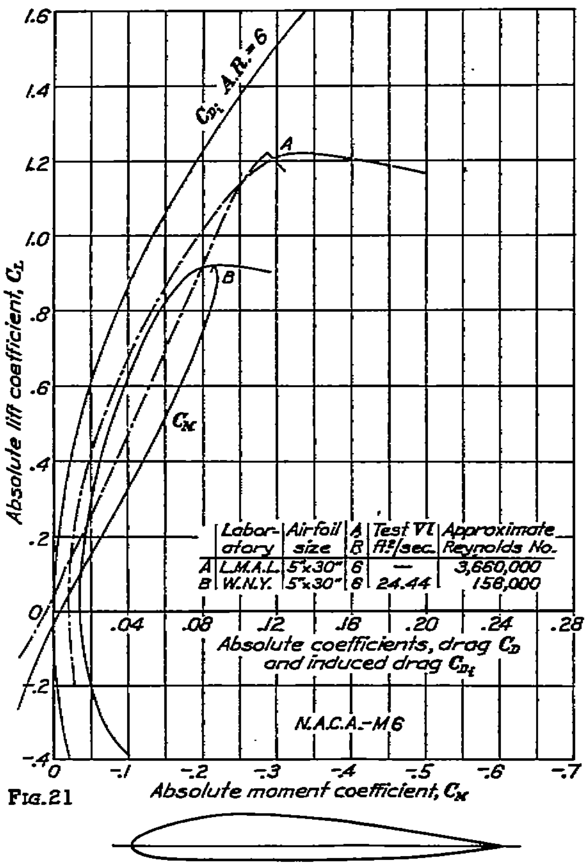

FIG. 21

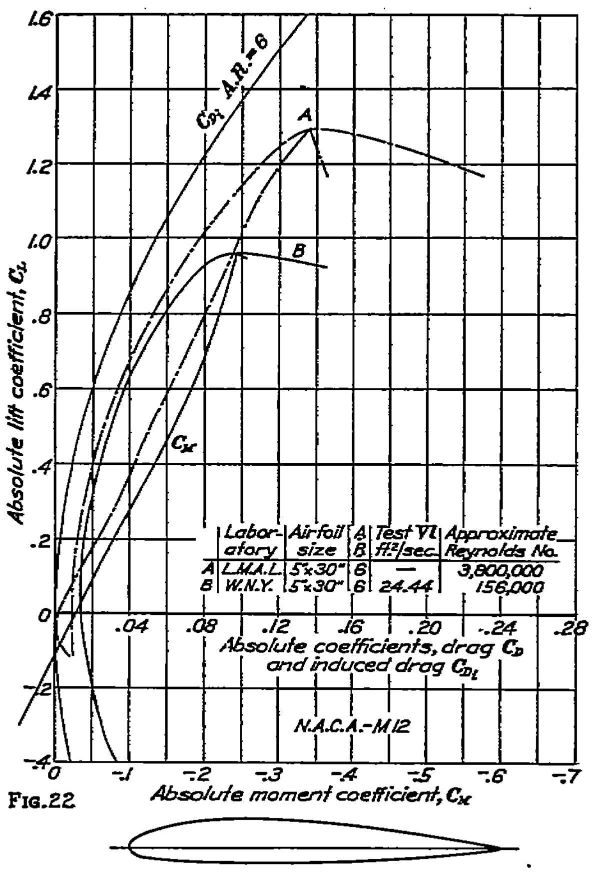

FIG. 22

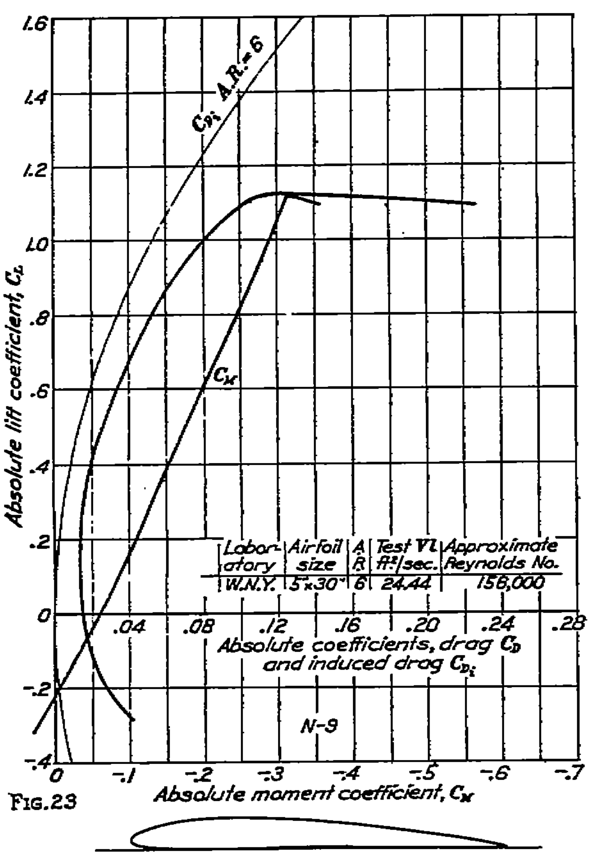

FIG. 23

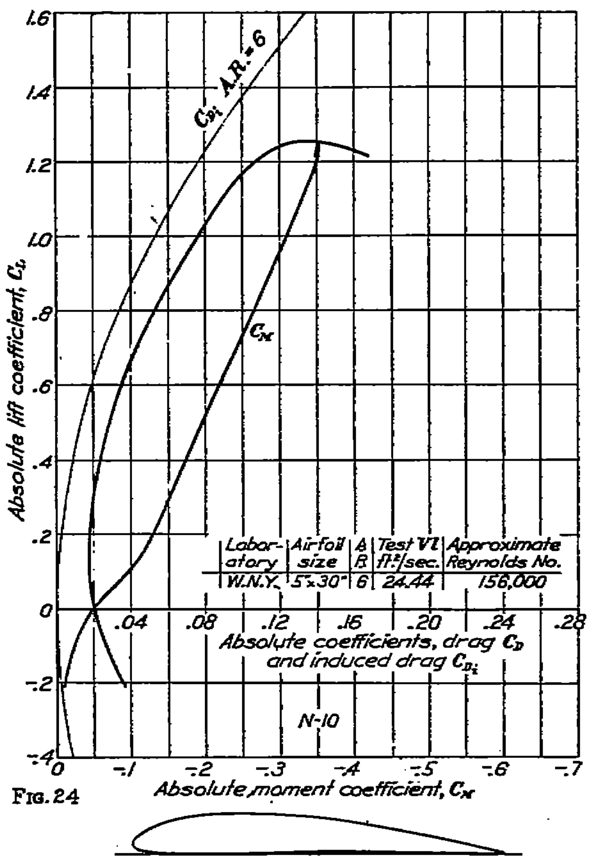

FIG. 24

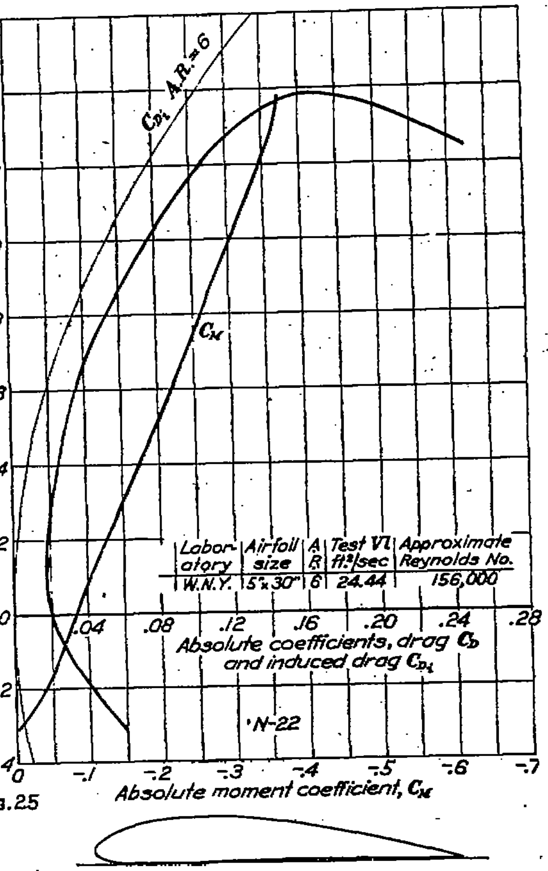

FIG. 25

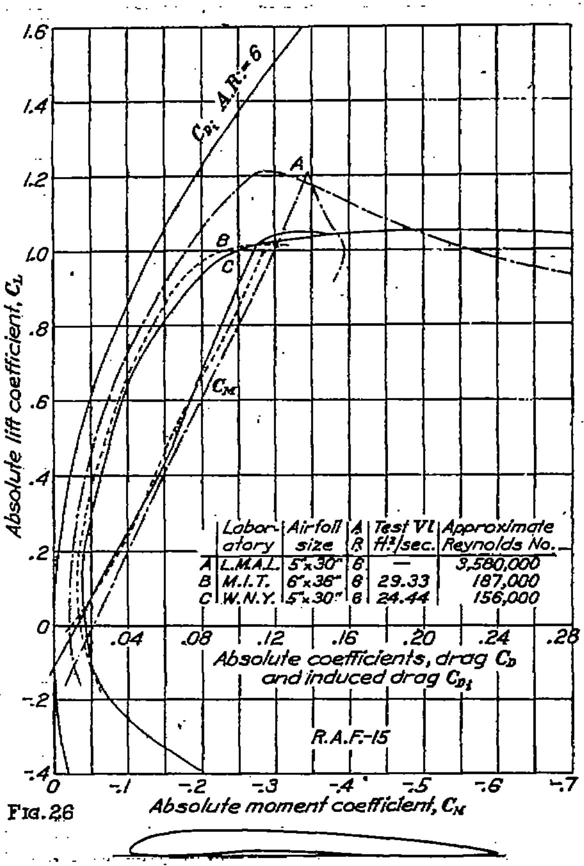

FIG. 26

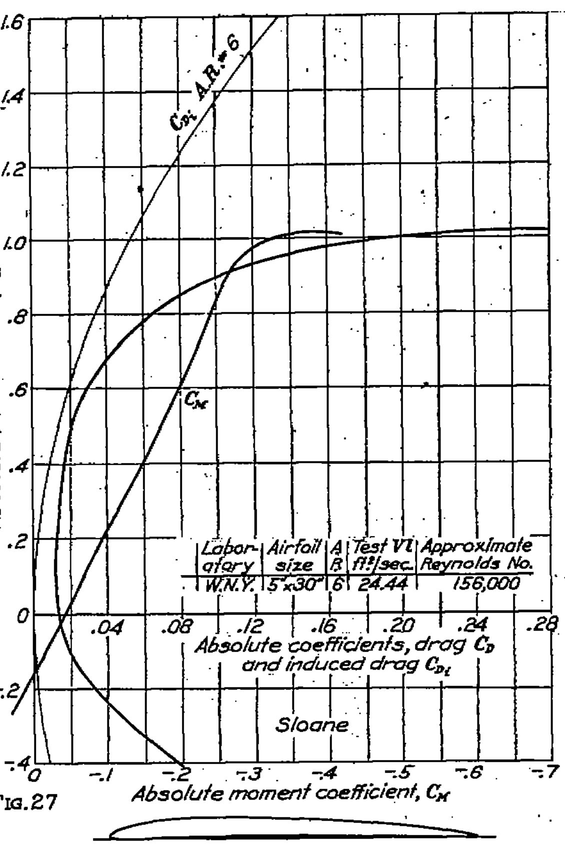

FIG. 27

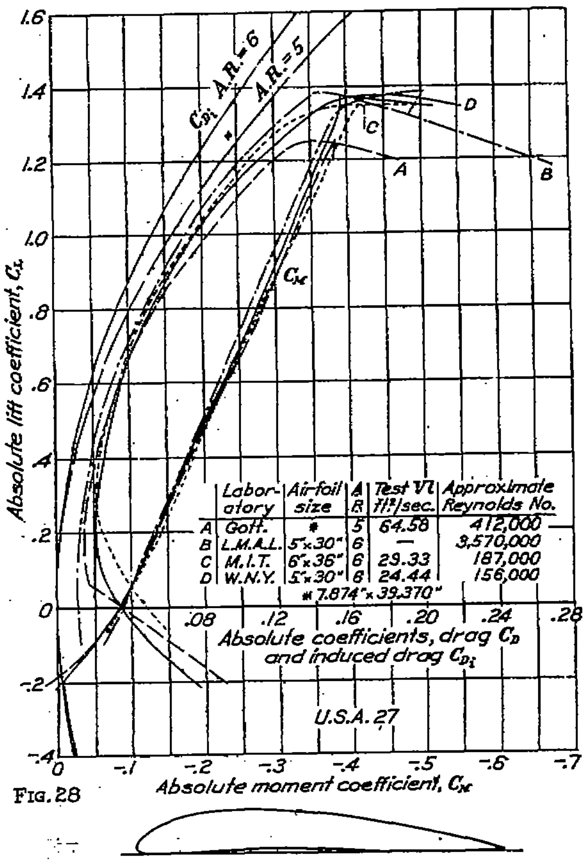

FIG. 28

Table XLIX and Figures 51 to 55 compare the data on the basis of total profile drag for constant load and stalling speed. It is shown in Reference 16 that the section selected will vary with major requirements as follows:

Maximum speed.—Section having least value of C_{D0}/C_L maximum at high speed ratios, $V/V_s>2.5$.

Maximum climb and ceiling.—Section having least value of C_{D0}/C_L maximum between $V/V_s=1.10$ and $V/V_s=1.5$.

Maximum endurance.—Section having least value of C_{D0}/C_L maximum at $V/V_s=1.10$.

General performance.—Section having least average value of C_{D0}/C_L maximum at all values of V/V_s.

SCALE EFFECT

The same conclusions regarding scale effect can be drawn from Figures 1 to 30 as have been drawn from previous test data. The following conclusions are quoted from Reference 17:

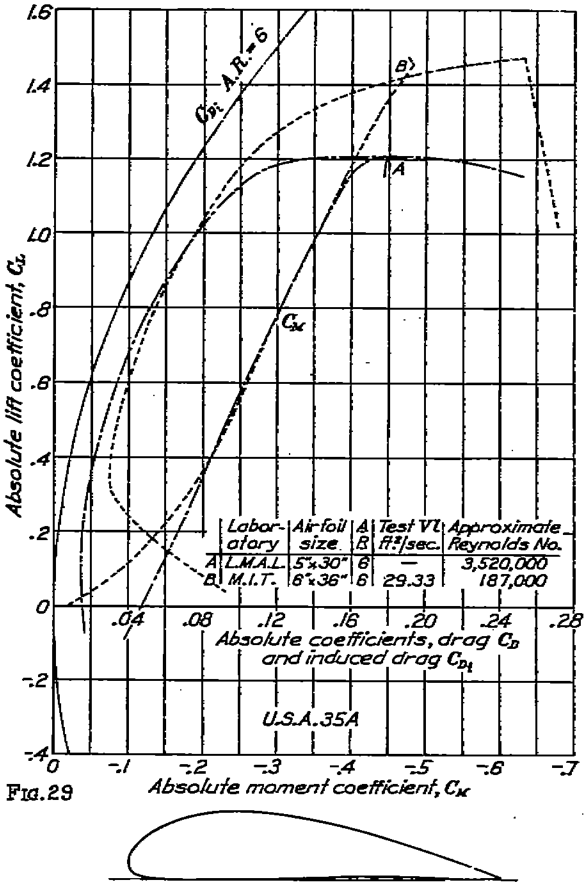

FIG. 29

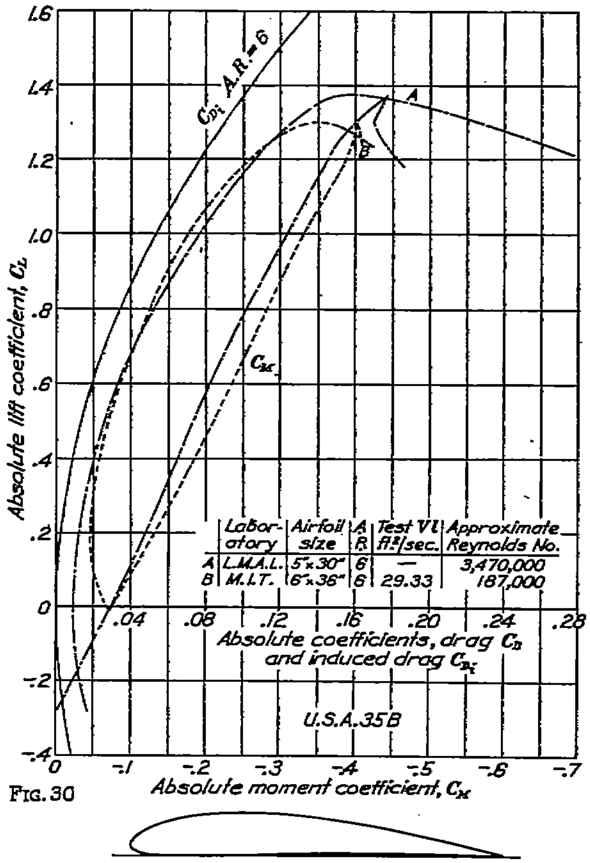

FIG. 30

The scale effects depend on the airfoil section and are in general similar for similar sections.

All airfoil sections may be roughly divided into three general classes as follows:

(*a*) The highly cambered or very thick section having a very high lift at Reynolds Numbers within the testing range of the average wind tunnel. This class usually shows a decrease in C_L maximum with increase in Reynolds Number.

(*b*) The moderately cambered, medium lift section. This class usually has a moderate, and favorable scale effect on C_L with a fairly low and favorable scale effect on C_D.

(*c*) The thin, to moderately thick, double cambered section of low lift at normal test Reynolds Numbers. This class usually shows a large increase in C_L maximum and a moderate decrease in C_D minimum with increase in Reynolds Number.

Airfoils such as the G–387 and U. S. A.–35A come in class (*a*); the R. A. F.–15 and Clark Y in class (*b*); the M–6 and M–12 in class (*c*).

USE OF THE DATA

The diagrams and tables enable an engineer to make a logical selection of a wing section.

The full-scale data from the L. M. A. L. tests should be used whenever possible since free-flight tests have verified the validity of these data.

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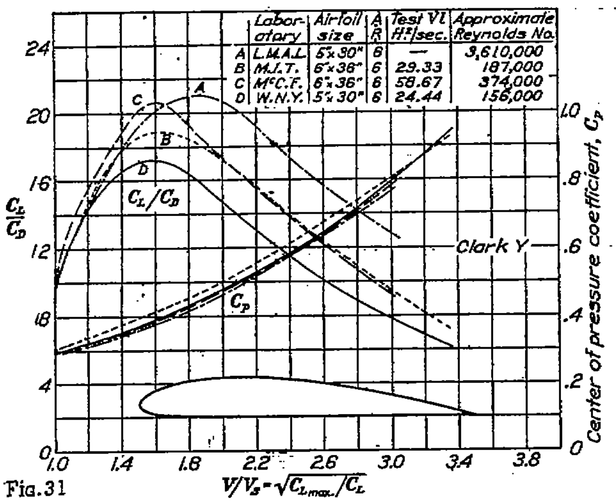

FIG. 31

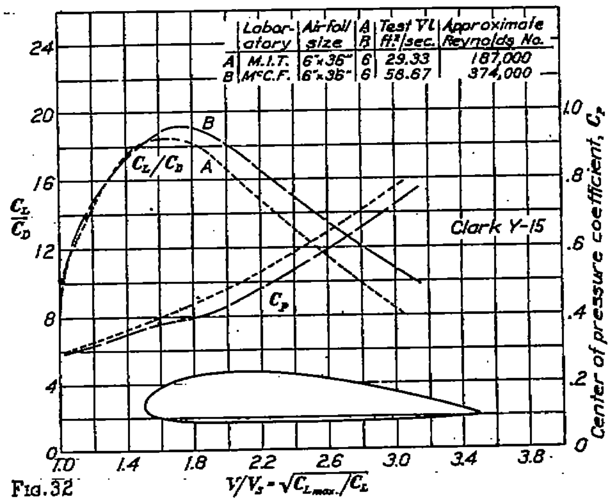

FIG. 32

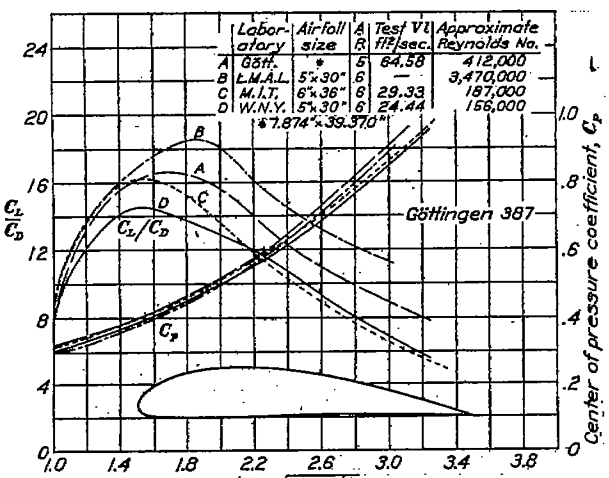

FIG. 33

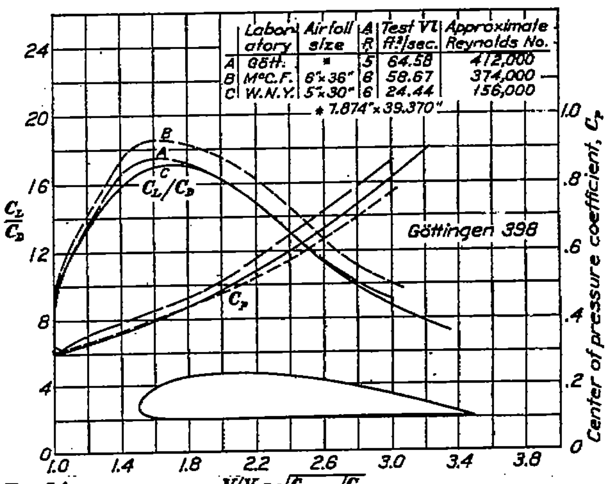

FIG. 34

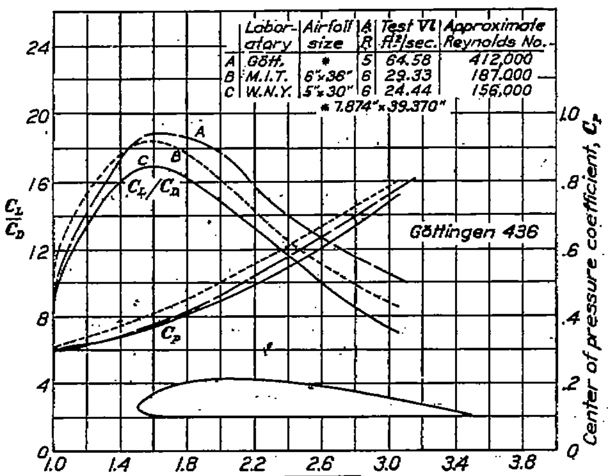

FIG. 35

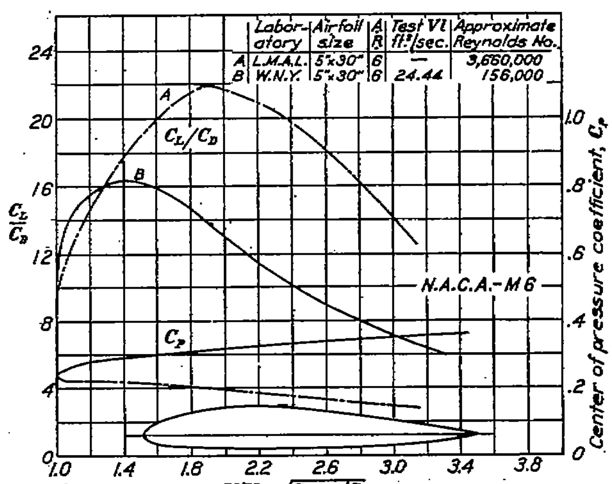

FIG. 36

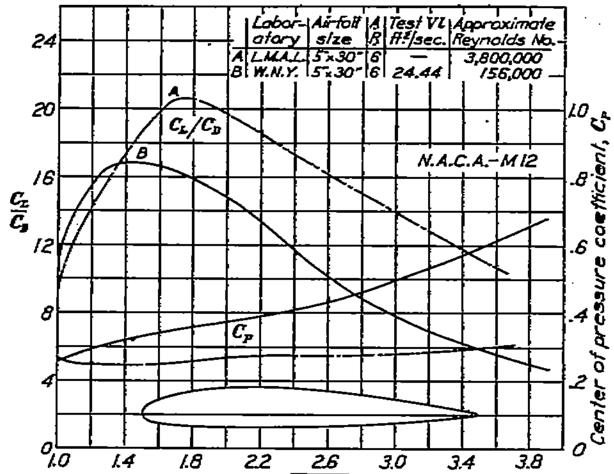

FIG. 37

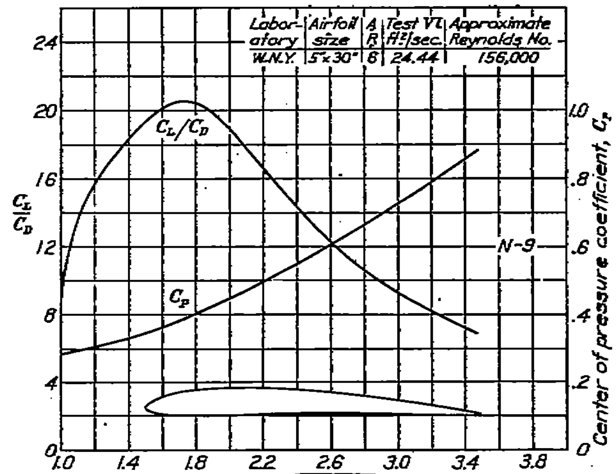

FIG. 38

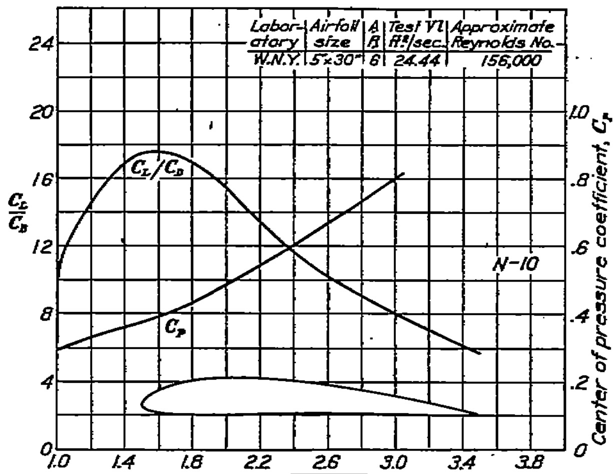

FIG. 39

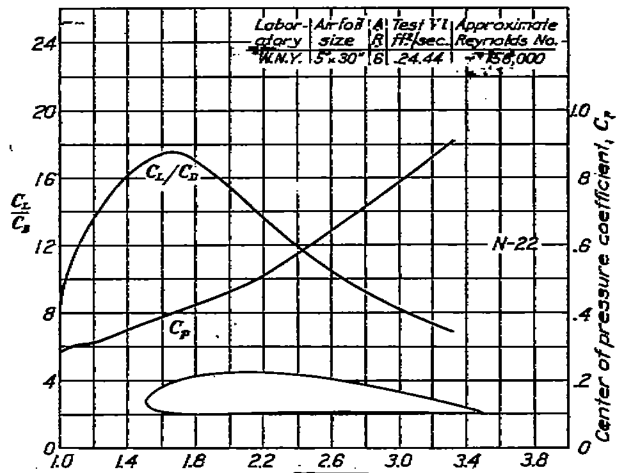

FIG. 40

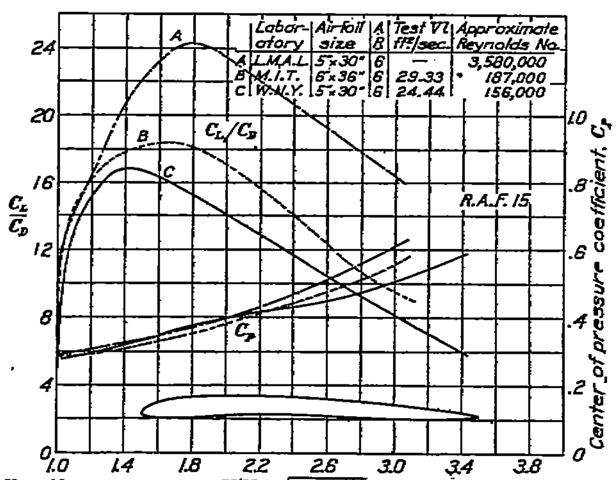

FIG. 41

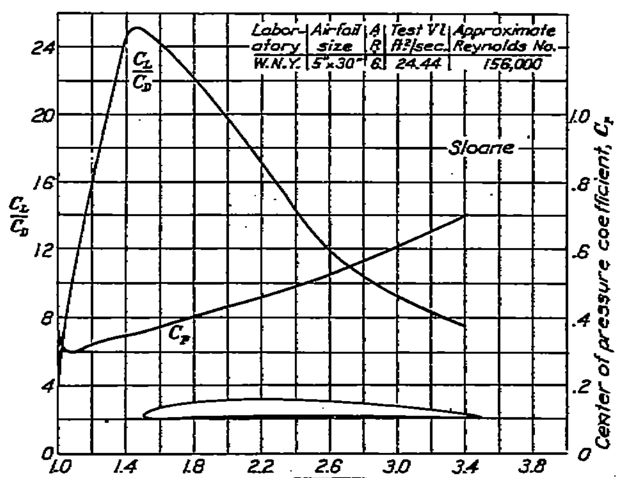

FIG. 42

Since the scale effect is in general similar for similar sections, it is to be expected that certain wing sections such as the G-398 and N-22 which show up well in an atmospheric tunnel would have good characteristics at full Reynolds Number. This has been verified by the flight test data on airplanes with these wing sections.

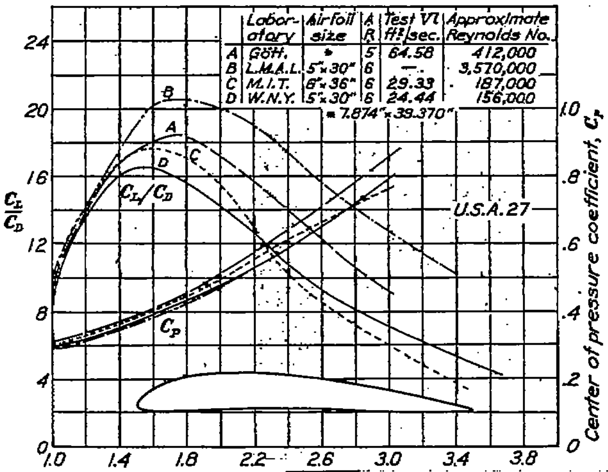

FIG. 43 $V/V_s = \sqrt{C_{L_{max.}}/C_L}$

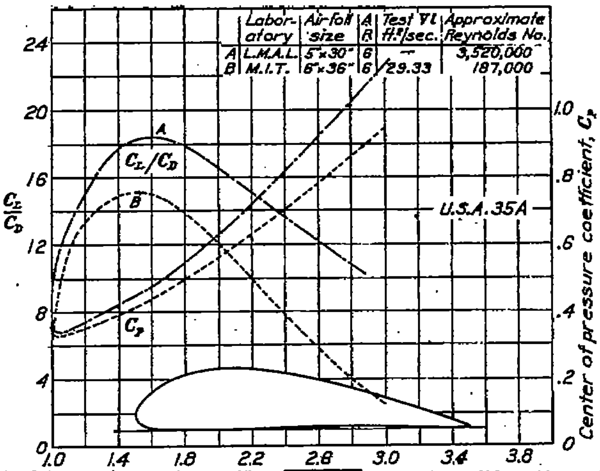

FIG. 44 $V/V_s = \sqrt{C_{L_{max.}}/C_L}$

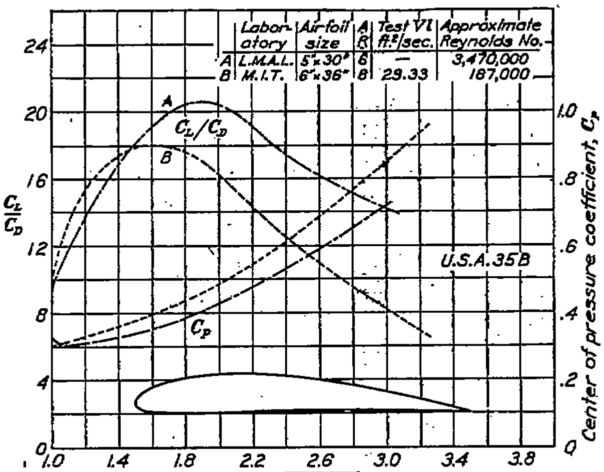

FIG. 45 $V/V_s = \sqrt{C_{L_{max.}}/C_L}$

CONCLUSIONS

The following conclusions can be drawn from this collection of airfoil data:

Direct comparison of the data should be made only when the Reynolds Numbers of the tests are the same. True relative values are then obtained at that Reynolds Number.

Allowance for the scale effect should be made when the tests are at different Reynolds Numbers.

The scale effect is in general similar for similar airfoil sections.

Test data at high Reynolds Numbers show better accord with free-flight data. Preference should therefore be given to data from the variable density tunnel.

More wings which show up well in an atmospheric tunnel should be tested at full scale. It is understood that this is now being done for a group of sections including the G-398.

BUREAU OF AERONAUTICS,
NAVY DEPARTMENT, *April 18, 1929.*

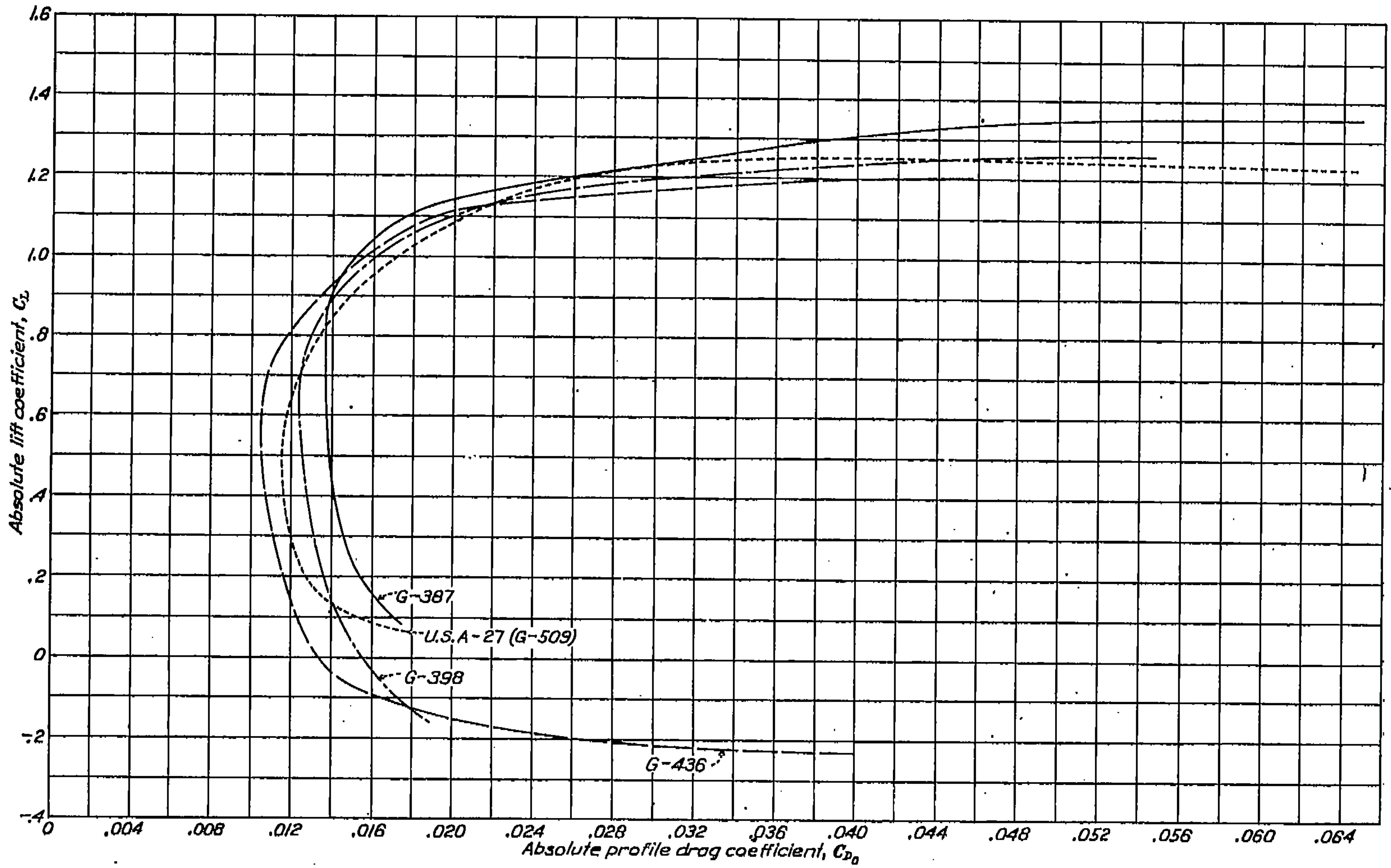

FIGURE 46.—Göttingen Laboratory tests. Airfoil size, 7.874×39.370 inches; aspect ratio, 5; test, Vl=64.58 square feet per second; approximate Reynolds Number, 412,000

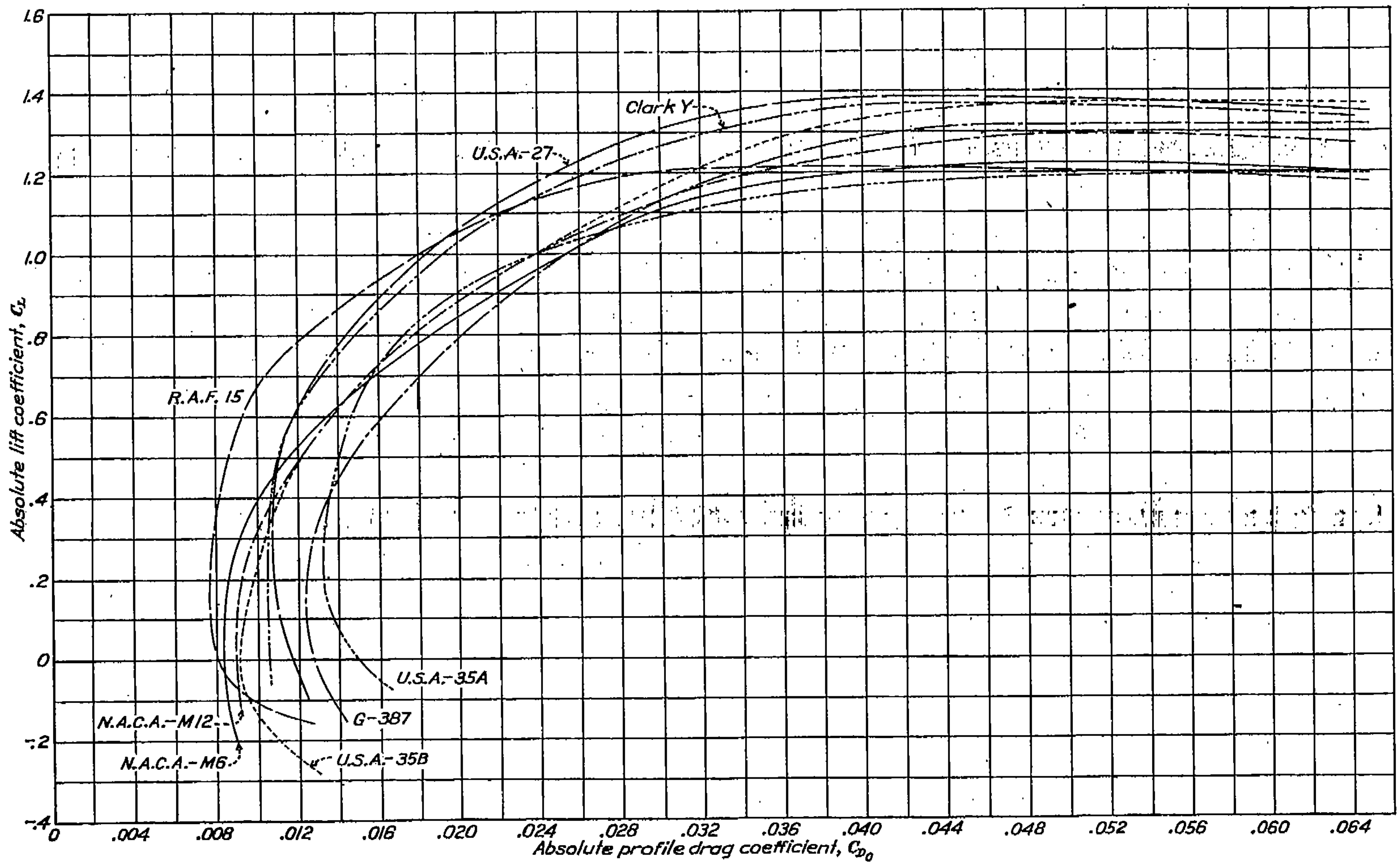

FIGURE 47.—Langley Memorial Aeronautical Laboratory tests. Airfoil size 5×30 inches; aspect ratio, 6. Airfoil, Clark Y, average Reynolds Number, 3,610,000; G-387, average Reynolds Number, 3,470,000; M-6, average Reynolds Number, 3,600,000; M-12, average Reynolds Number, 3,800,000; R. A. F.-15, average Reynolds Number, 3,580,000; U. S. A.-27, average Reynolds Number, 3,570,000; U. S. A.-35A, average Reynolds Number, 3,520,000; U. S. A.-35B, average Reynolds Number, 3,470,000

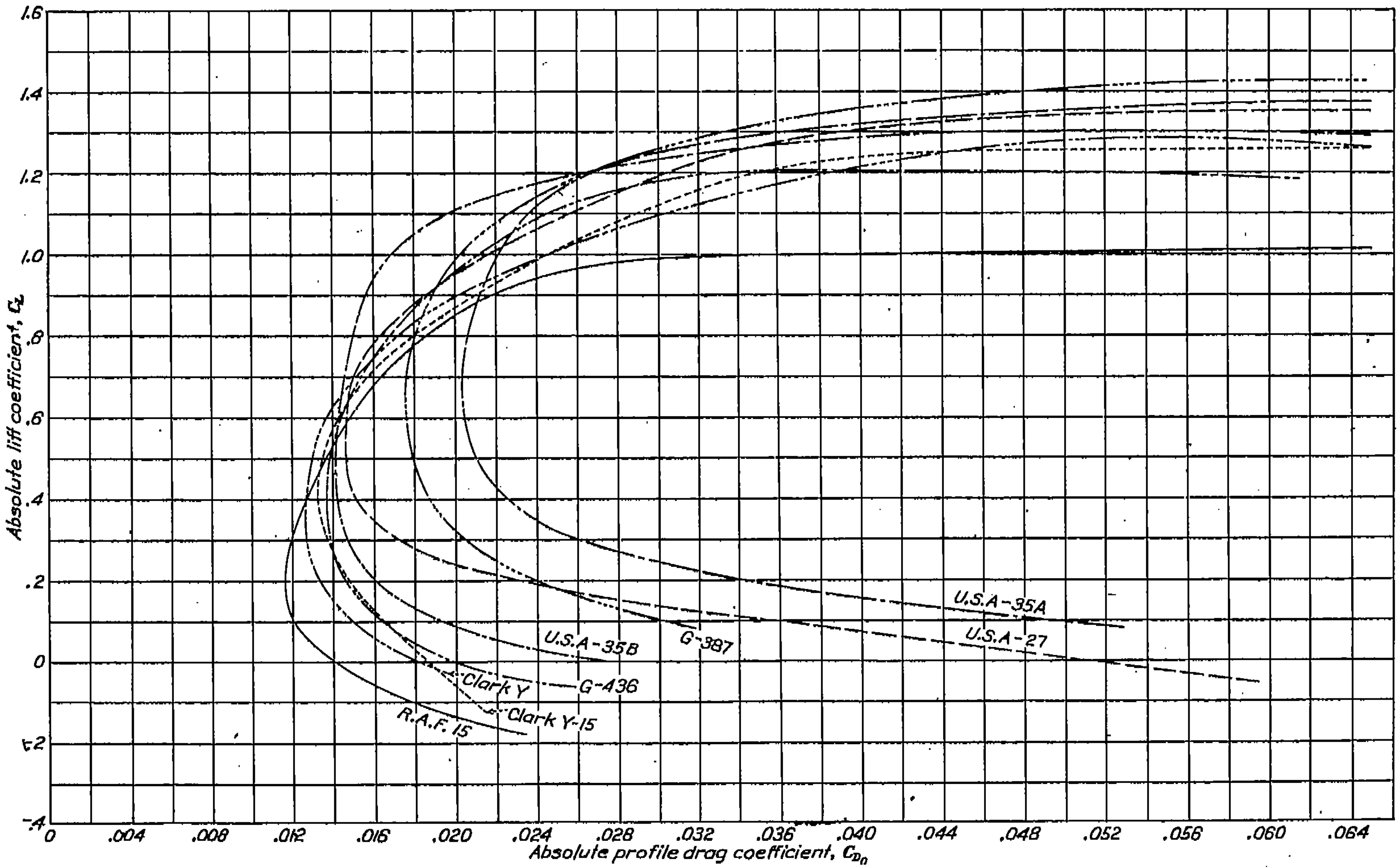

FIGURE 48.—Massachusetts Institute of Technology tests. Airfoil size 6×36 inches; aspect ratio, 6; test Vl=29.33 square feet per second; approximate Reynolds Number, 187,000

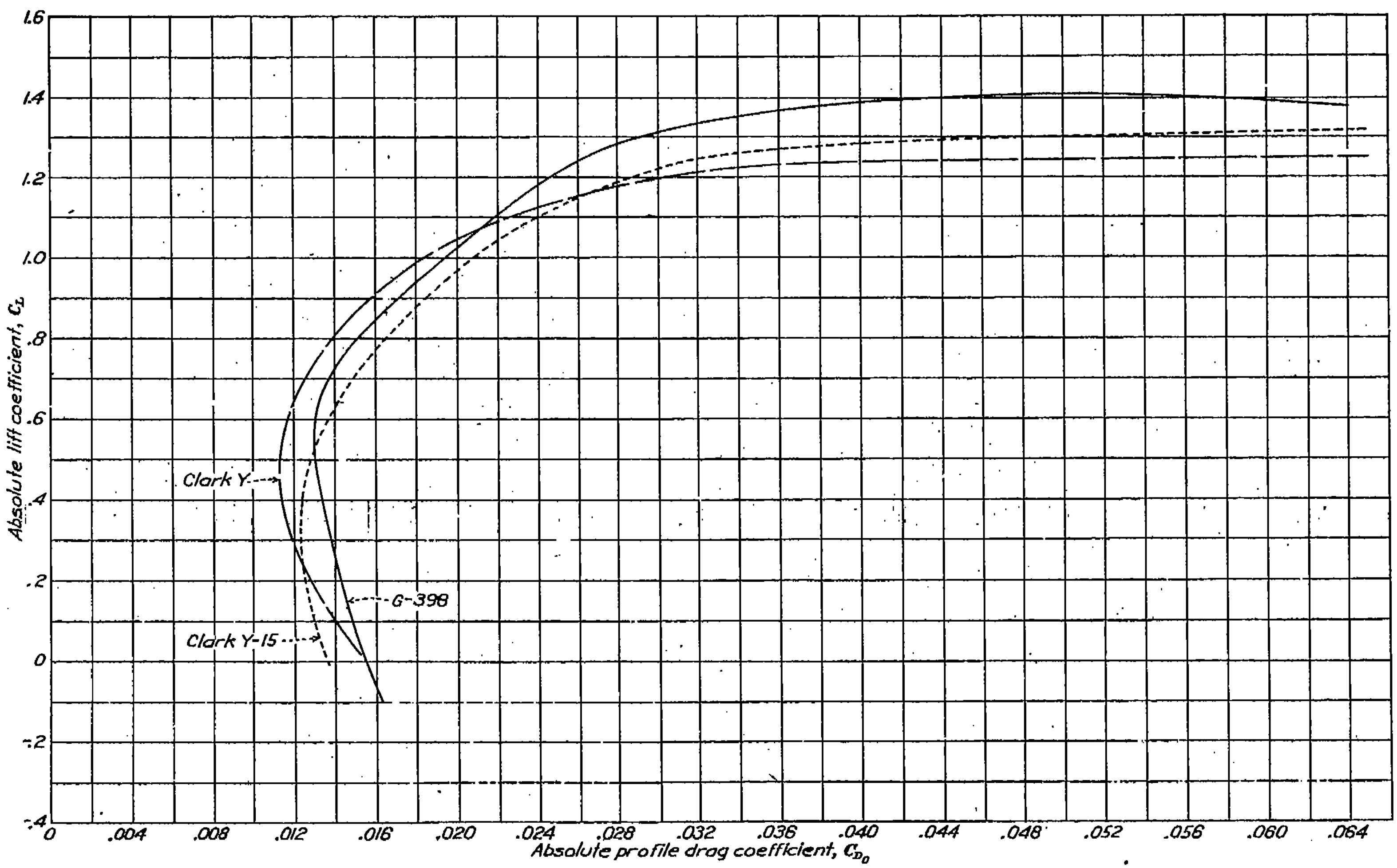

FIGURE 49.—McCook Field tests. Airfoil size, 6×36 inches; aspect ratio, 6; test VI=58.67 square feet per second; approximate Reynolds Number, 374,000

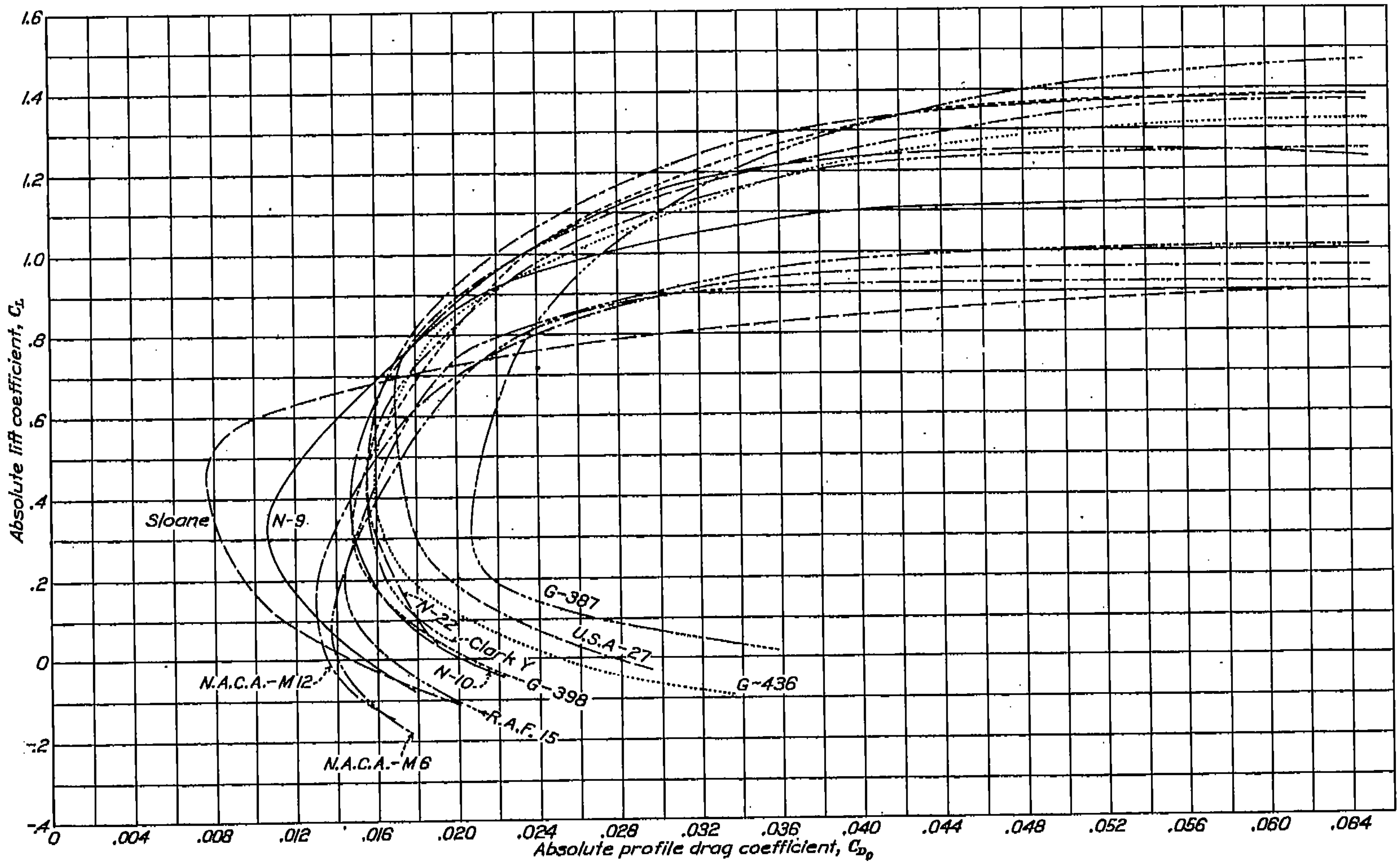

FIGURE 50.—Washington Navy Yard tests. Airfoil size, 5×30 inches; aspect ratio, 6; test, Vl=24.44 square feet per second; approximate Reynolds Number, 156,000

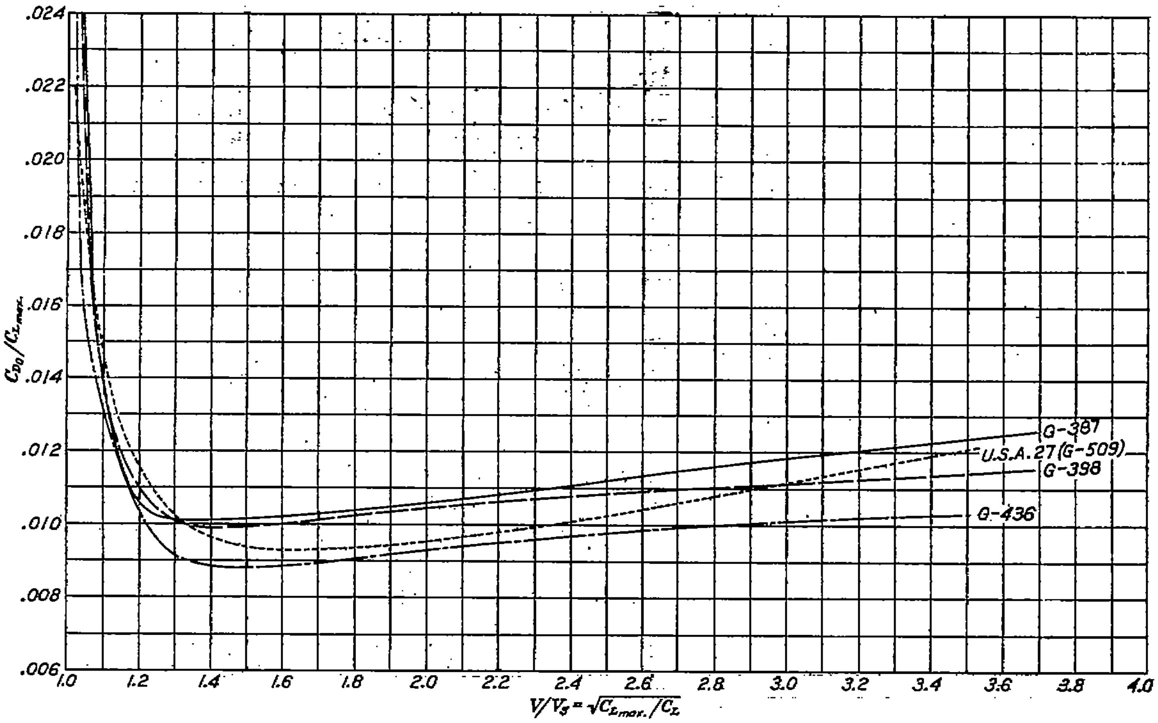

FIGURE 51.—Gottingen Laboratory tests. Airfoil size, 7.874×39.370 inches; aspect ratio, 5; test Vl=64.58 square feet per second; approximate Reynolds Number, 412,000

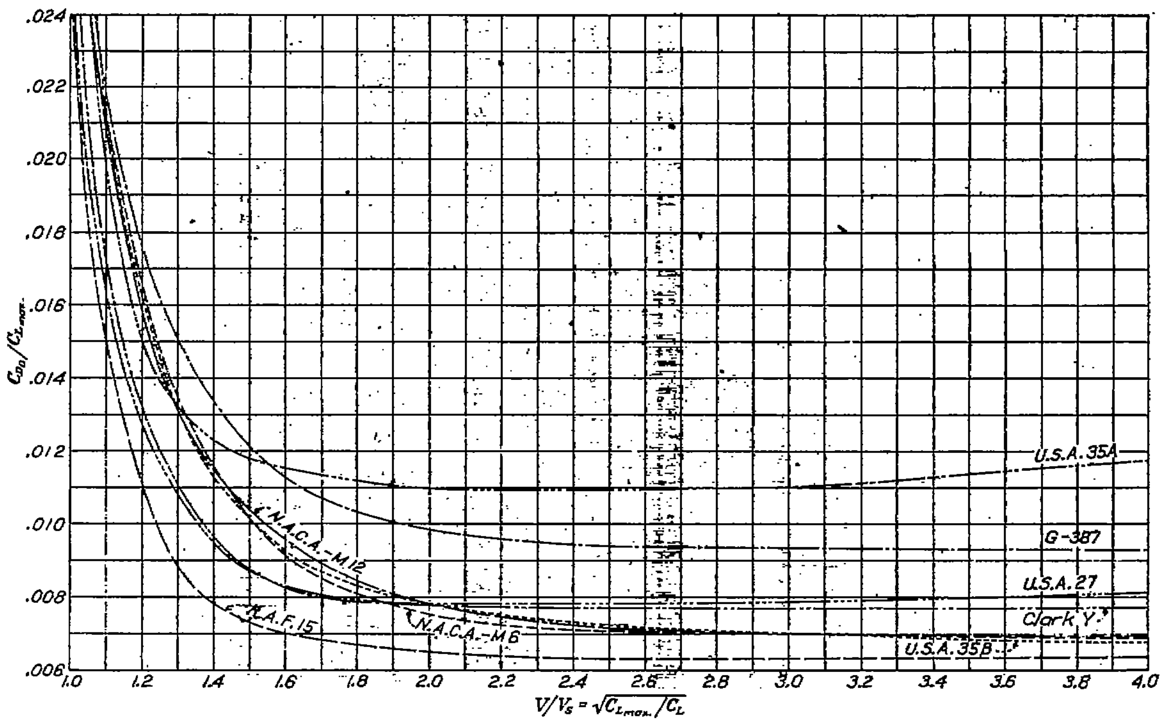

FIGURE 52.—Langley Memorial Aeronautical Laboratory tests. Airfoil size, 5×30 inches; aspect ratio, 6; approximate Reynolds Number, 3,600,000

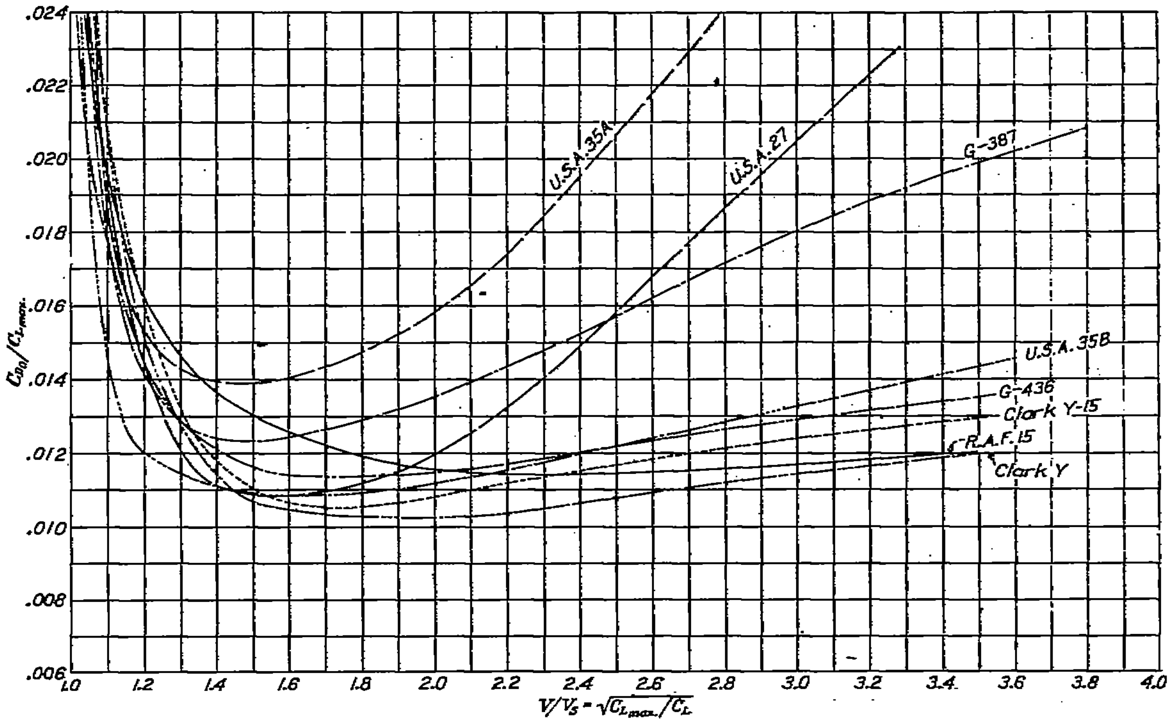

FIGURE 53.—Massachusetts Institute of Technology tests. Airfoil size, 6×36 inches; aspect ratio, 6; test VI×29.33 square feet per second; approximate Reynolds Number, 187,000

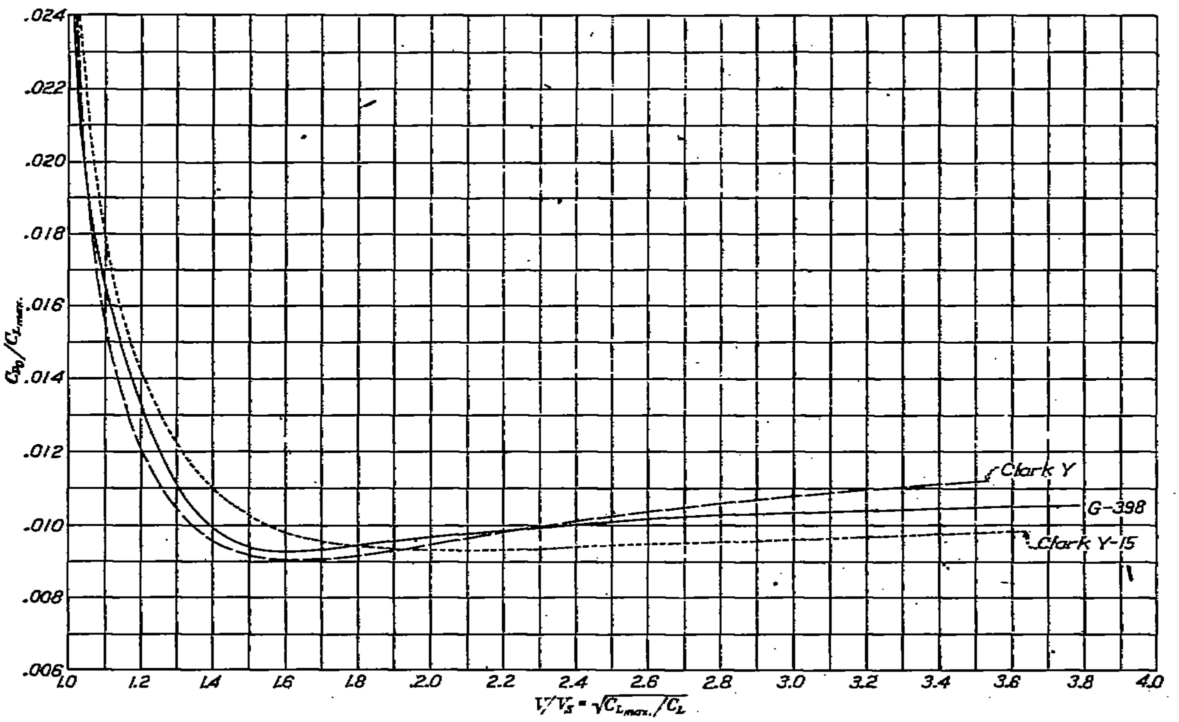

FIGURE 54.—McCook Field tests. Airfoil size, 6×36 inches; aspect ratio, 6; test, VI=58.67 square feet per second; approximate Reynolds Number, 374,000

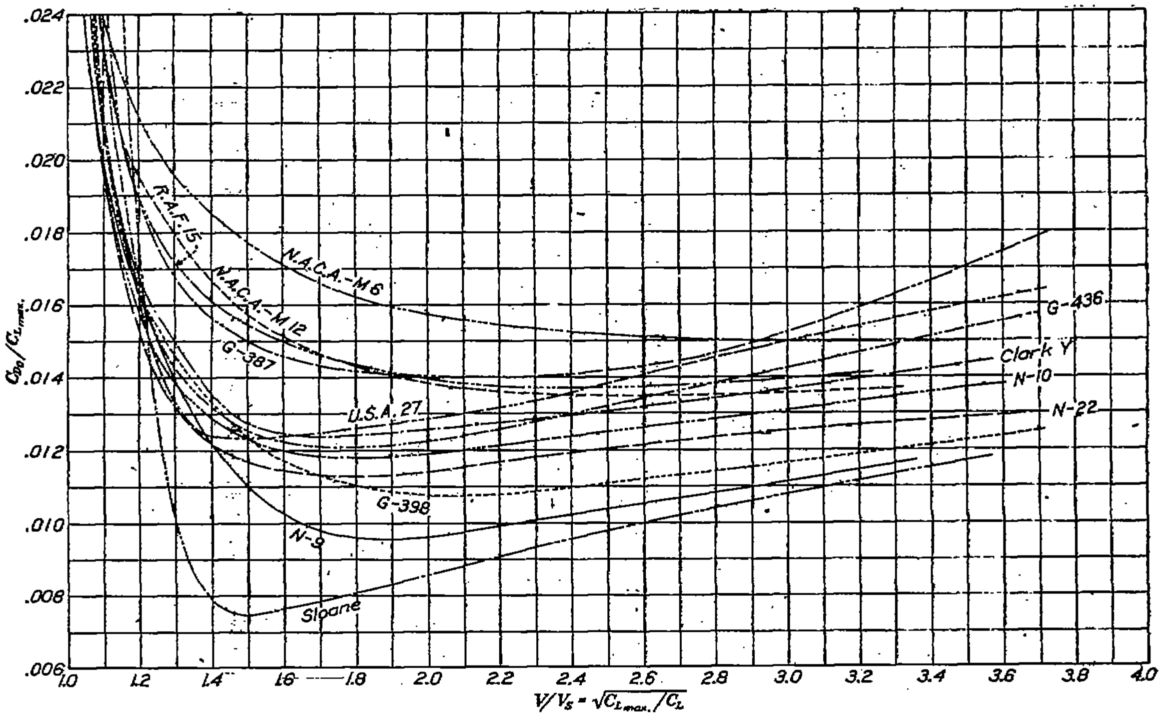

FIGURE 55.—Washington Navy Yard tests. Airfoil size, 5×30 inches; aspect ratio, 6; test, Vl=24.44 square feet per second; approximate Reynolds Number, 156,000

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TABLE I

SPECIFIED ORDINATES OF AIRFOIL SECTIONS

All dimensions are given in per cent of chord length

Distance from leading edge in percentage of chord	Clark Y		Clark Y-15		G-387		G-398	
	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber
0	3.49	3.49	3.50	3.50	3.78	3.78	3.74	3.74
1.25	5.53	1.94	5.98	1.43	6.53	1.43	6.20	1.89
2.5	6.50	1.46	7.21	.76	7.91	.93	7.40	1.28
5	7.87	.94	8.86	−.06	9.89	.40	9.17	.69
7.5	8.86	.61	10.01	−.50	11.32	.15	10.37	.35
10	9.63	.40	10.89	−.87	12.40	.03	11.25	.18
15	10.74	.15	12.17	−1.38	13.84	0	12.53	.03
20	11.35	.04	12.96	−1.57	14.71	.05	13.34	0
30	11.73	0	13.35	−1.65	15.34	.23	13.80	.05
40	11.40	0	13.00	−1.60	14.85	.38	13.34	.17
50	10.52	0	11.99	−1.48	13.47	.50	12.27	.27
60	9.18	0	10.44	−1.29	11.54	.57	10.63	.33
70	7.52	0	8.39	−1.04	9.21	.58	8.53	.35
80	5.54	0	5.95	−.73	6.58	.49	6.12	.27
90	3.22	0	3.19	−.39	3.61	.28	3.40	.13
95	1.88	0	1.75	−.25	2.02	.16	1.92	.06
100	.25	.25	.14	−.01	.25	.25	.25	.25

Distance from leading edge in percentage of chord	G-436		M-6		M-12		N-9	
	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber
0	2.66	2.66	0	0	0	0	2.25	2.25
1.25	4.53	1.21	1.97	−1.76	2.03	−1.65	3.72	1.14
2.5	5.54	.79	2.81	−2.20	2.86	−2.14	4.50	.77
5	7.00	.37	4.03	−2.73	4.01	−2.72	5.51	.39
7.5	8.11	.15	4.94	−3.03	4.89	−3.07	6.22	.21
10	8.98	.05	5.71	−3.24	5.59	−3.31	6.75	.11
15	10.16	0	6.82	−3.47	6.61	−3.62	7.52	.01
20	10.82	0	7.55	−3.62	7.30	−3.80	8.00	0
30	11.08	0	8.22	−3.79	7.95	−3.98	8.26	.03
40	10.55	0	8.05	−3.90	7.86	−3.96	8.00	.10
50	9.60	0	7.26	−3.94	7.25	−3.82	7.38	.16
60	8.28	0	6.03	−3.82	6.27	−3.50	6.38	.20
70	6.60	0	4.58	−3.48	4.98	−3.00	5.13	.21
80	4.70	0	3.06	−2.83	3.50	−2.31	3.67	.16
90	2.64	0	1.55	−1.77	1.89	−1.37	2.07	.08
95	1.54	0	.88	−1.08	1.07	−.81	1.26	.04
100	.25	.25	0	0	0	0	.25	0

Distance from leading edge in percentage of chord	N-10		N-22		R. A. F.-15		Sloane	
	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber
0	2.99	2.99	3.37	3.37	1.50	1.50	0.82	0.82
1.25	4.96	1.51	5.58	1.70	3.14	.76	1.89	.24
2.5	5.92	1.02	6.66	1.15	3.94	.50	2.56	.08
5	7.33	.55	8.25	.62	5.00	.18	3.37	.01
7.5	8.28	.28	9.33	.32	5.67	.02	3.95	.05
10	8.99	.14	10.13	.16	6.09	.02	4.38	.12
15	10.04	.01	11.28	.03	6.67	.18	4.95	.32
20	10.67	.00	12.01	0	6.96	.53	5.29	.50
30	11.01	.04	12.42	.05	6.94	1.02	5.62	.63
40	10.73	.14	12.01	.15	6.63	1.02	5.63	.57
50	9.85	.22	11.04	.24	6.13	.71	5.39	.48
60	8.50	.27	9.57	.30	5.52	.33	4.88	.38
70	6.83	.28	7.68	.32	4.79	.06	4.11	.30
80	4.90	.22	5.51	.24	3.91	.04	3.16	.21
90	2.74	.10	3.06	.12	2.81	.21	2.00	.10
95	1.60	.05	1.73	.05	2.17	.32	1.32	.04
100	.25	.25	.25	.25	.94	.94	.25	.25

TABLE I—Continued

SPECIFIED ORDINATES OF AIRFOIL SECTIONS—Continued

Distance from leading edge in percentage of chord	U. S. A.-27		U. S. A.-35A		U. S. A.-35B	
	Upper camber	Lower camber	Upper camber	Lower camber	Upper camber	Lower camber
0	1.77	1.77	4.33	4.33	2.84	2.84
1.25	3.89	.61	8.09	1.62	5.15	1.03
2.5	5.15	.35	9.58	.96	6.21	.63
5	6.95	.10	11.83	.42	7.62	.28
7.5	8.23	.01	13.58	.22	8.65	.14
10	9.19	0	14.88	.10	9.45	.07
15	10.52	.13	16.60	0	10.56	0
20	11.32	.37	17.72	.08	11.28	.05
30	11.87	.91	18.43	.25	11.76	.15
40	11.59	1.08	17.86	.44	11.41	.28
50	10.78	.78	16.16	.60	10.34	.39
60	9.57	.35	13.91	.67	8.91	.45
70	7.97	.07	11.12	.65	7.05	.42
80	5.92	.01	7.88	.55	5.02	.35
90	3.65	.19	4.33	.32	2.72	.20
95	2.33	.33	2.39	.19	1.52	.12
100	.74	.74	.43	0	.25	.25

TABLE II

SPECIFIED THICKNESS OF AIRFOIL SECTIONS

All dimensions are given in per cent of chord length

Airfoil section	Maximum thickness	Thickness at—			
		10 per cent from leading edge	15 per cent from leading edge	60 per cent from leading edge	70 per cent from leading edge
Clark Y	11.73	9.23	10.59	9.18	7.52
Clark Y-15	15.00	11.76	13.55	11.73	9.43
G-387	15.11	12.37	13.84	10.97	8.63
G-398	13.75	11.07	12.50	10.30	8.18
G-436	11.08	8.93	10.16	8.28	6.60
M-6	12.01	8.95	10.29	9.85	8.06
M-12	11.93	8.90	10.23	9.77	7.98
N-9	8.23	6.64	7.51	6.18	4.92
N-10	10.97	8.85	10.03	8.23	6.55
N-22	12.37	9.97	11.25	9.27	7.30
R. A. F.-15	6.49	6.07	6.49	5.19	4.73
Sloane	5.06	4.26	4.63	4.50	3.81
U. S. A.-27	10.96	9.19	10.39	9.22	7.90
U. S. A.-35A	18.18	14.78	16.60	13.24	10.37
U. S. A.-35B	11.61	9.38	10.56	8.46	6.63

TABLE III

G-387 AIRFOIL — GÖTTINGEN TEST

Airfoil size, 7.874 x 39.370 inches.
Aspect ratio, 5.

Test speed, 98.42 ft./sec.
Test Vl, 64.58 sq. ft./sec.

Data with tunnel wall interference corrections applied are taken from Reference 3

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−9.0	−0.104	0.0690	−0.058	----------	−1.51	----------	0.0683
−6.0	.082	.0180	−.123	----------	4.55	----------	.0175
−4.6	.182	.0179	−.146	0.79	10.2	2.74	.0157
−3.1	.280	.0201	−.167	.60	13.9	2.21	.0151
−1.6	.380	.0235	−.192	.50	16.2	1.89	.0148
−0.2	.468	.0291	−.218	.45	16.1	1.71	.0151
1.3	.581	.0357	−.242	.41	16.3	1.53	.0141
2.7	.681	.0438	−.265	.38	15.6	1.41	.0142
4.2	.789	.0531	−.288	.37	14.8	1.32	.0135
5.7	.872	.0631	−.310	.36	12.4	1.25	.0146
8.6	1.085	.0921	−.375	.34	11.8	1.12	.0171
11.6	1.218	.124	−.410	.33	9.81	1.06	.0294
14.5	1.340	.162	−.429	.32	8.27	1.01	.0476
17.5	1.360	.217	−.452	.34	6.27	1.00	.0992

TABLE IV

G-398 AIRFOIL — GÖTTINGEN TEST

Airfoil sizes, 7.874x39.370 inches.
Aspect ratio, 5.

Test speed, 98.42 ft./sec.
Test Vl 64.58 sq. ft./sec.

Data with tunnel wall interference corrections applied are taken from Reference 3

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−11.9	−0.297	0.101	0.031	--------	−2.94	--------	0.0954
−8.9	−.159	.0205	−.054	--------	−7.76	--------	.0188
−6.0	.037	.0152	−.100	--------	2.43	--------	.0151
−4.6	.138	.0152	−.122	0.87	9.08	3.02	.0140
−3.1	.232	.0170	−.143	.63	13.7	2.33	.0135
−1.6	.340	.0205	−.170	.49	16.6	1.93	.0132
−0.2	.435	.0249	−.192	.45	17.5	1.70	.0128
2.8	.640	.0386	−.245	.39	16.6	1.40	.0124
5.7	.840	.0597	−.295	.36	14.1	1.23	.0147
8.6	1.015	.0851	−.337	.34	11.9	1.12	.0193
11.6	1.170	.1150	−.371	.31	10.2	1.04	.0278
14.5	1.260	.1560	−.403	.32	8.08	1.00	.0547

TABLE V

G-436 AIRFOIL — GÖTTINGEN TEST

Airfoil size, 7.874×39.370 inches.
Aspect ratio, 5.

Test speed, 98.42 ft./sec.
Test Vl, 64.58 sq. ft./sec.

Data with tunnel wall interference corrections applied is taken from Reference 3

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.9	−0.236	0.0437	−0.009	--------	−5.40	--------	0.0401
−6.0	−.050	.0144	−.063	--------	−3.47	--------	.0142
−4.5	.050	.0130	−.084	--------	3.84	--------	.0128
−3.0	.150	.0133	−.107	0.71	11.3	2.84	.0119
−1.6	.246	.0159	−.130	.53	15.5	2.22	.0121
−0.1	.349	.0189	−.154	.44	18.5	1.86	.0111
1.3	.451	.0247	−.182	.39	18.3	1.64	.0117
2.8	.548	.0294	−.202	.36	18.6	1.49	.0101
4.3	.647	.0382	−.226	.34	16.9	1.37	.0092
5.7	.751	.0488	−.248	.32	15.4	1.27	.0129
8.7	.945	.0728	−.301	.31	13.0	1.13	.0159
11.6	1.120	.0999	−.343	.30	11.2	1.04	.0200
14.6	1.204	.138	−.365	.31	8.73	1.00	.0457

TABLE VI

USA-27 AIRFOIL — GÖTTINGEN TEST

Airfoil size, 7.874×39.370 inches.
Aspect ratio, 5.

Test speed, 98.42 ft./sec.
Test Vl, 64.58 sq. ft./sec.

Data with tunnel wall interference corrections applied is taken from Reference 4.(G-509)

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−9.0	−0.203	0.0919	0.019	--------	−2.21	--------	0.0893
−6.0	−.037	.0468	−.072	--------	−.79	--------	.0467
−4.5	.063	.0179	−.106	--------	3.52	--------	.0177
−3.0	.164	.0150	−.126	0.77	10.9	2.76	.0133
−1.4	.264	.0166	−.149	.57	15.9	2.18	.0122
0.0	.364	.0201	−.171	.47	18.1	1.85	.0116
1.6	.457	.0251	−.193	.42	18.2	1.65	.0117
3.1	.559	.0317	−.214	.39	17.6	1.50	.0117
4.7	.695	.0432	−.258	.36	16.1	1.34	.0124
6.2	.794	.0536	−.280	.35	14.8	1.25	.0134
9.2	.967	.0781	−.319	.33	12.4	1.14	.0185
12.2	1.140	.1050	−.356	.32	10.9	1.05	.0221
15.3	1.253	.1380	−.384	.31	9.09	1.00	.0379
18.2	1.200	.1890	−.380	.32	6.35	1.02	.0973

TABLE VII

CLARK Y AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds Number, 3,610,000.

Data from Reference 2 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−6.02	−0.060	0.0108	−0.068	----------	−5.55	----------	0.0106
−4.48	.045	.0107	−.091	----------	4.21	----------	.0106
−2.94	.167	.0121	−.120	0.720	13.8	2.86	.0106
−1.40	.268	.0144	−.145	.541	18.6	2.26	.0106
.15	.384	.0182	−.166	.432	21.1	1.89	.0103
1.69	.501	.0245	−.185	.368	20.4	1.65	.0111
3.23	.602	.0312	−.224	.371	19.3	1.51	.0119
6.31	.819	.0508	−.284	.346	16.1	1.29	.0152
9.39	1.034	.0770	−.312	.302	13.4	1.15	.0201
12.47	1.231	.1085	−.360	.294	11.4	1.05	.0280
15.52	1.367	.1395	−.415	.306	9.80	1.00	.0403
18.49	1.283	.2217	−.378	.294	5.80	1.03	.1342
21.41	1.081	.3023	−.328	.293	3.58	1.12	.2402

TABLE VIII

G-387 AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds Number, 3,470,000.

Data from Reference 2 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−9.06	−0.156	0.0156	−0.058	----------	−10.0	----------	0.0143
−5.98	.061	.0126	−.106	----------	4.85	----------	.0124
−4.44	.168	.0139	−.135	0.807	12.1	2.82	.0124
−2.89	.280	.0172	−.168	.702	16.3	2.18	.0130
−1.35	.390	.0210	−.176	.452	18.6	1.85	0129
.19	.504	.0283	−.202	.401	17.8	1.62	0148
1.73	.612	.0368	−.234	.381	16.6	1.47	.0168
3.28	.725	.0468	−.255	.351	15.5	1.35	.0188
6.36	.960	.0712	−.285	.296	13.5	1.18	.0222
9.44	1.146	.1004	−.348	.304	11.4	1.08	.0307
12.50	1.308	.1340	−.392	.301	9.75	1.01	.0431
15.50	1.328	.1848	−.441	.332	7.18	1.00	.0911
18.50	1.320	.2462	−.448	.337	5.36	1.01	.1537
21.49	1.276	.3002	−.453	.350	4.25	1.02	.2138

TABLE IX

N. A. C. A.-M6 AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,660,000.

Data from Reference 1 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−3.08	−0.202	0.0111	0.064	----------	−18.2	----------	0.0089
−1.54	−.097	.0094	.035	----------	−10.3	----------	.0089
.01	.016	.0080	.008	----------	2.0	----------	.0080
1.55	.126	.0098	−.017	0.141	12.9	3.12	.0090
3.09	.237	.0115	−.045	.187	20.6	2.27	.0085
4.63	.340	.0155	−.064	.187	21.9	1.90	.0093
6.17	.456	.0226	−.096	.211	20.2	1.64	.0115
9.25	.665	.0385	−.145	.218	17.3	1.36	.0150
12.33	.875	.0616	−.192	.221	14.2	1.18	.0209
15.41	1.073	.0892	−.232	.219	12.0	1.07	.0281
18.46	1.222	.1287	−.286	.238	9.52	1.00	.0494
21.44	1.169	.1981	−.312	.269	5.89	1.02	.1256

TABLE X

N. A. C. A.-M12 AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,800,000.

Data from Reference 1 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−3.05	−0.118	0.0098	−0.019	--------	−12.0	--------	0.0091
−1.51	−.017	.0069	−.001	--------	−1.91	--------	.0089
.04	.096	.0092	−.029	0.302	10.4	3.66	.0087
1.58	.207	.0123	−.057	.274	16.8	2.50	.0100
3.12	.318	.0163	−.088	.275	19.5	2.02	.0109
4.66	.417	.0203	−.107	.257	20.6	1.76	.0110
6.20	.537	.0280	−.131	.244	19.2	1.55	.0126
9.29	.760	.0479	−.192	.253	15.9	1.30	.0172
12.37	.971	.0724	−.241	.250	13.4	1.15	.0223
15.44	1.155	.1022	−.287	.251	11.3	1.06	.0313
18.49	1.293	.1388	−.342	.269	9.32	1.00	.0501
21.44	1.165	.2293	−.364	.312	5.09	1.05	.1572

TABLE XI

R. A. F.-15 AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,580,000.

Data from Reference 2 corrected for tunnel-wall interference.

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−4.56	−0.162	0.0141	−0.013	--------	−11.5	--------	0.0127
−3.02	−.052	.0067	−.039	--------	−5.98	--------	.0085
−1.48	.052	.0083	−.066	1.270	6.27	4.82	.0081
0.06	.166	.0090	−.090	0.539	18.5	2.70	.0075
1.61	.285	.0124	−.116	.408	23.0	2.06	.0081
3.15	.398	.0164	−.158	.360	24.3	1.74	.0079
4.69	.507	.0222	−.176	.347	22.8	1.55	.0085
6.24	.629	.0306	−.202	.322	20.6	1.39	.0095
9.32	.850	.0525	−.260	.307	16.2	1.19	.0141
12.41	1.063	.0809	−.313	.296	13.2	1.06	.0203
15.46	1.209	.1093	−.344	.289	11.0	1.00	.0317
16.43	1.127	.1611	−.358	.318	6.98	1.04	.0937
18.38	1.004	.2248	−.394	.385	4.46	1.10	.1712
21.35	0.924	.2928	−.379	.392	3.15	1.14	.2474

TABLE XII

U. S. A.-27 AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,570,000.

Data from Reference 2 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.04	−0.100	0.0128	−0.061	--------	−7.82	--------	0.0123
−4.50	.007	.0117	−.090	--------	.60	--------	.0117
−2.95	.120	.0118	−.112	0.940	10.2	3.40	.0110
−1.42	.221	.0134	−.137	.621	16.5	2.50	.0106
0.13	.332	.0167	−.164	.494	19.9	2.04	.0108
1.67	.439	.0211	−.183	.416	20.6	1.78	.0108
3.21	.553	.0275	−.190	.360	20.1	1.58	.0112
4.75	.654	.0353	−.233	.363	18.5	1.46	.0125
6.29	.768	.0456	−.256	.333	16.8	1.35	.0143
9.37	.972	.0678	−.307	.316	14.3	1.20	.0175
12.44	1.165	.0953	−.342	.295	12.2	1.09	.0232
15.50	1.326	.1285	−.385	.293	10.3	1.02	.0352
16.53	1.356	.1417	−.504	.368	9.79	1.00	.0397
18.50	1.324	.1931	−.482	.367	6.87	1.02	.1001
21.45	1.181	.2712	−.491	.411	4.36	1.08	.1972

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TABLE XIII

U. S. A.-35A AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,520,000.

Data from Reference 2 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−9.03	−0.075	0.0168	−0.098	----------	−4.46	----------	0.0165
−5.94	.146	.0143	−.154	----------	10.2	2.88	.0132
−4.40	.252	.0166	−.178	0.714	15.2	2.19	.0132
−2.86	.365	.0205	−.203	.558	17.8	1.82	.0134
−1.32	.468	.0255	−.224	.479	18.4	1.61	.0138
.22	.586	.0327	−.254	.434	18.0	1.44	.0144
1.76	.692	.0410	−.280	.404	16.9	1.32	.0155
3.30	.798	.0510	−.304	.380	15.6	1.23	.0172
4.84	.884	.0616	−.322	.364	14.3	1.17	.0201
6.37	.984	.0741	−.356	.361	13.3	1.11	.0226
9.43	1.142	.1042	−.392	.342	11.0	1.03	.0350
12.46	1.203	.1495	−.430	.355	8.05	1.00	.0727
15.46	1.201	.2029	−.447	.368	5.93	1.00	.1263
18.44	1.152	.2512	−.443	.378	4.59	1.03	.1808
21.42	1.097	.2956	−.405	.359	3.72	1.05	.2316

TABLE XIV

U. S. A.-35B AIRFOIL — L. M. A. L. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Average Reynolds number, 3,470,000.

Data from Reference 2 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−9.11	−0.285	0.0173	−0.001	----------	−16.5	----------	0.0130
−6.02	−.062	.0094	−.058	----------	−6.60	----------	.0092
−4.48	.044	.0093	−.082	----------	4.73	----------	.0092
−2.94	.157	.0109	−.109	0.699	14.4	2.96	.0096
−1.40	.263	.0143	−.136	.516	18.4	2.28	.0106
.14	.378	.0183	−.147	.388	20.6	1.91	.0107
1.69	.488	.0247	−.176	.361	19.8	1.68	.0120
3.23	.603	.0332	−.212	.351	18.1	1.51	.0138
6.31	.823	.0542	−.259	.314	15.2	1.29	.0182
9.40	1.045	.0818	−.320	.307	12.8	1.15	.0265
12.47	1.235	.1181	−.372	.302	10.9	1.06	.0321
15.52	1.374	.1490	−.440	.323	9.23	1.00	.0488
18.50	1.304	.2261	−.423	.323	5.77	1.03	.1359
21.45	1.181	.3057	−.465	.375	3.87	1.08	.2317

TABLE XV

CLARK Y AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−6.01	−0.031	0.0196	−0.075	----------	−1.58	----------	0.0195
−3.97	.110	.0154	−.110	0.930	7.15	3.36	.0147
−1.94	.252	.0163	−.144	.562	15.5	2.22	.0129
.10	.401	.0214	−.177	.448	18.7	1.76	.0129
2.13	.553	.0295	−.211	.397	18.7	1.50	.0132
4.17	.696	.0409	−.243	.364	17.0	1.33	.0152
6.20	.835	.0550	−.274	.348	15.2	1.22	.0179
8.23	.960	.0720	−.306	.329	13.3	1.14	.0229
10.26	1.077	.0905	−.337	.316	11.9	1.07	.0289
12.29	1.179	.1103	−.363	.309	10.7	1.03	.0365
14.30	1.239	.1347	−.380	.308	9.21	1.00	.0531
16.29	1.177	.1740	−.401	.340	6.90	1.03	.1005

TABLE XVI

CLARK Y-15 AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−7.96	−0.135	0.0224	−0.051	----------	−6.02	----------	0.0214
−5.93	.000	.0180	−.079	----------	0	----------	.0180
−3.90	.135	.0169	−.108	0.790	7.99	8.05	.0159
−1.86	.272	.0179	−.137	.517	15.2	2.15	.0139
.17	.416	.0226	−.170	.411	18.4	1.74	.0133
2.21	.591	.0328	−.216	.371	18.0	1.45	.0142
4.25	.727	.0444	−.249	.346	16.4	1.32	.0163
6.28	.852	.0582	−.276	.327	14.6	1.22	.0196
8.31	.970	.0736	−.300	.314	13.2	1.14	.0235
10.33	1.087	.0910	−.325	.302	11.9	1.08	.0283
12.36	1.191	.1092	−.350	.296	10.9	1.03	.0340
14.37	1.251	.1282	−.356	.291	9.75	1.00	.0451
16.38	1.259	.1482	−.356	.290	8.49	1.00	.0639
18.37	1.230	.1921	−.364	.300	6.40	1.01	.1117

TABLE XVII

G-387 AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test Speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.02	−0.065	0.0715	−0.035	----------	−0.91	----------	0.0713
−5.98	.076	.0321	−.117	----------	2.37	4.38	.0318
−3.95	.221	.0237	−.156	0.678	9.32	2.54	.0211
−1.91	.368	.0264	−.195	.507	13.9	1.97	.0192
.12	.512	.0320	−.234	.431	16.0	1.67	.0181
2.16	.657	.0405	−.270	.395	16.2	1.49	.0175
4.20	.805	.0527	−.308	.370	15.3	1.38	.0182
6.23	.962	.0689	−.351	.349	14.0	1.22	.0197
8.27	1.103	.0876	−.386	.336	12.6	1.14	.0229
10.30	1.228	.1088	−.417	.325	11.3	1.08	.0287
12.30	1.339	.1315	−.440	.317	10.2	1.03	.0363
14.34	1.414	.1567	−.458	.310	9.06	1.01	.0506
16.35	1.431	.1890	−.473	.312	7.57	1.00	.0804
18.35	1.423	.2217	−.481	.323	6.44	1.00	.1142

TABLE XVIII

G-436 AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.02	−0.065	0.0258	−0.063	----------	2.52	----------	0.0256
−3.98	.080	.0172	−.099	1.020	4.65	3.88	.0169
−1.95	.225	.0170	−.134	.593	13.2	2.32	.0143
.09	.372	.0219	−.169	.452	17.7	1.80	.0136
2.13	.516	.0281	−.207	.400	18.4	1.58	.0139
4.16	.665	.0387	−.243	.366	17.2	1.35	.0151
6.20	.821	.0529	−.282	.342	15.5	1.21	.0171
8.24	.973	.0701	−.320	.329	13.9	1.11	.0198
10.27	1.097	.0884	−.356	.319	12.4	1.05	.0244
12.29	1.198	.1085	−.375	.310	11.0	1.00	.0324
14.29	1.183	.1361	−.371	.313	8.70	1.01	.0619
16.28	1.146	.1717	−.371	.322	6.69	1.03	.1020

TABLE XIX

R. A. F.-15 AIRFOIL — M. I. T. TEST

Airfoil size, 6 × 36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 5 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−4.44	−0.184	0.0251			−7.28		0.0238
−2.40	−.018	.0145	−0.015		−1.21		.0145
−0.37	.143	.0122	−.072	0.490	11.7	2.67	.0111
1.67	.303	.0168	−.115	.359	18.0	1.83	.0119
3.71	.460	.0254	−.147	.320	18.1	1.49	.0141
5.75	.610	.0348	−.184	.300	17.5	1.29	.0149
7.78	.755	.0481	−.226	.290	15.7	1.16	.0175
9.82	.895	.0640	−.259	.287	14.0	1.07	.0214
11.84	.995	.0867	−.282	.289	11.5	1.01	.0339
13.85	1.017	.1264	−.310	.299	8.04	1.00	.0713

TABLE XX

U. S. A.-27 AIRFOIL — M. I. T. TEST

Airfoil size 6 × 36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 5 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.01	−0.059	0.0594	−0.065		−0.99		0.0592
−3.97	.112	.0333	−.117	0.860	3.38	3.47	.0326
−1.94	.244	.0226	−.154	.603	10.8	2.35	.0194
.09	.386	.0231	−.182	.465	16.7	1.87	.0151
2.13	.534	.0301	−.215	.402	17.7	1.59	.0149
4.17	.685	.0400	−.253	.369	17.1	1.40	.0150
6.20	.825	.0534	−.286	.345	15.4	1.28	.0172
8.23	.958	.0693	−.320	.329	13.8	1.19	.0204
10.26	1.081	.0871	−.350	.314	12.4	1.08	.0250
12.29	1.198	.1059	−.376	.300	11.3	1.06	.0296
14.31	1.294	.1254	−.399	.295	10.3	1.02	.0368
16.33	1.347	.1491	−.415	.295	9.02	1.00	.0526
18.33	1.347	.2069	−.425	.307	6.50	1.00	.1104
20.31	1.290	.3725	−.426	.311	3.46	1.02	.2841

TABLE XXI

U. S. A.-35A AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 5, changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−7.99	0.041	0.0931	−0.059		0.44		0.0930
−5.96	.176	.0545	−.131	0.900	3.23	2.89	.0529
−3.92	.315	.0302	−.186	.619	10.4	2.16	.0249
−1.89	.457	.0326	−.227	.495	14.0	1.79	.0215
.15	.608	.0404	−.261	.429	15.1	1.56	.0207
2.18	.759	.0509	−.294	.391	14.9	1.39	.0203
4.22	.905	.0649	−.331	.367	13.9	1.28	.0213
6.26	1.050	.0810	−.367	.350	13.0	1.18	.0225
8.29	1.183	.1001	−.399	.340	11.8	1.11	.0259
10.31	1.286	.1231	−.426	.333	10.4	1.07	.0352
12.33	1.363	.1534	−.450	.330	8.90	1.04	.0548
14.35	1.421	.1806	−.470	.330	7.50	1.02	.0824
16.35	1.453	.2230	−.484	.331	6.52	1.01	.1109
18.36	1.470	.2527	−.477	.351	5.82	1.00	.1378
20.25	1.017	.2709		.390	3.75	1.20	.2158

TABLE XXII

U. S. A.-35B AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.00	−0.006	0.0278	−0.073	--------	−0.21	--------	0.0278
−3.97	.123	.0189	−.109	0.960	6.50	3.26	.0181
−1.94	.258	.0187	−.147	.560	13.8	2.25	.0151
.10	.397	.0226	−.183	.438	17.6	1.81	.0142
2.13	.542	.0301	−.220	.387	18.0	1.55	.0144
4.17	.698	.0408	−.257	.353	17.1	1.37	.0149
6.21	.860	.0543	−.294	.332	15.8	1.23	.0146
8.24	1.003	.0704	−.331	.321	14.3	1.14	.0169
10.27	1.129	.0895	−.368	.312	12.6	1.07	.0218
12.30	1.238	.1125	−.394	.309	11.0	1.03	.0311
14.32	1.300	.1357	−.402	.305	9.60	1.00	.0460
16.31	1.275	.1684	−.407	.307	7.58	1.01	.0821

TABLE XXIII

CLARK Y AIRFOIL — McC. F. TEST

Airfoil size, 6 × 36 inches.
Aspect ratio, 6.

Test speed, 80 M. P. H.
Test *V l*, 58.67 sq. ft./sec.

Data with tunnel-wall interference corrections applied are taken from Reference 7 and changed to absolute coefficients

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.22	0	0.0152	−0.074	--------	0	--------	0.0152
−4.17	.144	.0149	−.109	0.760	9.71	2.94	.0138
−0.04	.468	.0227	−.183	.392	20.6	1.63	.0110
4.07	.760	.0450	−.253	.332	16.9	1.28	.0144
8.16	1.040	.0759	−.319	.307	13.7	1.10	.0184
12.20	1.232	.1150	−.367	.300	10.7	1.01	.0344
14.18	1.248	.1443	−.374	.302	8.93	1.00	.0615
16.17	1.239	.1892	−.379	.312	6.54	1.01	.1077

TABLE XXIV

CLARK Y-15 AIRFOIL — McC. F. TEST

Airfoil size, 6 × 36 inches.
Aspect ratio, 6.

Test speed, 80 M. P. H.
Test *Vl*, 58.67 sq. ft./sec.

Data with tunnel-wall interference corrections applied are taken from Reference 7 and changed to absolute coefficients

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.23	−0.013	0.0137	−0.070	--------	−0.97	--------	0.0137
−4.17	.136	.0137	−.103	0.765	9.98	3.12	.0127
−2.12	.281	.0168	−.133	.475	16.71	2.18	.0126
−0.06	.422	.0219	−.163	.390	19.29	1.78	.0124
2.00	.593	.0328	−.215	.362	18.06	1.50	.0141
4.06	.741	.0446	−.248	.333	16.63	1.34	.0155
6.10	.873	.0579	−.293	.335	15.09	1.23	.0174
8.14	1.009	.0751	−.310	.307	13.43	1.14	.0209
10.18	1.132	.0931	−.333	.295	12.16	1.09	.0251
12.21	1.235	.1118	−.357	.292	11.04	1.04	.0308
14.21	1.294	.1333	−.373	.283	9.71	1.02	.0444
16.20	1.322	.1677	−.392	.298	7.89	1.00	.0750
16.96	.966	.2561	−.356	.347	3.77	1.17	.2065
17.99	1.009	.2757	−.357	.348	3.66	1.14	.2215

TABLE XXII

U. S. A.-35B AIRFOIL — M. I. T. TEST

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 29.33 sq. ft./sec.

Faired data from Reference 6 changed to absolute coefficients and corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.00	−0.006	0.0278	−0.073	----------	−0.21	----------	0.0278
−3.97	.123	.0189	−.109	0.960	6.50	3.26	.0181
−1.94	.258	.0187	−.147	.560	13.8	2.25	.0151
.10	.397	.0226	−.183	.438	17.6	1.81	.0142
2.13	.542	.0301	−.220	.387	18.0	1.55	.0144
4.17	.698	.0408	−.257	.353	17.1	1.37	.0149
6.21	.860	.0543	−.294	.332	15.8	1.23	.0146
8.24	1.003	.0704	−.331	.321	14.3	1.14	.0169
10.27	1.129	.0895	−.368	.312	12.6	1.07	.0218
12.30	1.238	.1125	−.394	.309	11.0	1.03	.0311
14.32	1.300	.1357	−.402	.305	9.60	1.00	.0460
16.31	1.275	.1684	−.407	.307	7.58	1.01	.0821

TABLE XXIII

CLARK Y AIRFOIL — McC. F. TEST

Airfoil size, 6 × 36 inches.
Aspect ratio, 6.

Test speed, 80 M. P. H.
Test Vl, 58.67 sq. ft./sec.

Data with tunnel-wall interference corrections applied are taken from Reference 7 and changed to absolute coefficients

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.22	0	0.0152	−0.074	----------	0	----------	0.0152
−4.17	.144	.0149	−.109	0.760	9.71	2.94	.0138
−0.04	.468	.0227	−.183	.392	20.6	1.63	.0110
4.07	.760	.0450	−.253	.332	16.9	1.28	.0144
8.16	1.040	.0759	−.319	.307	13.7	1.10	.0184
12.20	1.232	.1150	−.367	.300	10.7	1.01	.0344
14.18	1.248	.1443	−.374	.302	8.93	1.00	.0615
16.17	1.239	.1892	−.379	.312	6.54	1.01	.1077

TABLE XXIV

CLARK Y-15 AIRFOIL — McC. F. TEST

Airfoil size, 6 × 36 inches.
Aspect ratio, 6.

Test speed, 80 M. P. H.
Test Vl, 58.67 sq. ft./sec.

Data with tunnel-wall interference corrections applied are taken from Reference 7 and changed to absolute coefficients

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−6.23	−0.013	0.0137	−0.070	----------	−0.97	----------	0.0137
−4.17	.136	.0137	−.103	0.765	9.98	3.12	.0127
−2.12	.281	.0168	−.133	.475	16.71	2.18	.0126
−0.06	.422	.0219	−.163	.390	19.29	1.78	.0124
2.00	.593	.0328	−.215	.362	18.06	1.50	.0141
4.06	.741	.0446	−.248	.333	16.63	1.34	.0155
6.10	.873	.0579	−.293	.335	15.09	1.23	.0174
8.14	1.009	.0751	−.310	.307	13.43	1.14	.0209
10.18	1.132	.0931	−.333	.295	12.16	1.09	.0251
12.21	1.235	.1118	−.357	.292	11.04	1.04	.0308
14.21	1.294	.1333	−.373	.288	9.71	1.02	.0444
16.20	1.322	.1677	−.392	.293	7.89	1.00	.0750
16.96	.966	.2561	−.336	.347	3.77	1.17	.2065
17.99	1.009	.2757	−.367	.348	3.66	1.14	.2215

TABLE XXV

G-398 Airfoil McC. F. Test

Airfoil size, 6×36 inches.
Aspect ratio, 6.

Test speed, 80 M. P. H.
Test *Vl*, 58.67 sq. ft./sec.

Data with tunnel-wall interference corrections applied are taken from Reference 7 and changed to absolute coefficients

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.23	−0.097	0.0168	−0.062	--------	−5.79	--------	0.0163
−6.20	.044	.0152	−.093	--------	2.87	--------	.0152
−4.14	.198	.0164	−.129	0.657	12.1	2.67	.0143
−2.08	.353	.0199	−.168	.478	17.7	2.00	.0133
−.01	.508	.0274	−.211	.415	18.6	1.67	.0136
2.04	.661	.0360	−.246	.373	18.4	1.46	.0128
4.10	.811	.0516	−.282	.348	15.7	1.32	.0167
6.15	.961	.0676	−.322	.335	14.2	1.21	.0185
8.19	1.098	.0856	−.355	.322	12.8	1.13	.0215
10.23	1.224	.1048	−.379	.310	11.7	1.07	.0253
12.26	1.337	.1271	−.417	.312	10.5	1.03	.0323
14.28	1.408	.1544	−.429	.307	9.12	1.00	.0492
16.22	1.358	.2002	−.442	.327	6.78	1.02	.1023

TABLE XXVI

Clark Y Airfoil W. N. Y. Test

Airfoil size 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec.

Data from Reference 11 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.02	−0.167	0.0356	−0.040	--------	−4.69	--------	--------
−7.01	−.096	.0249	--------	--------	−3.86	--------	--------
−6.00	−.029	.0214	--------	--------	−1.36	--------	--------
−4.99	.041	.0198	--------	--------	2.07	--------	0.0197
−3.99	.111	.0183	−.105	0.950	6.06	3.37	.0176
−2.98	.181	.0184	−.121	.660	9.84	2.64	.0166
−1.97	.254	.0199	−.138	.540	12.8	2.28	.0165
−.96	.325	.0216	−.156	.474	15.0	1.97	.0160
.05	.400	.0241	−.174	.428	16.6	1.77	.0156
2.07	.551	.0320	−.212	.380	17.2	1.55	.0159
4.09	.704	.0437	−.247	.344	16.1	1.34	.0173
6.11	.840	.0573	−.277	.328	14.7	1.22	.0198
8.13	.980	.0748	−.308	.314	13.2	1.14	.0233
10.14	1.093	.0925	−.340	.308	11.8	1.07	.0291
12.15	1.190	.1115	−.355	.300	10.7	1.03	.0364
14.16	1.242	.1322	−.361	.296	9.39	1.00	.0503
16.16	1.257	.1622	−.360	.294	7.74	1.00	.0782
18.13	1.058	.2938	−.388	.354	3.58	1.09	.2349

TABLE XXVII

G-387 Airfoil W. N. Y. Test

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec

Data from Reference 8 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.01	−0.065	0.0513	--------	--------	−1.27	--------	--------
−7.00	.014	.0357	--------	--------	.39	--------	0.0357
−5.99	.075	.0287	−0.118	--------	2.61	4.46	.0283
−4.98	.141	.0254	--------	0.954	5.55	3.25	.0243
−3.97	.213	.0236	−.147	.702	9.03	2.64	.0212
−2.96	.279	.0247	−.161	.584	11.3	2.31	.0206
−1.95	.352	.0278	−.179	.514	12.7	2.06	.0212
.06	.493	.0353	−.214	.438	14.0	1.74	.0224
2.08	.639	.0439	−.248	.492	14.6	1.53	.0222
4.10	.785	.0555	−.283	.364	14.1	1.38	.0228
6.12	.922	.0708	−.314	.346	13.0	1.27	.0256
8.14	1.057	.0883	−.348	.332	12.0	1.19	.0289
10.15	1.192	.1083	−.378	.322	11.0	1.12	.0329
12.17	1.309	.1306	−.405	.312	10.0	1.07	.0396
14.18	1.404	.1530	−.428	.306	9.18	1.03	.0484
16.19	1.467	.1753	−.441	.306	8.37	1.01	.0610
18.19	1.488	.2074	−.490	.334	7.17	1.00	.0808
20.14	1.105	.3263	−.406	.356	3.38	1.16	.2614

TABLE XXVIII

G-398 Airfoil — W. N. Y. Test

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec.

Data from Reference 8 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.02	−0.130	0.0301	------	------	−4.32	------	------
−7.01	−.059	.0235	------	------	−2.51	------	0.0232
−6.00	.013	.0200	------	------	.65	------	.0200
−4.99	.063	.0183	−0.108	------	4.54	4.20	.0179
−3.98	.157	.0175	−.125	0.796	8.97	2.96	.0162
−2.97	.227	.0182	−.141	.620	12.5	2.47	.0155
−1.96	.300	.0197	−.158	.525	15.2	2.15	.0149
.06	.439	.0256	−.189	.432	17.1	1.78	.0153
2.08	.593	.0354	−.230	.388	16.8	1.53	.0167
4.09	.736	.0475	−.262	.356	15.5	1.37	.0188
6.11	.878	.0619	−.297	.340	14.2	1.26	.0210
8.13	1.011	.0780	−.324	.324	13.0	1.18	.0237
10.15	1.137	.0970	−.353	.314	11.7	1.11	.0283
12.16	1.252	.1178	−.379	.308	10.6	1.05	.0345
14.17	1.350	.1396	−.400	.302	9.67	1.01	.0429
16.18	1.387	.1638	−.406	.300	8.47	1.00	.0617
18.17	1.370	.1973	−.403	.306	6.94	1.01	.0977

TABLE XXIX

G-436 Airfoil — W. N. Y. Test

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec.

Data from Reference 8 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.03	−0.270	0.0674	−0.021	------	−4.01	------	------
−6.01	−.094	.0341	−.044	------	−2.76	------	0.0336
−5.00	−.017	.0254	------	------	−.67	------	.0254
−3.99	.066	.0223	−.089	------	2.96	4.49	.0221
−2.98	.142	.0202	−.079	0.760	7.03	3.06	.0191
−1.97	.211	.0196	−.123	.580	10.8	2.51	.0172
−.96	.280	.0207	−.134	.492	13.5	2.18	.0165
.05	.348	.0229	−.154	.436	15.2	1.95	.0165
2.06	.488	.0287	−.187	.380	17.0	1.65	.0160
4.08	.638	.0388	−.222	.350	16.4	1.44	.0171
6.10	.788	.0527	−.257	.328	15.0	1.30	.0198
8.12	.924	.0687	−.292	.322	13.5	1.20	.0233
10.14	1.059	.0879	−.322	.316	12.1	1.12	.0284
12.15	1.177	.1087	−.354	.310	10.8	1.06	.0352
14.17	1.296	.1300	−.382	.302	9.97	1.01	.0409
16.17	1.325	.1580	−.380	.296	8.38	1.00	.0648
18.16	1.285	.2013	−.391	.314	6.38	1.02	.1136

TABLE XXX

N-9 Airfoil — W. N. Y. Test

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec.

Data from reference 10 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.04	−0.318	0.0500	0.031	------	−6.36	------	------
−6.02	−.165	.0236	−.013	------	−6.99	------	------
−5.01	−.081	.0183	−.036	------	−4.43	------	0.0179
−4.00	.008	.0150	------	------	.53	------	.0150
−2.99	.094	.0136	−.083	0.888	6.91	3.47	.0131
−1.98	.167	.0137	−.101	.604	12.2	2.60	.0122
−.97	.246	.0142	−.120	.486	17.3	2.14	.0110
.04	.320	.0160	−.130	.422	20.0	1.88	.0106
2.06	.460	.0231	−.166	.358	19.9	1.57	.0118
4.08	.608	.0342	−.199	.326	17.8	1.36	.0145
6.10	.752	.0474	−.234	.312	15.9	1.23	.0174
8.11	.895	.0632	−.266	.298	14.2	1.12	.0207
10.13	1.011	.0827	−.292	.292	12.2	1.06	.0264
12.14	1.107	.1047	−.310	.288	10.6	1.01	.0396
14.14	1.124	.1328	−.315	.286	8.46	1.00	.0657
16.14	1.094	.2265	−.359	.328	4.83	1.02	.1629

TABLE XXXI

N-10 AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio 6.

Test speed 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 10 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.03	−0.209	0.0372	−0.010	------	−5.62	------	------
−6.01	−.047	.0223	−.034	------	−2.11	------	0.0222
−5.00	.031	.0193	−.060	------	1.61	------	.0192
−3.99	.103	.0179	−.106	------	5.75	3.50	.0173
−2.98	.173	.0177	−.122	0.700	9.77	2.69	.0161
−1.97	.251	.0191	−.139	.554	13.1	2.24	.0157
−0.96	.321	.0204	−.155	.480	15.7	1.98	.0149
.05	.397	.0232	−.172	.432	17.1	1.78	.0148
2.07	.545	.0310	−.206	.376	17.6	1.52	.0152
4.09	.693	.0422	−.239	.346	16.4	1.35	.0167
6.11	.836	.0573	−.275	.332	14.6	1.23	.0202
8.12	.976	.0729	−.303	.316	13.4	1.13	.0222
10.14	1.110	.0901	−.332	.304	12.3	1.07	.0246
12.16	1.218	.1117	−.354	.298	10.9	1.02	.0329
14.16	1.257	.1347	−.352	.292	9.32	1.00	.0508
16.16	1.215	.1679	−.350	.288	7.24	1.02	.0896

TABLE XXXII

N-22-AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 12 corrected for tunnel-wall interference.

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−10.04	−0.309	0.0745	−0.003	------	−4.15	------	------
−8.02	−.165	.0365	−.050	------	−4.52	------	------
−7.01	−.090	.0235	−.064	------	−3.83	------	------
−6.00	−.020	.0210	------	------	−0.95	------	0.0210
−4.99	.053	.0186	------	------	2.85	------	.0184
−3.98	.125	.0183	−.109	0.912	6.83	3.32	.0175
−2.97	.200	.0194	−.126	.654	10.3	2.63	.0178
−1.96	.275	.0207	−.143	.538	13.3	2.24	.0167
−0.96	.330	.0219	−.150	.472	15.1	2.05	.0161
.05	.426	.0251	−.176	.426	17.0	1.80	.0155
2.08	.591	.0345	−.217	.376	17.1	1.53	.0159
4.09	.740	.0462	−.247	.348	16.0	1.37	.0171
6.11	.880	.0627	−.275	.326	14.0	1.26	.0216
8.13	1.024	.0779	−.304	.310	13.1	1.16	.0221
10.15	1.152	.0978	−.334	.304	11.8	1.10	.0273
12.16	1.267	.1184	−.357	.298	10.7	1.05	.0331
14.17	1.347	.1396	−.368	.292	9.65	1.02	.0433
16.18	1.384	.1648	−.369	.286	8.40	1.00	.0631
18.16	1.241	.2490	------	------	4.98	------	.1672

TABLE XXXIII

N. A. C. A.-M6 AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 14, corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.06	−0.438	0.0527	0.064	------	−8.31	------	------
−6.04	−.316	.0284	.058	------	−11.1	------	------
−4.02	−.186	.0193	.034	------	−9.63	------	0.0175
−3.02	−.122	.0169	.018	------	−7.22	------	.0162
−2.01	−.056	.0155	.006	------	−3.61	------	.0153
−1.00	.018	.0138	−.013	0.726	1.30	------	.0138
.01	.108	.0145	−.038	.350	7.45	2.93	.0139
1.03	.207	.0170	−.068	.326	12.2	2.11	.0147
2.04	.296	.0199	−.091	.308	14.9	1.76	.0152
4.06	.442	.0269	−.130	.294	16.4	1.44	.0165
6.07	.577	.0368	−.164	.284	15.7	1.26	.0191
8.09	.709	.0468	−.193	.274	15.1	1.14	.0200
10.10	.821	.0599	−.213	.260	13.7	1.06	.0241
12.12	.900	.0738	−.221	.248	12.2	1.01	.0308
14.12	.922	.0889	−.216	.238	10.4	1.00	.0438
16.12	.904	.1163	−.212	.238	7.77	1.01	.0729

TABLE XXXIV

N. A. C. A.-M12 AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 13, corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−8.06	−0.446	0.0419	0.056	--------	−10.6	--------	--------
−6.04	−.317	.0253	.055	--------	−12.5	--------	--------
−4.02	−.142	.0178	.057	--------	−7.97	--------	0.0167
−3.01	−.080	.0150	−.007	--------	−5.33	--------	.0147
−2.00	−.013	.0136	--------	--------	−.96	--------	.0136
−.99	.063	.0134	−.043	0.682	4.70	3.91	.0132
.02	.147	.0141	−.063	.428	10.4	2.56	.0130
1.03	.241	.0163	−.090	.372	14.8	2.00	.0131
2.04	.325	.0201	−.116	.358	16.2	1.72	.0145
4.06	.466	.0277	−.152	.326	16.8	1.44	.0161
6.08	.591	.0360	−.180	.304	16.4	1.27	.0174
8.09	.710	.0475	−.203	.286	15.0	1.16	.0206
10.10	.817	.0601	−.222	.274	13.6	1.08	.0246
12.12	.909	.0752	−.236	.262	12.1	1.03	.0318
14.12	.960	.0931	−.244	.254	10.3	1.00	.0441
16.12	.944	.1442	−.253	.268	6.54	1.01	.0969

TABLE XXXV

R. A. F.-15 AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 9 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−8.05	−0.406	0.0829	--------	--------	−4.90	--------	--------
−6.03	−.263	.0423	0.035	--------	−6.21	--------	--------
−4.02	−.135	.0221	.006	--------	−6.11	--------	0.0211
−3.01	−.064	.0181	−.013	--------	−3.54	--------	.0179
−2.00	.009	.0165	−.030	--------	.55	--------	.0165
−0.99	.094	.0160	−.055	0.592	5.88	3.43	.0155
.02	.081	.0156	−.077	.434	11.6	2.41	.0138
1.03	.260	.0185	--------	.402	14.1	2.02	.0149
2.04	.335	.0217	−.124	.374	15.4	1.78	.0157
4.06	.477	.0285	−.156	.334	16.7	1.49	.0164
6.08	.614	.0372	−.184	.304	16.5	1.31	.0171
8.10	.752	.0504	−.214	.292	14.9	1.18	.0204
10.11	.865	.0663	−.238	.284	13.0	1.10	.0265
12.12	.971	.0865	−.262	.278	11.2	1.04	.0364
14.13	1.014	.1238	−.274	.278	8.19	1.02	.0691
16.13	1.054	.2120	−.334	.318	4.97	1.00	.1530
18.13	1.043	.2880	−.372	.354	3.62	1.01	.2301

TABLE XXXVI

SLOANE AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test Vl, 24.44 sq. ft./sec.

Data from Reference 9 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_s}$	Profile drag coefficient C_{D_0}
−8.05	−0.416	0.0801	--------	--------	−5.19	--------	--------
−7.04	−.340	.0631	--------	--------	−5.39	--------	--------
−6.03	−.265	.0451	0.031	--------	−5.87	--------	--------
−5.02	−.192	.0314	--------	--------	−6.11	--------	--------
−4.02	−.119	.0209	−.010	--------	−5.69	--------	0.0201
−3.01	−.050	.0169	−.029	--------	−2.96	--------	.0168
−2.00	.018	.0118	−.043	--------	1.53	--------	.0118
−.99	.088	.0118	−.061	0.702	7.46	3.41	.0114
.02	.164	.0126	−.082	.508	13.0	2.50	.0112
2.05	.344	.0149	−.133	.394	23.1	1.72	.0086
4.07	.505	.0201	−.171	.348	25.1	1.42	.0065
6.08	.639	.0345	−.207	.330	18.5	1.26	.0128
8.10	.752	.0530	−.231	.312	14.2	1.16	.0230
10.11	.853	.0811	−.260	.300	10.5	1.09	.0424
12.12	.957	.1344	−.285	.304	7.12	1.03	.0857
14.13	1.002	.2008	−.334	.335	4.99	1.01	.1474
16.13	1.019	.2621	−.372	.360	3.88	1.00	.2068
18.13	1.011	.3103	−.396	.380	3.26	1.00	.2560

TABLE XXXVII

U. S. A.-27 AIRFOIL — W. N. Y. TEST

Airfoil size, 5×30 inches.
Aspect ratio, 6.

Test speed, 40 M. P. H.
Test *Vl*, 24.44 sq. ft./sec.

Data from Reference 11 corrected for tunnel-wall interference

Angle of attack α degrees	Lift coefficient C_L	Drag coefficient C_D	Moment coefficient C_M	Center of pressure coefficient C_p	$\frac{C_L}{C_D}$	Speed ratio $\frac{V}{V_S}$	Profile drag coefficient C_{D_0}
−8.03	−0.217	0.0777	0.003	------	−2.79	------	------
−7.02	−.131	.0588	−.036	------	−2.23	------	------
−6.01	−.046	.0440	------	------	−1.04	------	------
−5.00	.030	.0296	------	------	1.01	------	0.0295
−3.99	.102	.0242	−.113	------	4.22	3.67	.0236
−2.98	.174	.0217	−.127	0.728	8.02	2.82	.0201
−1.97	.245	.0220	−.143	.580	11.1	2.37	.0188
−.96	.316	.0232	−.160	.500	13.6	2.09	.0179
.05	.387	.0257	−.178	.452	15.1	1.89	.0177
2.07	.531	.0321	−.211	.388	16.5	1.61	.0171
4.09	.688	.0422	−.249	.360	16.3	1.42	.0170
6.11	.825	.0560	−.281	.336	14.7	1.29	.0198
8.12	.966	.0719	−.311	.320	13.4	1.19	.0222
10.14	1.086	.0896	−.340	.310	12.1	1.13	.0269
12.14	1.211	.1086	−.366	.304	11.1	1.07	.0308
14.16	1.289	.1311	−.382	.298	9.83	1.03	.0429
16.17	1.356	.1498	−.391	.288	9.05	1.01	.0523
18.17	1.378	.1789	−.392	.286	7.70	1.00	.0782
20.17	1.347	.2229	−.512	------	6.04	1.01	.1266

TABLE XXXVIII

MAIN SLOPE OF LIFT CURVE, $dC_L/d\alpha$

Laboratory and test conditions	Airfoil section	$dC_L/d\alpha$
Göttingen tests	G-387	0.070
Aspect ratio, 5.	G-398	.069
Approximate Reynolds Number, 412,000.	G-436	.069
	U. S. A.-27	.069
L. M. A. L. tests	Clark Y	.071
	G-387	.072
Aspect ratio, 6.	M-6	.070
	M-12	.071
Approximate Reynolds Number, 3,600,000.	R. A. F.-15	.072
	U. S. A.-27	.070
	U. S. A.-35A	.071
	U. S. A.-35B	.072
M. I. T. tests	Clark Y	.071
Aspect ratio, 6.	Clark Y-15	.070
Approximate Reynolds Number, 187,000.	G-387	.071
	G-436	.073
	R. A. F.-15	.075
	U. S. A.-27	.070
	U. S. A.-35A	.071
	U. S. A.-35B	.070
McC. F. tests	Clark Y	.072
Aspect ratio, 6.	Clark Y-15	.070
Approximate Reynolds Number, 374,000.	G-398	.073
W. N. Y. tests	Clark Y	.071
Aspect ratio, 6.	G-387	.070
Approximate Reynolds Number, 156,000.	G-398	.072
	G-436	.072
	M-6	.069
	M-12	.068
	N-9	.072
	N-10	.073
	N-22	.075
	R. A. F.-15	.073
	Sloane	.075
	U. S. A.-27	.071

TABLE XXXIX

ANGLE AND MOMENT COEFFICIENT FOR ZERO LIFT

Laboratory and test conditions	Airfoil section	Angle of attack for zero lift (degrees)	C_M at zero C_L
Göttingen tests	G-387	−7.3	−0.096
Aspect ratio, 5.	G-398	−6.4	−.091
Approximate Reynolds Number, 412,000.	G-436	−5.2	−.075
	U. S. A.-27	−5.4	−.083
L. M. A. L. tests	Clark Y	−5.1	−.081
Aspect ratio, 6	G-387	−6.8	−.096
Approximate Reynolds Number, 3,600,000.	M-6	−0.2	.010
	M-12	−1.2	−.005
	R. A. F.-15	−2.2	−.052
	U. S. A.-27	−4.6	−.090
	U. S. A.-35A	−7.9	−.119
	U. S. A.-35B	−5.1	−.072
M. I. T. tests	Clark Y	−5.6	−.084
Aspect ratio, 6.	Clark Y-15	−5.9	−.079
Approximate Reynolds Number, 187,000.	G-387	−7.1	−.082
	G-436	−5.1	−.071
	R. A. F.-15	−2.1	−.023
	U. S. A.-27	−5.3	−.087
	U. S. A.-35A	−8.5	−.020
	U. S. A.-35B	−5.9	−.075
McC. F. tests	Clark Y	−6.2	−.074
Aspect ratio, 6.	Clark Y-15	−6.0	−.073
Approximate Reynolds Number, 374,000.	G-398	−6.8	−.084
W. N. Y. tests	Clark Y	−5.6	−.077
Aspect ratio, 6.	G-387	−7.1	−.101
Approximate Reynolds Number, 156,000.	G-398	−6.2	−.089
	G-436	−4.8	−.070
	M-6	−1.2	−.009
	M-12	−1.8	−.028
	N-9	−4.0	−.059
	N-10	−5.4	−.049
	N-22	−5.8	−.082
	R. A. F.-15	−2.1	−.030
	Sloane	−2.2	−.042
	U. S. A.-27	−5.4	−.084

TABLE XL

CENTER OF PRESSURE CHARACTERISTICS

Laboratory and test conditions	Airfoil section	C_p most forward	C_p at $\frac{V}{V_s}=2.0$	C_p at $\frac{V}{V_s}=3.0$
Göttingen tests	G-387	0.32	0.51	0.91
Aspect ratio, 5.	G-398	.31	.51	.86
Approximate Reynolds Number, 412,000.	G-436	.30	.47	.76
	U. S. A.-27	.31	.51	.86
L. M. A. L. tests	Clark Y	.294	.463	.766
Aspect ratio, 6.	G-387	.301	.494	.889
Approximate Reynolds Number, 3,600,000.	M-6		.195	.148
	M-12	.246	.269	.280
	R. A F.-15	.289	.400	.610
	U. S. A.-27	.293	.473	.792
	U. S. A.-35A	.342	.628	1.132
	U. S. A.-35B	.302	.425	.718
M. I. T. tests	Clark Y	.308	.501	.805
Aspect ratio, 6.	Clark Y-15	.290	.478	.773
Approximate Reynolds Number, 187,000.	G-387	.310	.511	.859
	G-436	.310	.502	.784
	R. A. F.-15	.285	.381	.558
	U. S. A.-27	.292	.495	.761
	U. S. A.-35A	.330	.560	.943
	U. S. A.-35B	.305	.485	.850
McC. F. tests	Clark Y	.300	.475	.783
Aspect ratio, 6.	Clark Y-15	.288	.428	.722
Approximate Reynolds Number, 374,000.	G-398	.307	.478	.769
W. N. Y. tests	Clark Y	.294	.480	.794
Aspect ratio, 6.	G-387	.306	.500	.845
Approximate Reynolds Number, 156,000.	G-398	.300	.484	.810
	G-436	.296	.448	.739
	M-6	.238	.318	.352
	M-12	.254	.371	.497
	N-9	.286	.449	.728
	N-10	.288	.483	.801
	N-22	.266	.461	.789
	R. A. F.-15	.278	.400	.508
	Sloane	.300	.431	.608
	U. S. A.-27	.286	.450	.792

TABLE XLI

MAXIMUM LIFT COEFFICIENT, $C_{L_{max}}$

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$C_{L_{max}}$	α for $C_{L_{max}}$ degrees
Göttingen tests	G-387	1.362	16.5
Aspect ratio, 5.	G-398	1.260	14.5
Approximate Reynolds Number, 412,000.	U. S. A.-27	1.258	15.5
	G-436	1.204	14.6
L. M. A. L. tests	U. S. A.-27	1.386	16.7
Aspect ratio, 6.	U. S. A.-35B	1.377	16.0
Approximate Reynolds Number, 3,600,000.	Clark Y	1.370	16.0
	G-387	1.329	14.6
	M-12	1.298	18.6
	M-6	1.222	18.6
	R. A. F.-15	1.211	18.7
	U. S. A.-35A	1.208	13.5
M. I. T. tests	U. S. A. 35A	1.470	18.3
Aspect ratio, 6.	G-387	1.431	16.3
Approximate Reynolds Number, 187,000.	U. S. A.-27	1.351	17.3
	U. S. A.-35B	1.301	14.6
	Clark Y-15	1.260	15.6
	Clark Y	1.239	14.4
	G-436	1.204	13.0
	R. A. F.-15	1.017	13.9
McC. F. tests	G-398	1.408	14.5
Aspect ratio, 6.	Clark Y-15	1.322	16.2
Approximate Reynolds Number, 374,000.	Clark Y	1.250	13.8
W. N. Y. tests	G-387	1.488	18.2
Aspect ratio, 6.	G-398	1.387	16.2
Approximate Reynolds Number, 156,000.	N-22	1.384	10.2
	U. S. A.-27	1.378	18.2
	G-436	1.325	15.9
	Clark Y	1.258	15.6
	N-10	1.257	14.2
	N-9	1.125	13.6
	R. A. F.-15	1.053	16.4
	Sloane	1.019	16.1
	M-12	.962	14.6
	M-6	.922	14.1

TABLE XLII

MINIMUM DRAG COEFFICIENT, $C_{D_{min}}$

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$C_{D_{min}}$	α for $C_{D_{min}}$ degrees
Göttingen tests	G-436	0.0130	−4.0
Aspect ratio, 5.	G-398	.0150	−5.4
Approximate Reynolds Number, 412,000.	U. S. A.-27	.0150	−3.0
	G-387	.0178	−5.0
L. M. A. L. tests	M-6	.0080	0.0
Aspect ratio, 6.	R. A. F.-15	.0083	−1.5
Approximate Reynolds Number, 3,600,000.	M-12	.0089	−1.5
	U. S. A.-35B	.0093	−4.8
	Clark Y	.0106	−5.5
	U. S. A.-27	.0116	−4.0
	G-387	.0126	−6.0
	U. S. A.-35A	.0142	−6.7
M. I. T. tests	R. A. F.-15	.0123	−0.7
Aspect ratio, 6.	Clark Y	.0153	−3.5
Approximate Reynolds Number, 187,000.	G-436	.0165	−3.0
	Clark Y-15	.0168	−4.5
	U. S. A.-35B	.0185	−2.7
	U. S. A.-27	.0220	−1.0
	G-387	.0237	−3.9
	U. S. A.-35A	.0302	−8.6
McC. F. tests	Clark Y-15	.0133	−5.0
Aspect ratio, 6.	Clark Y	.0149	−4.5
Approximate Reynolds Number, 374,000.	G-398	.0152	−6.2
W. N. Y. tests	Sloane	.0118	−1.0
Aspect ratio, 6.	M-12	.0134	−1.5
Approximate Reynolds Number, 156,000.	N-9	.0135	−2.5
	M-6	.0138	−1.0
	R. A. F.-15	.0156	−0.6
	G-398	.0175	−4.0
	N-10	.0177	−3.5
	N-22	.0183	−4.0
	Clark Y	.0183	−4.0
	G-436	.0196	−2.0
	U. S. A.-27	.0217	−2.9
	G-387	.0236	−4.0

TABLE XLIII

MAXIMUM RATIO C_L/C_D AND LIFT COEFFICIENT AT MAXIMUM C_L/C_D

Airfoils listed according to maximum C_L/C_D merit

Laboratory and test conditions	Airfoil section	Maximum C_L/C_D	α for maximum C_L/C_D degrees
Göttingen tests	G-436	18.9	1.0
Aspect ratio, 5.	U. S. A.-27	18.5	.8
Approximate Reynolds Number, 412,000.	G-398	17.5	0
	G-387	16.6	0
L. M. A. L. tests	R. A. F.-15	24.3	3.2
Aspect ratio, 6.	M-6	21.9	4.4
Approximate Reynolds Number, 3,600,000.	Clark Y	21.1	.3
	M-12	20.6	4.8
	U. S. A.-27	20.6	1.7
	U. S. A.-35B	20.5	.3
	G-387	18.6	−1.3
	U. S. A.-35A	18.4	−1.3
M. I. T. tests	Clark Y	18.8	1.0
Aspect ratio, 6.	G-436	18.5	1.6
Approximate Reynolds Number, 187,000.	Clark Y-15	18.4	.5
	R. A. F.-15	18.4	2.5
	U. S. A.-35B	18.1	1.5
	U. S. A.-27	17.7	2.0
	G-387	16.2	1.5
	U. S. A.-35A	15.1	.4
McC. F. tests	Clark Y	20.6	0
Aspect ratio, 6.	Clark Y-15	19.2	.5
Approximate Reynolds Number, 374,000.	G-398	18.6	0
W. N. Y. tests	Sloane	25.1	3.8
Aspect ratio, 6.	N-9	20.6	1.0
Approximate Reynolds Number, 156,000.	N-10	17.6	1.7
	N-22	17.6	1.0
	Clark Y	17.2	1.8
	G-398	17.1	.5
	M-12	16.8	4.0
	R. A. F.-15	16.8	4.8
	G-436	16.8	2.3
	U. S. A.-27	16.5	2.8
	M-6	16.4	4.1
	G-387	14.6	2.1

Laboratory and test conditions	Airfoil section	C_L at maximum C_L/C_D	$\frac{C_L \text{ at max. } C_L/C_D}{C_{L_{max}}}$
Göttingen tests	G-436	0.430	0.355
Aspect ratio, 5.	U. S. A.-27	.410	.327
Approximate Reynolds Number, 412,000.	G-398	.443	.355
	G-387	.487	.358
L. M. A. L. tests	R. A. F.-15	.401	.331
Aspect ratio, 6.	M-6	.330	.270
Approximate Reynolds Number, 3,600,000.	Clark Y	.391	.286
	M-12	.439	.348
	U. S. A.-27	.440	.318
	U. S. A.-35B	.390	.284
	G-387	.890	.294
	U. S. A.-35A	.470	.389
M. I. T. tests	Clark Y	.462	.373
Aspect ratio, 6.	G-436	.478	.396
Approximate Reynolds Number, 187,000.	Clark Y-15	.445	.353
	R. A. F.-15	.370	.364
	U. S. A.-35B	.495	.370
	U. S. A.-27	.520	.385
	G-387	.610	.426
	U. S. A.-35A	.628	.427
McC. F. tests	Clark Y	.510	.408
Aspect ratio, 6.	Clark Y-15	.470	.355
Approximate Reynolds Number, 374,000.	G-398	.470	.334
W. N. Y. tests	Sloane	.432	.473
Aspect ratio, 6.	N-9	.389	.346
Approximate Reynolds Number, 156,000.	N-10	.515	.410
	N-22	.499	.360
	Clark Y	.531	.422
	G-398	.471	.340
	M-12	.457	.475
	R. A. F.-15	.528	.501
	G-436	.500	.378
	U. S. A.-27	.583	.423
	M-6	.445	.493
	G-387	.639	.429

TABLE XLIV

RATIO C_L/C_D FOR VARIOUS FRACTIONS OF MAXIMUM C_L

Laboratory and test conditions	Airfoil section	C_L/C_D at—	
		¾ maximum C_L	½ maximum C_L
Göttingen tests	G-387	13.6	15.6
Aspect ratio, 5.	G-398	14.1	16.6
Approximate Reynolds Number 412,000.	G-436	14.6	17.8
	U. S. A.-27	14.2	16.7
L. M. A. L. tests	Clark Y	14.8	18.7
Aspect ratio, 6.	G-387	14.0	16.0
Approximate Reynolds Number 3,600,000.	M-6	15.0	17.8
	M-12	14.6	17.4
	R. A. F.-15	16.7	20.9
	U. S. A.-27	14.8	17.8
	U. S. A.-35A	15.4	17.8
	U. S. A.-35B	14.2	17.0
M. I. T. tests	Clark Y	15.2	18.0
Aspect ratio, 6.	Clark Y-15	14.8	17.5
Approximate Reynolds Number 187,000.	G-387	14.0	15.8
	G-436	15.6	17.8
	R. A. F.-15	16.6	18.0
	U. S. A.-27	14.5	17.1
	U. S. A.-35A	13.8	16.0
	U. S. A.-35B	15.8	17.4
McC. F. tests	Clark Y	15.9	19.0
Aspect ratio, 6.	Clark Y-15	15.0	17.5
Approximate Reynolds Number 374,000.	G-398	14.4	17.7
W. N. Y. tests	Clark Y	14.7	16.9
Aspect ratio, 6.	G-387	12.4	14.3
Approximate Reynolds Number 156,000.	G-398	13.7	15.9
	G-436	14.0	16.0
	N-9	15.9	18.4
	N-10	14.6	17.0
	N-22	14.1	16.4
	M-6	15.4	16.3
	M-12	16.1	16.8
	R. A. F.-15	15.6	16.8
	Sloane	16.9	25.0
	U. S. A.-27	13.8	16.2

Laboratory and test conditions	Airfoil section	C_L/C_D at—		
		¼ maximum C_L	⅙ maximum C_L	⅛ maximum C_L
Göttingen tests	G-387	15.5	12.2	9.9
Aspect ratio 5.	G-398	16.1	12.8	10.3
Approximate Reynolds Number, 412,000.	G-436	17.4	13.9	11.3
	U. S. A.-27	17.2	13.7	10.8
L. M. A. L. tests	Clark Y	20.6	17.8	14.8
Aspect ratio, 6.	G-387	17.9	14.5	12.1
Approximate Reynolds Number, 3,600,000.	M-6	21.8	19.0	15.4
	M-12	19.6	17.2	15.6
	R. A. F.-15	23.4	20.6	17.4
	U. S. A.-27	20.0	16.8	13.8
	U. S. A.-35A	16.7	13.3	10.6
	U. S. A.-35B	20.2	17.6	15.7
M. I. T. tests	Clark Y	17.2	13.4	10.2
Aspect ratio, 6.	Clark Y-15	16.6	12.2	9.3
Approximate Reynolds Number, 187,000.	G-387	13.8	10.2	7.0
	G-436	15.9	11.9	9.4
	R. A. F.-15	17.4	13.3	10.8
	U. S. A.-27	15.2	9.5	5.9
	U. S. A.-35A	12.5	5.8	3.7
	U. S. A.-35B	16.0	12.0	9.3
Mc. C. F. tests	Clark Y	17.3	13.1	10.1
Aspect ratio, 6.	Clark Y-15	18.1	14.6	12.0
Approximate Reynolds Number, 374,000.	G-398	17.5	14.0	11.2
W. N. Y. tests	Clark Y	14.8	11.2	8.5
Aspect ratio, 6.	G-387	13.0	10.2	7.7
Approximate Reynolds Number, 156,000.	G-398	16.3	12.6	9.8
	G-436	14.9	11.2	8.3
	N-9	19.0	13.0	10.2
	N-10	15.4	11.3	8.8
	N-22	15.2	11.7	9.1
	M-6	13.1	10.1	8.2
	M-12	14.9	11.1	8.9
	R. A. F.-15	14.2	11.6	8.9
	Sloane	20.1	14.2	10.3
	U. S. A.-27	14.4	10.6	8.0

TABLE XLV

RATIO OF MAXIMUM C_L TO MINIMUM C_D

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$\frac{C_{L_{max}}}{C_{D_{min}}}$
Göttingen tests. Aspect ratio, 5. Approximate Reynolds Number, 412,000.	G-436	92.5
	G-398	84.0
	U. S. A.-27	83.5
	G-387	76.5
L. M. A. L. tests. Aspect ratio, 6. Approximate Reynolds Number, 3,600,000.	M-6	153
	U. S. A.-35B	148
	R. A. F.-15	146
	M-12	145
	Clark Y	129
	U. S. A.-27	120
	G-387	106
	U. S. A.-35A	85.1
M. I. T. tests. Aspect ratio, 6. Approximate Reynolds Number, 187,000.	R. A. F.-15	82.7
	Clark Y	80.9
	Clark Y-15	76.0
	G-436	73.0
	U. S. A.-35B	70.3
	U. S. A.-27	61.4
	G-387	60.4
	U. S. A.-35A	48.7
McC. F. tests. Aspect ratio, 6. Approximate Reynolds Number, 374,000.	Clark Y-15	99.4
	G-398	92.5
	Clark Y	83.9
W. N. Y. tests. Aspect ratio, 6. Approximate Reynolds Number, 156,000.	Sloane	86.3
	N-9	83.3
	G-398	79.1
	N-22	75.6
	M-12	71.8
	N-10	71.0
	Clark Y	68.7
	G-436	67.6
	R. A. F. 15	67.5
	M-6	66.8
	U. S. A.-27	63.5
	G-387	63.0

TABLE XLVI

MAXIMUM RATIO OF C_L^3 TO C_D^2

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$(C_L^3/C_D^2)_{max}$
Göttingen tests. Aspect ratio, 5. Approximate Reynolds Number, 412,000.	G-436	189
	U. S. A.-27	188
	G-387	180
	G-398	174
L. M. A. L. tests. Aspect ratio, 6. Approximate Reynolds Number, 3,600,000.	R. A. F.-15	265
	Clark Y	237
	U. S. A.-27	229
	M-6	204
	M-12	202
	U. S. A.-35A	202
	U. S. A.-35B	197
	G-387	179
M. I. T. tests. Aspect ratio, 6. Approximate Reynolds Number, 187,000.	U. S. A.-35B	215
	Clark Y	203
	U. S. A.-27	203
	G-436	202
	Clark Y-15	201
	R. A. F.-15	193
	G-387	188
	U. S. A.-35A	181
McC. F. tests. Aspect ratio, 6. Approximate Reynolds Number, 374,000.	G-398	227
	Clark Y	226
	Clark Y-15	204
W. N. Y. tests. Aspect ratio, 6. Approximate Reynolds Number, 156,000.	Sloane	320
	N-9	194
	N-10	190
	Clark Y	188
	N-22	185
	U. S. A.-27	183
	G-436	181
	G-398	176
	R. A. F.-15	171
	M-12	166
	M-6	162
	G-387	162

TABLE XLVII

RATIO OF MAXIMUM C_L' TO MINIMUM C_D'

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$\frac{C_{L'max}}{C_{D'max}}$
Göttingen tests	G-436	10,300
Aspect ratio, 5.	G-398	8,890
Approximate Reynolds Number, 412,000.	U. S. A.-27	8,736
	G-387	7,970
L. M. A. L. tests	U. S. A.-35B	30,200
Aspect ratio, 6.	M-6	28,500
Approximate Reynolds Number, 3,600,000.	M-12	27,300
	R. A. F.-15	25,800
	Clark Y	22,900
	U. S. A.-27	19,800
	G-387	14,800
	U. S. A.-35A	8,750
M. I. T. tests	Clark Y	8,100
Aspect ratio, 6.	Clark Y-15	7,000
Approximate Reynolds Number, 187,000.	R. A. F.-15	6,960
	U. S. A.-35B	6,430
	G-436	6,410
	G-387	5,220
	U. S. A.-27	5,090
	U. S. A.-35A	3,490
McC. F. tests	Clark Y-15	13,100
Aspect ratio, 6.	G-398	12,000
Approximate Reynolds Number, 374,000.	Clark Y	8,800
W. N. Y. tests	G-398	8,680
Aspect ratio, 6.	N-22	7,910
Approximate Reynolds Number, 156,000.	N-9	7,800
	Sloane	7,580
	N-10	6,320
	G-436	6,050
	Clark Y	5,930
	G-387	5,900
	U. S. A.-27	5,550
	M-12	4,900
	R. A. F.-15	4,800
	M-6	4,110

TABLE XLVIII

MINIMUM PROFILE DRAG COEFFICIENT C_{D0} (FAIRED)

Airfoils listed according to merit

Laboratory and test conditions	Airfoil section	$C_{D0\ max}$
Göttingen tests	G-436	0.0106
Aspect ratio, 5.	U. S. A.-27	.0116
Approximate Reynolds Number, 412,000.	G-398	.0124
	G-387	.0147
L. M. A. L. tests	R. A. F.-15	.0076
Aspect ratio, 6.	M-6	.0083
Approximate Reynolds Number, 3,600,000.	M-12	.0089
	U. S. A.-35B	.0091
	Clark Y	.0105
	U. S. A.-27	.0106
	G-387	.0123
	U. S. A.-35A	.0132
M. I. T. tests	R. A. F.-15	.0116
Aspect ratio, 6.	Clark Y	.0127
Approximate Reynolds Number, 187,000.	Clark Y-15	.0132
	G-436	.0137
	U. S. A.-35B	.0142
	U. S. A.-27	.0147
	G-387	.0176
	U. S. A.-35A	.0204
McC. F. tests	Clark Y	.0113
Aspect ratio, 6.	Clark Y-15	.0124
Approximate Reynolds Number, 374,000.	G-398	.0131
W. N. Y. tests	Sloane	.0076
Aspect ratio, 6.	N-9	.0106
Approximate Reynolds Number, 156,000.	M-12	.0130
	M-6	.0138
	R. A. F.-15	.0145
	G-398	.0148
	N-10	.0148
	N-22	.0156
	Clark Y	.0156
	G-436	.0160
	U. S. A.-27	.0170
	G-387	.0207

TABLE XLIX

FAIRED RATIO $C_{D_0}/C_{L_{max}}$ FOR VARIOUS SPEED RATIOS

Laboratory and test conditions	Airfoil section	$C_{D_0}/C_{L_{max}}$ (faired) at— $V/V_s=1.10$	$V/V_s=1.50$	$V/V_s=2.50$
Göttingen tests	G-387	0.0140	0.0101	0.0112
Aspect ratio, 5.	G-398	.0140	.0099	.0108
Approximate Reynolds Number, 412,000.	G-436	.0130	.0088	.0098
	U. S. A.-27	.0147	.0093	.0102
L. M. A. L. tests	Clark Y	.0171	.0068	.0077
Aspect ratio, 6.	G-387	.0217	.0121	.0094
Approximate Reynolds Number, 3,600,000.	M-6	.0212	.0101	.0070
	M-12	.0208	.0104	.0071
	R. A. F.-15	.0149	.0073	.0063
	U. S. A.-27	.0164	.0067	.0078
	U. S. A.-35A	.0139	.0117	.0109
	U. S. A.-35B	.0211	.0101	.0072
M. I. T. tests	Clark Y	.0208	.0107	.0108
Aspect ratio, 6.	Clark Y-15	.0210	.0110	.0117
Approximate Reynolds Number, 187,000.	G-387	.0180	.0123	.0157
	G-436	.0177	.0116	.0122
	R. A. F.-15	.0195	.0130	.0114
	U. S. A.-27	.0193	.0108	.0158
	U. S. A.-35A	.0158	.0139	.0207
	U. S. A.-35B	.0145	.0109	.0122
McC. F. tests	Clark Y	.0155	.0092	.0102
Aspect ratio, 6.	Clark Y-15	.0181	.0103	.0094
Approximate Reynolds Number, 374,000.	G-398	.0168	.0094	.0101
W. N. Y. tests	Clark Y	.0209	.0127	.0131
Aspect ratio, 6.	G-387	.0235	.0150	.0142
Approximate Reynolds Number, 156,000.	G-398	.0210	.0128	.0110
	G-436	.0232	.0125	.0132
	N-9	.0201	.0110	.0108
	N-10	.0126	.0123	.0125
	N-22	.0196	.0117	.0120
	M-6	.0242	.0177	.0152
	M-12	.0234	.0157	.0135
	R. A. F.-15	.0256	.0154	.0137
	Sloane	.0335	.0075	.0096
	U. S. A.-27	.0214	.0123	.0138

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